

HORSE CARE



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Get under his skin

Your horse's muscles do a lot more than just move him from A to B - discover how they work and how to keep them healthy

Words Katy Islip



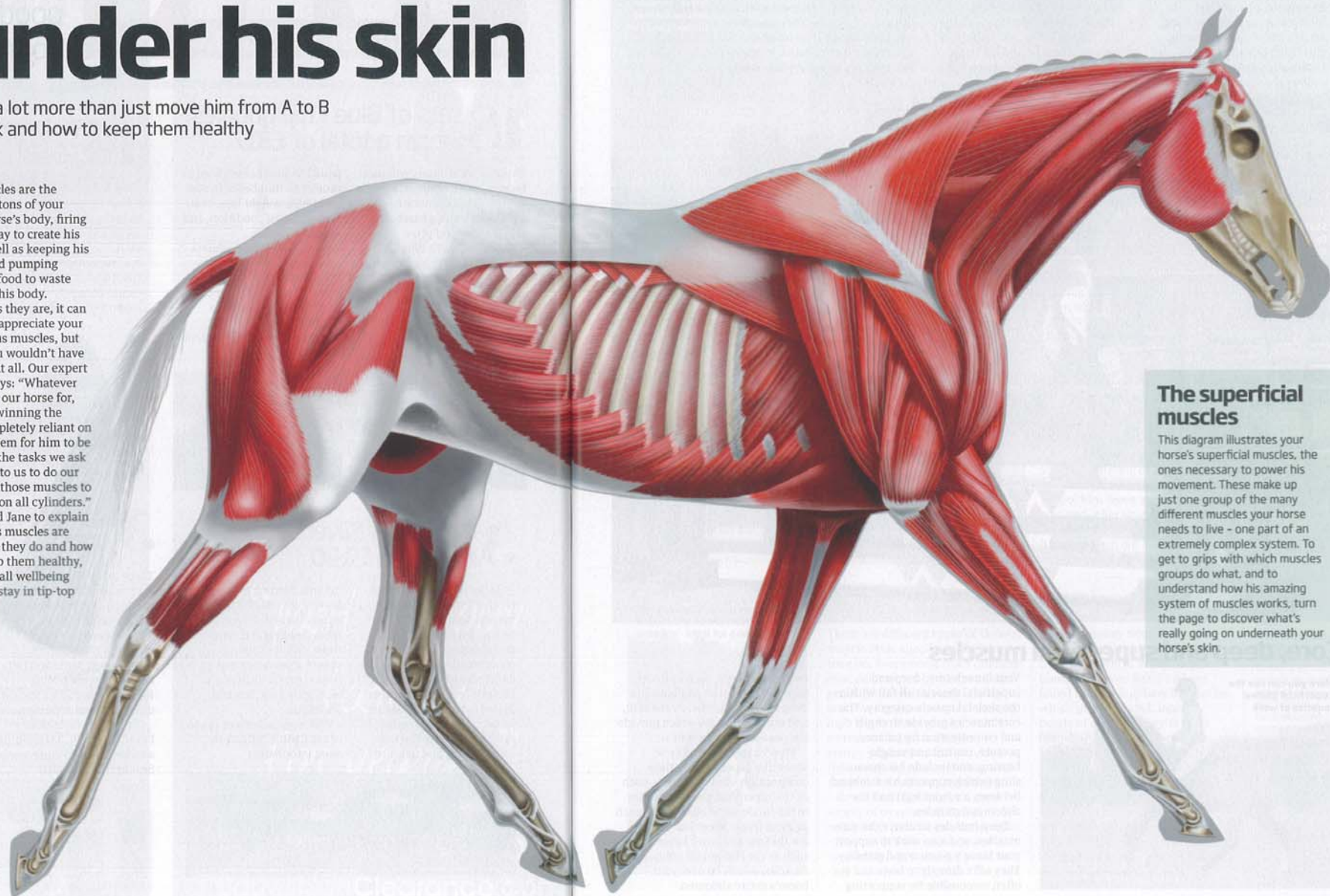
OUR EXPERT

JANE KING is an equine vet who deals with a huge range of horses and ponies at the Westmorland Veterinary Group in Cumbria, which is a member of the XLVets group. Find out more at www.westmorland-vets.co.uk and www.xlvets.co.uk

Muscles are the pistons of your horse's body, firing away to create his movements as well as keeping his posture stable and pumping everything from food to waste products around his body.

Hidden away as they are, it can be easy to under-appreciate your horse's marvellous muscles, but without them you wouldn't have much of a horse at all. Our expert vet, Jane King, says: "Whatever discipline we use our horse for, from hacking to winning the Derby, we're completely reliant on his muscular system for him to be able to complete the tasks we ask of him. So it's up to us to do our best to look after those muscles to keep them firing on all cylinders."

We've recruited Jane to explain what your horse's muscles are made of, the jobs they do and how you can help keep them healthy, boosting his overall wellbeing and helping him stay in tip-top condition.



The superficial muscles

This diagram illustrates your horse's superficial muscles, the ones necessary to power his movement. These make up just one group of the many different muscles your horse needs to live - one part of an extremely complex system. To get to grips with which muscles groups do what, and to understand how his amazing system of muscles works, turn the page to discover what's really going on underneath your horse's skin.

ARTWORK

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Types of muscle and what they do

Your horse's body contains a variety of different types of muscle: skeletal, smooth, cardiac and ciliary. Skeletal muscles are under voluntary control and are striated (they have parallel lines or grooves on the surface). They're responsible for movement, posture and locomotion, as well as breathing, eating, chewing, swallowing, shivering, grooming, facial expressions and blinking. Smooth muscles aren't under

voluntary control, instead they function automatically. This type of muscle surrounds, and is found in, all internal tissues and organs, for example the bladder, gut, womb, and blood vessels.

Jane says: "Its function is usually moving things within the hollow structure it surrounds, such as moving food through the gut, having a wee, giving birth or moving blood around the body."

Other types of muscle such as cardiac and ciliary have very

specific jobs. Cardiac muscle pushes blood in and out of the heart, and is very strong and thick. It's fatigue resistant, so it never gets tired, which is a good job as it beats around 100,000 times a day!

Ciliary muscles are found in the eyes, and control a horse's ability to focus on objects. They are a lot weaker in horses than in other species, such as humans, so they find it harder to see objects clearly at close distances.



A WEIGHTY ISSUE
Skeletal muscle doesn't just do a lot of important jobs, it makes up a lot of your horse, providing around 40% of his body weight.

Skeletal muscles are responsible for all kinds of locomotion, from galloping to jumping



Core, deep and superficial muscles

Here you can see the superficial gluteal muscles at work



Your horse's core, deep and superficial muscles all fall within the skeletal muscle category. The core muscles provide strength and co-ordination for balance, posture, control and weight-bearing, and include his thoracic sling (which supports his forehead between his front legs) and his abdominal muscles.

Deep muscles sit above the core muscles, and also work to support your horse's posture and stability. They affix directly to bone and are often responsible for supporting

individual joints, such as his hip. Superficial muscles sit above his deep muscles, just below his skin, and are the muscles which provide the power for movement.

They're split into bulky or sheet-like depending on their composition - bulky muscles such as the superficial gluteal muscles in the hindquarters can be as much as 25cm thick. Sheet-like muscles are thinner and cover larger areas, such as the abdominal oblique muscles, which lie over your horse's entire abdomen.

How do skeletal muscles work?

Skeletal muscles are made up of bundles of fibres which are very narrow and long, providing a striated appearance, and are usually attached to your horse's skeleton at either end by tendons. Each individual muscle fibre (or cell) contains hundreds of smaller strands called myofibrils, which run the length of the cell and contract to cause movement.

Jane says: "This contraction happens when thick (myosin) filaments in the myofibril slide over thin (actin) filaments in a ratchet-like action, triggered by nerve stimulation under the voluntary muscle control process."

Glucose and oxygen from the blood, and glycogen (glucose stored within the muscle), enable the production of a substance called ATP, which provides the energy for the contraction to happen.

Muscle contractions are either isometric or isotonic. Isometric contractions are when the muscle is working statically to maintain a position, and in time the muscle will start to tire and burn.

Isotonic contractions cause movement and can be either concentric, where the muscle shortens to produce movement, or eccentric, where the muscle controls the movement, such as halting sharply.



Holding the head in a set position is an example of an isometric contraction

Caring for his muscles



An exercise sheet will keep his muscles warm when it's chilly

In terms of day-to-day care, keeping your horse's muscles warm when it's cold is vital, so always rug appropriately. If you're considering clipping him, be honest about how much hair needs to come off for the work he does. If you do clip him out, use an exercise sheet in cold weather, and whenever you ride, start by allowing him time to stretch his muscles and warm up properly.

Jane adds: "When you finish, if you've been doing lots of hard work such as cantering or an intense schooling session, you need to walk to cool him down and let the lactic acid and other waste products leave his muscles, as well as allowing him to stretch out and bring his muscle temperature down."



AEROBIC VS. ANAEROBIC EXERCISE

Respiration releases energy for cells from glucose, and can be aerobic, which requires oxygen, or anaerobic, which does not. When muscles are exercising really hard, the blood can't supply oxygen fast enough, so the muscles rely on the anaerobic metabolism of glucose and glycogen, which is less efficient, so muscles tire more quickly.



PHYSIOTHERAPY CAN HELP

"Horses are athletes who work hard and are prone to muscle injuries, so a good physio can help keep your horse on the road," says Jane. "Physios may use different machines to treat muscle injury, but their most important tool is their hands, feeling for problem areas and massaging injured muscles and trigger points to relieve spasms."

Horses with more slow twitch muscle fibres will have greater stamina - ideal for endurance



Types of muscle fibre

There are different types of skeletal muscle fibre, specific to the jobs they do. Every horse has a different mix, determined by his breed and genes. Slow twitch works slowly and over long periods, and contains high levels of myoglobin, which stores and supplies oxygen for energy production and provides the strong red colour. Packed with small blood vessels - capillaries - slow twitch fibres have a good supply of oxygen and fuel aerobic respiration (see the panel top right).

Fast twitch fibres are powerful, contract quickly, and are paler as they have less myoglobin. They can

produce energy with anaerobic respiration, but tire more quickly than slow twitch. White muscle fibres work even faster and are found in large numbers in muscles which produce rapid, intense bursts of activity. They're paler because there's no myoglobin. They produce ATP fuel rapidly but tire quickly when the glycogen stores run out. Jane says: "Think about the white meat on your turkey breast (fast twitch) and brown meat on the legs (slow twitch) - this shows the differences in muscle composition according to the jobs they do."



HOW MUSCLES WORK TOGETHER

To move a joint or limb, muscles work in pairs - one muscle contracts (the agonist) while simultaneously another relaxes (the antagonist). These then co-ordinate with other sets of muscles, forming groups to create smooth movement.

Training muscles

A fitness or training programme which increases the amount of aerobic metabolism his muscles are capable of will mean your horse tires less quickly. It'll also help keep his joints and core muscles strong and well-supported.

When it comes to an effective training programme, planning and patience are key, so build the intensity of the work slowly and factor in rest periods. Jane says: "Think of a pyramid - you need a good foundation so spend a long time conditioning your horse with road work and hacking, to condition his muscles and bones. The bigger the base of your pyramid, the higher the peak can be."

Your exercise programme will depend

on the discipline you're training for, but whatever your eventual aim, a varied programme will bring the most benefits. Use different types of work to train different muscles and work in different paces on different surfaces, including grass, tarmac and the arena.

If your horse is usually fit and working hard, you may want to factor in an annual break to really rest him. Traditionally, many horses would have been worked for a portion of the year, then given a complete break for several weeks or months, such as hunters who worked over the winter but were turned away in the summer. Jane says: "Many people now keep their horse in work all

year, but it's worth considering giving him some time off, as this will allow any subtle or unrecognised injuries to heal as well as providing a bit of rest and relaxation, which is as important for his mental health as it is for him physically."



Working on different surfaces develops different muscles



A varied exercise regime will benefit his muscles

Creating a good diet plays a key role in supporting his muscles



Feeding for muscle benefits

An effective feeding programme also has a role to play in keeping your horse's muscles in top nick. Sodium and potassium are required to create the chemical reaction at the nerve muscle junction, giving them the instruction to contract, and calcium is needed in the muscle cell to allow the contraction to happen. A horse who is exercising hard will lose sodium and potassium through his sweat, so he'll need electrolytes in his diet to replace them - if he's lacking in these it'll contribute to muscle fatigue.

Other feeding considerations include ensuring his carbohydrate

intake isn't too high, as excess carbs lead to an increase in glycogen levels within muscles, which can contribute to conditions such as tying up (see page 116). Instead, a high fibre diet which includes vegetable oils will stand your horse (and his muscles) in good stead.

Jane explains: "Your horse is a grazing animal who feeds little and often, and is not designed to have a high carbohydrate grain diet. When horses are working hard, they need more energy in their feed than fibre alone can supply, and that's where oils come in as an ideal energy source, because of their high calorie content."



WHY VITAMIN E IS KEY

Vitamin E deficiency has been linked to equine motor neurone disease, which causes muscle weakness and wastage. Poor diet or a lack of good-quality turnout can contribute to this condition, but it's thankfully rare. Vitamin E can also aid muscle repair, and has anti-oxidant properties.

Common muscle problems

Just like ours, your horse's muscles are prone to a range of problems - read on for Jane's guide to the most common.

INJURIES

Muscle injuries can have a huge range of causes, from a slip which causes a pulled muscle to problems resulting from external trauma. Knowing what's normal for your horse is a real help in identifying such injuries, so spending time feeling his muscles when you're grooming and looking out for changes or hard or sore areas will help you keep tabs on things. If you spot signs of pain or discomfort but can't find an obvious cause, it could be what's called referred pain, when the pain is located away from the area involved.

If your horse has a bad fall, it can cause nerve damage, which can lead to muscle wastage as the muscle isn't getting the signals it needs to work properly - this is often seen in horses who have suffered pelvic fractures. If you notice muscle wastage across your horse's back, think whether he's suffered an injury, and consider having his saddle checked to make sure it's fitting properly, as any pinching or pressure points can cause nerve damage.

Other muscle injuries include haematomas, which are swellings as a result of an injury (such as a kick). These can swell a lot and are similar to blood blisters in humans, with treatment options including drainage, massage, cold hosing and rest.

BACTERIAL DISEASES

The most commonly seen bacterial disease affecting muscles is tetanus. This is caused by a bacteria found in soil called *Clostridium tetani*, and your horse is particularly susceptible to this entering his body through contaminated puncture wounds, which don't need to be big and can be easily missed. Also known as



Get to know what's normal for his body by regularly feeling his muscles

lockjaw, tetanus causes muscles to go into spasm and is usually fatal, but is completely preventable with a simple vaccine, usually given every two years.

Another bacterial disease affecting muscles is a rare condition called atypical myopathy, which attacks the muscles' ability to generate energy, leading to stiffness, tremors and collapse, and is often fatal.

Jane says: "This is an unusual disease which has been recognised in the last few years in the Netherlands and the UK. It's seen more in the autumn, more often in horses who are out all the time, and especially in fields on a hill with trees and water. Recent research suggests it could be linked to clostridial disease, but more study is needed."

Botulism is another bacterial condition affecting muscles. Caused by *Clostridium botulinum*, it causes flaccid paralysis of the muscles, including those of the gut, meaning the horse is unable to eat or swallow, and is usually fatal. It's usually seen in horses who have eaten contaminated silage or haylage, so be careful not to feed forage contaminated by soil, moulds or the carcasses of dead animals, such as rats and birds.

INHERITED CONDITIONS

One of the most common muscle problems Jane sees is azoturia, or tying up, where the muscles of the hindquarters stiffen and tense up, causing severe pain, a stiffened gait, reluctance to move and other symptoms including profuse sweating, pawing at the ground and straining to urinate. Jane says: "It's now recognised that this condition isn't, as was thought, caused by a build-up of lactic acid, but a range of causes, including exhaustion following extreme exercise particularly in unfit horses, an over-load of carbohydrate without sufficient exercise and inadequate vitamin E, selenium or electrolytes in the diet."

There are several different syndromes within this condition, which is properly called exertional rhabdomyolysis (ER). Sporadic ER happens in any breed, age or sex of horse and is generally a one-off. The two main genetic disorders which cause tying up are recurrent exertional rhabdomyolysis (RER) and polysaccharide storage myopathy (PSSM).

RER is more often seen in mares, Thoroughbreds and more highly-strung horses, and is thought to be down to abnormalities in calcium regulation within the muscle cells. PSSM is found in more than 20 breeds including Appaloosas and Warmbloods and is characterised by excessive storage of glycogen within the muscle cell - if this isn't used up by exercise, an abnormal polysaccharide can form within the cells and although the precise mechanism isn't known, the two combined could leave the muscle more susceptible to damage.

If your horse ties up while you're riding, get off but don't force him to move - this can exacerbate muscle damage and is very painful. Get transport to take him home, and once there rug him up and call your vet. If the muscle damage is severe, myoglobin passing into the blood can damage his kidneys and will turn his urine port wine coloured, and he may need a drip and intensive nursing while he recovers. ❑



Appaloosas are genetically predisposed to PSSM