

Care of the competition horse – what's muscle got to do with it?



The muscle cover of competition horses is often scrutinised as a sign of fitness and desirable appearance; but do we really know what we are looking for when assessing this and why? And what is the best way to get equine muscles in optimal condition? This article takes a look at equine muscles in more detail and offers advice on how to ensure your competition horse is fit for his job.

Horses have evolved over millions of years to become a very athletic species. They have elongated limbs with little fleshy coverage which act as lightweight but strong levers that propel the body efficiently across the ground. Their power comes from the muscle groups covering the fore and hindquarters, stabilised by the muscles of the trunk and the neck.



Figure 1. Horses have evolved to become a very athletic species.

Understanding muscle

Muscles range in size and function throughout the body: From the huge powerhouse muscles of the hindquarters to the tiny but precise structures that control the movement of an eyeball or the opening of the larynx at full exercise. Regardless of size, each muscle is given an anatomic name although it is also common to describe groups of muscles that work together to produce a single function e.g. the 'gluteals' or the 'quadriceps'.

Each muscle bundle is surrounded by connective tissue that separates it from its neighbours and is made up of many thousands of muscle fibres – each representing one specialised, elongated cell. These muscle fibres contain fibrils made of protein that contract to shorten the muscle. This process requires a constant supply of energy, manufactured in the muscle cells themselves from oxygen and glucose in the bloodstream. Muscles require a huge blood supply which is why the function of the muscular, respiratory and circulatory systems are inextricably linked.

Movement of the limbs is created by this shortening of muscle proteins creating a 'pull' on the fibrous extension of the muscle body, the tendon. Tendons are incredibly strong and elastic structures that are attached to the bones of the limbs and trunk: moving the limbs or giving postural support.



Figure 2. Tendons are very strong and elastic structures.

How can I assess topline and muscle condition?

We all want our horses to be healthy, fit and well prepared for whatever activities we ask of them. We dedicate an enormous amount of time to training and improving performance, so how do we know if our hard work has paid off?

Static evaluation

Looking at your horse when it is standing still is a good time to evaluate his topline. Don't forget that a well-developed topline doesn't just look good! The muscles of the neck, back and croup stabilise the core, give elevation to movement, enable your horse to carry himself in an outline and are key in preventing fatigue and therefore injury. It is a common mistake to look for a rounded outline of the crest of the neck and mistake it for muscle, when more often than not a well-defined crest actually represents fat! Muscle is only present below a structure called the nuchal ligament. To find the nuchal ligament, feel behind the poll for a thick rubber band like structure

running down to the withers (see figure 3). As you get further from the poll, the ligament becomes further and further away from the base of the mane. Anything above this ligament is not muscle, just fat. This should obviously be minimal in a fit athlete. Below the ligament, the muscles of the neck should be firm and well defined. The epaxial muscles of the back run on either side of the supraspinous ligament – the line down the middle of the back. They should be well developed, giving a rounded appearance.



Figure 3. Palpating the nuchal ligament.

Dynamic evaluation

The trot is an ideal pace at which to evaluate the locomotor or 'powerhouse' muscles of the fore and hindquarters. Again they should be well defined. If these areas look rounded but you cannot identify individual muscles moving it is likely that there is a layer of fat covering whatever muscle may or may not be present. This is a common mistake – to confuse 'condition' with muscular fitness.

The hindquarters should appear proportionally larger than the forequarters, transmitting the power required to establish a light forehand. A natural, balanced outline with good elevation gives an indication that the core muscles and topline are working effectively.



Figure 4. During dynamic evaluation, you should be able to appreciate individual muscle group definition.

Recovery from exercise

This parameter often gets overlooked when riders are assessing muscle health and fitness and yet could be argued is the most important. The muscles are the end point of respiration in the body, where oxygen and glucose is turned into mechanical energy. An equine athlete whose muscles are fit for the job should not show signs of early fatigue and should be able to clear the oxygen debt and waste products from their muscles after exercise efficiently. If your horse is still puffing several minutes after a workout, it might be worth taking steps to address their muscular fitness. If the problem persists, you should ask your vet to check them out as this symptom could also result from problems with the respiratory or cardiovascular systems.

What exercises will help my horse build muscles?

Exercise is crucial if you want to build muscle and fitness. The aims of a muscle development programme are twofold: to increase muscle protein synthesis and therefore the size and strength of the muscles; and to influence the recruitment of different types of muscle fibres, depending on the discipline in which your horse is competing.

There are different types of muscle fibres present in varying proportions in each muscle: Fast twitch (Type 2) and slow twitch (Type 1). Large proportions of fast twitch fibres in a muscle mean explosive power is generated - for example when performing in a short sprint flat race or tackling the puissance wall. These muscles fatigue quickly. Slow twitch fibres are present in greater numbers in muscles used for postural control and can work for prolonged periods of time.



Figure 5. Fast twitch (type 2) muscle fibres generate explosive power.

The best way to ensure that the correct types of muscles are being recruited and conditioned is to train your horse for the work that he will be doing. However, in disciplines where working in an outline and working the topline is not the norm, these horses will still benefit from additional core muscle conditioning as these supportive muscles can help to reduce injury. There are even exercises that you can do with your horse on the ground to work these areas - talk to a registered physiotherapist to get more information.

A gradual increase in the intensity of work that is asked of your horse is also important to prevent injury. Recent work conducted by the University of Liverpool suggests that horses could suffer from a condition very familiar to human athletes: DOMS or Delayed Onset Muscle Soreness. This is the pain and muscle damage generated by unaccustomed exercise that you might actually have experienced yourself - for example when you have done 'too much' at the gym and become very sore and stiff around 24 hours afterwards. It is likely that horses are not immune from these effects and while unlikely to be seriously detrimental to health, pain, poor performance and resistance to training are certainly undesirable. Build up your horse's level of work gradually and be vigilant for signs of soreness and poor performance that could indicate that you have overdone it.

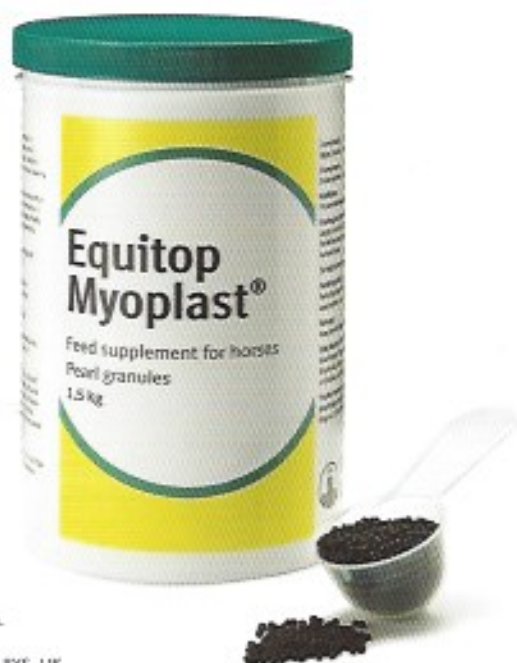
What nutrition is required to build muscle?

Exercise builds muscle because it creates microscopic damage to the muscle fibres which through cellular signalling stimulates muscles to grow in size and strength. Muscle is continually being 'turned over' i.e. broken down and replaced. When the rate of protein synthesis is higher than that of degradation, muscles grow in size. In order to support this process, the right nutrition needs to be in place. Muscle protein synthesis is a process that requires energy, but not too much, or excess energy will be laid down as fat. Depending on the energy source, some animals will also become 'fizzy' if too many concentrates are provided.

Most horse owners know that dietary protein is required to build muscle. Muscle is comprised of around 70% protein which in turn is made up of its building blocks: amino acids. Dietary protein, once digested and broken down into its constituent amino acids, is reassembled to form equine muscle protein. However, too much protein in the diet may not all be taken up and used effectively by the body and will be metabolised to energy and fat rather than muscle.

There are around 21 amino acids that make up equine muscle protein. 10 of these are 'essential' amino acids which must be supplied in the diet. The rest can be manufactured by the horse. Some of these amino acids: lysine, methionine and threonine can actually be growth limiting if not present in the diet, this is especially important in young horses. The branched chain amino acids leucine, isoleucine and valine have also been shown to have a key role in stimulating muscle protein synthesis in many species.

Dietary protein therefore has a critical role to play in maintaining the balance between the tissue damage and repair processes that your horse will be subject to during training. Providing an additional source of protein that is very digestible in the small intestine and that delivers a superior profile of amino acids such as Equitop Myoplast can be potentially beneficial to ongoing performance.



Advice on the use of Equitop Myoplast® or other products should be sought from your veterinary surgeon.
Equitop Myoplast contains Algae powder (*Spirulina platensis*).

Further information available from Boehringer Ingelheim Limited, Vetmedica, Bracknell, Berkshire, RG12 8YS, UK.
Email: vetmedica.uk@boehringer-ingelheim.com. This is not a veterinary medicine which is subject to authorisation by the MHRA. Date of preparation: Aug 2015. AHD 8694.