Why muscle building matters for a performance horse

To see a horse gallop full speed down the racetrack or to watch a horse propel itself over a six-foot jump is a sight that any horse lover can appreciate. But to get a horse to that point takes a lot of conditioning which includes building muscle. Humans may be no stranger to witnessing muscular feats of strength in athletes or bodybuilders, but there's something almost otherworldly about a horse at peak performance. The sheer power and range of motion it can generate is often enough to leave anyone watching in awe.

Indeed, muscles are important to performance horses—clearly—but that fact goes deeper than some trainers and owners may understand. Even for the large creatures they are, horses exhibit greater muscle mass relative to body size than would be expected. In many cases attributed to adaptations horses have made over generations through evolution, these muscle structures are important to consider when training performance horses. And yes, even genetics.

However, no two horses are the same; a fact trainers and owners often don't need reminding of. And while muscle toning and building are undoubtedly critical to performance in competition, the regimen has to fit the horse. To shape the most beneficial program, trainers and owners have to understand more about the equine anatomy in the first place, as well as effective and safe ways to building muscles. It is in the understanding of this that can make all the difference to the level of performance the horse delivers. It can mean the difference between 2 seconds in a race, better conformation in a show to even being able to jump higher.

Adaptability of muscles: An advantage in horses

There's a reason horses have such natural athletic prowess and propensity to further hone those abilities through training; it lies in the evolutionary track and history of the horse over time. According to a 2015 study published in "The Veterinary Journal," skeletal muscles in horses are "characterized by specific adaptations" such as increased muscle mass relative to body weight, greater locomotor efficiency and adaptable fiber-type composition[1]. These physical—and genetic— traits are the result of the horse's evolution as a grazing animal, centuries of selective breeding and the exceptional adaptability of equine muscles.

But first, some definitions. Skeletal muscles are one of the three muscular types, the most important for trainers and owners to be familiar with. The other two classes are smooth and cardiac, involuntary muscles found around the heart and other vital systems (respiratory, digestive, circulatory). Skeletal muscles are the ones typically thought of when hearing the word "muscle." They control movement and are made up of two types of muscle fibers. Type 1 fibers are slow contracting and used mostly in sustained, endurance activity, as they do not fatigue quickly. On the other hand, fast-twitch Type 2 fibers burn through fuel and are used in bursts of physical exertion like sprinting.

While horses have both types of fibers, it's these Type 2 fibers that determine horse performance and which offer more clues into why equines are such powerful animals to begin with. A 2017 study in "Proceedings of the National Academy of Science" sought to research the phenomenon of why chimpanzees demonstrate surprising "super strength" given their size. In the end, it wasn't force or velocity of muscle contractions, but the chimp's high fast-twitch fiber content[2]. According to The Horse, Thoroughbreds and Quarter Horses are estimated to have 80 to 90 percent Type 2 fiber content[3], which lays bare the raw potential for power and output horses possess.

Further augmenting this picture is the fact skeletal muscles in horses have been shown to be extraordinarily responsive to physical training. A 2017 study published in the journal "BMC Genomics" put it succinctly: "Equine skeletal muscle shows a remarkable ability to adapt to physical exercise and long-term training."[4] The science behind

[1] https://www.ncbi.nlm.nih.gov/pubmed/26831154
[2] http://www.pnas.org/content/114/28/7343
[3] https://thehorse.com/129870/body-builders-muscles/
[4] https://bmcgenomics.biomedcentral.com/articles/10.1186/s12864-017-4007-9

this is somewhat explained by the study in The Veterinary Journal. Equine skeletal muscles have biologic characteristics that permit higher aerobic capacity, greater intramuscular storage of energy and allow for greater resiliency against fatigue.

Why are horses so reactive to muscle-building regimens? The BMC Genomics study has more to say, as researchers were able to seize upon for the first time "a comprehensive set of genes that are differentially expressed in Thoroughbred skeletal muscle in response to both exercise and training … [indicating] that consecutive bouts of high-intensity exercise result in a priming of the skeletal muscle ... for the demands of the next exercise bout."

Tips for building muscle
The bottom line is the more training a horse gets, the stronger it will become, and the more receptive its body will be toward continued muscle-building. Here are some tips to keep in mind when building an optimized program:

Know the horse and its muscles
Different breeds are suited for different tasks and types of physical exertion, which is something trainers and owners know intimately. It also doesn't take a rocket scientist to see that a draft horse would be best for hauling or pushing weight at slower speeds with its sturdy build, and not racing or endurance riding. But knowing why this will help tailor the muscle-building regimen to the horse.

Draft horses, for example, have a higher muscular composition of Type 1 fibers that are fitting for their heavy pulling requirements. As mentioned, Thoroughbreds have concentrations of Type 2 fibers that enable a high level of short-term exertion. But the distinctions are even more varied. Type 2 fiber is further broken down into Type 2A and Type 2B. The former are fibers called on to maintain high speeds and levels of activity; the latter are fibers for short, intense bursts of energy, yet they tire more quickly.

It's important to realize these differences exist. This information should be used to adjust exercise regimens to fit the horse's natural strengths. Conditioning a racehorse to increase speed in structured exercises can help it build up Type 2A fibers, while draft horses get the ideal toning in exercises that mirror their work tasks.

Focus on the back
Horses need strong muscles not only to perform highly, but also to support riders. Yet focusing on building sufficient back and core strength may sometimes take a backseat to building up other sets of muscles that figure more directly into performance. Without attention paid to developing a strong back, however, trainers and owners risk injury or chronic pain and disorders to the horse.

Carrying a rider adds further physical demands on the horse, as Equine Mechanics explains: "Muscular effort is needed to round the back and to stabilize …, making it more able to carry the rider's weight, to step under with the hind legs, and to transfer the push from the hind legs effectively. To achieve this, the horse needs a large amount of muscle tone. For example, abdominal and short back muscles are also particularly important for [stabilizing] the back to allow propulsion from the hindlegs for collected movements, flying changes, and jump take off. In dressage horses' pectoral muscles control the descent of the forelimb during extension - and can become overstretched and damaged if extension is not controlled."[5]

To prioritize back strength, trainers and owners should build stretches into their programs, as well as include other back-toning activities like cavaletti, core training and abdominal conditioning.

Concentrate on nutrition and the role of protein
Of course, physical exercise alone won't facilitate the type of muscle building trainers and owners desire. There are other aspects of horse care that have to be factored in, like nutrition. And in the context of muscle-building, protein content is an important nutritional consideration for locking in gains from training. Amino acids, which make up proteins, are vital to different equine functions, particularly as they regard skeletal muscular function. Essential amino

[5] http://equinemechanics.com/post/120457139628/the-equine-back-how-do-you-keep-your-horses-back

acids are processed by the body and used to build and repair muscle, which underscores the importance of protein content in diet.

However, it's not a matter of loading protein in feed, as horses can make their own amino acids and may only need supplements targeting specific levels. Optimizing feed with ensuring the presence of high-quality natural sources of protein, like alfalfa hay, wheat middlings or soybeans.[6] Pasture grass is another viable option. With various types ranging between 20 and 10 percent protein content, fresh grass may be better for muscle-building than grass hays[7]. If more is needed, a concentrated feed supplement that doesn't add too many calories to the diet is an ideal solution for replenishing amino acids.

Understand the muscle-building cycle

Muscle-building in horses is a process, meaning it — like any other biologic function — is closely regulated and managed by the equine's body. It is also an intensive and cyclical, and appreciating all that goes into muscle-building will help trainers and owners optimize their strategies.

Each time a horse exercises, muscle breakdown occurs. Physical exertion, on a molecular scale, inevitably results in strain on the muscle tissue, producing small tears. It's the repair process that takes place afterward that heals the damaged tissue and builds new skeletal muscle. Humans can experience this when feeling sore after a workout: That's the body at work. Knowing this, trainers and owners should be cautious not to push a horse. Muscle-building takes time and careful management; overexertion easily leads to injury, which is a massive concern. A horse used to regular exercise or training that undergoes a sudden stop can lose muscle at a rapid rate, which further complicates efforts to build and sustain muscle mass.

The muscle-building cycle is also important to consider in training older horses. As an equine ages, the body's ability to build new muscle is lessened, and what gains are made take more exertion and more time to generate. However, horses may not be ready to retire quite yet, and it's at this stage that trainers and owners have to be careful in how they schedule muscle-building activities. There's greater risk for injury to consider.

Talk to Finish Line about supplements for muscle building

Trainers and owners can design the best training regimens for muscle-building when they more thoroughly appreciate the anatomical equine characteristics. Understanding the difference in slow-twitch and fast-twitch fibers can help provide the difference in meeting muscle-building goals through tailored exercise.

When looking for further insight into how to effectively and safely build muscle in horses, Finish Line can provide the needed expertise. Trainers and owners can take advantage of a range of horse care and feed products, as well as the knowledge of our experts, to increase performance and maximize training. Contact us today for more.

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[6] http://gettyequinenutrition.biz/Library/Proteinwhatarethebestsources.htm

[7] https://www.biostarus.com/blogs/formulators-corner/muscle-building-muscle-breakdown-understanding-the-cycle