Conditioning Your Horse for Athletic Events

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When was the last time you were up close and personal with a piece of exercise equipment or a pair of running shoes? Does the thought of going for a 5 mile run make you realize that you have spent way too much time on the couch this past winter? If your horse could talk it would probably share your sentiments in regard to jumping right into a long exercise outing when it has spent the past several months lounging near the round bale, getting a hay belly, and becoming unfit. Some people think that conditioning a horse is a mystical process. Keeping in mind that a horse has much more in common with us human beings than with a motorcycle or four-wheeler, will help to remove a lot of the mystery from the conditioning process.

Why should we be concerned about our horses' fitness levels as we beginning riding them after their long winter off? Horses, like humans, can experience many adverse effects of exercising too long and/or too hard without proper conditioning. Also similar to humans, horses have positive adaptations to exercise that will increase their performance over time.

There are several exertional myopathies or muscle diseases caused by exertion that can occur in the horse. They are usually produced in one of two ways. They made be a result of exercise following a period of inactivity during which the horse is maintained on a grain diet. The other main cause of exertional myopathies is inadequate conditioning of an unfit horse prior to prolonged strenuous exercise. These exertion related muscle diseases are often classified into three diseases: azoturia, typing up, and endurance related myopathies.

Azoturia, also known as Monday Morning Disease or Blackwater Disease, has been recognized as an exertional myopathy since the days when draft horses were doing the farm work. Farmers used to complain that their workhorses would have performance problems upon returning to the fields after a day or two of rest. This is because the horses' grain rations were not decreased when the horses were rested for a day or two. Azoturia means nitrogen in the urine, which aptly describes what occurs as a result of excessive break down of muscle tissue in the horse. When horses are kept on high carbohydrate diets their muscles accumulate large amounts of stored energy (starch) in the form of glycogen as their activity level is reduced. When the horse goes back to work these large stores of glycogen are broken down for energy. In the process of converting glycogen to energy, lactic acid is produced in the muscle. Excessive quantities of lactic acid wreak havoc with the horse's muscles. The vascular system cannot flush the lactic acid out of the muscle fast enough. Therefore, the high concentration of lactic acid degrades the muscle cells and myoglobin is released from the muscle cells into the system. The horse's kidneys are not designed to handle myoglobin clearance, thus an excessive strain is placed on the kidneys that may result in their failure. All of this damage can occur as soon as 15 minutes after the horse returns to work. It may also occur up to one hour after the horse has begun to exercise. It should be noted that the exercise does not necessarily have to be vigorous either.

Symptoms of azoturia are numerous and may be difficult to distinguish from severe colic. An affected horse may exhibit profuse sweating, and have an increased heart rate and/or respiratory rate. In addition, a stilted gait, muscular stiffness and spasms, and difficulty

controlling the hindquarters are also seen. Furthermore, a hunched appearance may be evident. Finally, if the horse's urine is red-brown, or black (often compared to coffee or coca-cola) that is a sure indication that muscle damage is occurring and myoglobin is being cleared from the body via urination. It also suggests that kidney damage is occurring. Muscle atrophy (wasting) is the irreversible end result. If your horse exhibits any of these symptoms it is imperative that the horse not be moved. Any further activity will only compound the damage already occurring to the horse's muscles. A horse exhibiting any of the symptoms of azoturia requires immediate veterinary attention. For those who have a horse that has had an episode of azoturia, be aware that the first attack seems to predispose a horse to subsequent attacks.

Tying-up (post-exertional myopathy) is a mild form of azoturia that is more commonplace. This muscle disease usually occurs at the beginning of exercise or when the horse is cooled down after a vigorous workout. Symptoms of tying up include the horse showing reluctance to move, its muscles being hard to palpation, and the horse exhibiting a short, stiff, stilted stride. The affected horse may or may not sweat excessively and may or may not have discolored urine. Similar to azoturia, the horse is not to be moved during a tying-up episode and immediate veterinary attention is vital.

Endurance related myopathy is similar to tying-up, however, it occurs in adequately conditioned horses that have been ridden for long distances. Affected horses may be severely dehydrated with salt and electrolyte imbalances.

Synchronous diaphragmatic flutter (SDF), commonly known as Thumps, is sometimes seen in less physically fit horses that become exhausted from exercise, or in fit horses that are exercised in hot, humid weather to which they are not accustomed. Thumps is a synchronous contraction of the diaphragm with the horse's heartbeat. Visually, a twitching or convulsive motion in the flank area occurs simultaneously with the atrial contraction of the heart. If their diaphragm is not contracting properly then they are less efficient in their breathing. Thus SDF affects the oxygen intake of the horse. Horses that are low calcium or potassium concentrations in the body are more susceptible to SDF.

Horses are susceptible to heat exhaustion and heat stroke just like people. Either condition is by and large observed in poorly conditioned horses that are overexerted in hot, humid weather. Heat exhaustion and heat stroke may occur with light work or heavy work. Symptoms are numerous and varied. A horse experiencing distress due to overheating may display weakness, rapid breathing, heavy sweating or no sweating at all (anhidrosis), and/or elevated pulse and temperature. Additionally, an affected horse may have muscular tremors or may refuse to continue working. Furthermore, dehydration is common and lack of appetite and depression may also be seen. Often the horse's temperature will rise dangerously high to 106°-110°F for a prolonged time period. The horse may collapse hours after exercising. In worse case scenarios a horse may slip into a coma and die. Immediate veterinary attention is critical. The first priority is to decrease the body temperature of the horse as quickly as possible. This is most promptly accomplished by giving the horse an ice or cold-water bath.

This recommendation is contrary to popularity held beliefs. However, when horses are in such a state of distress that their body temperature is 106°-110°F as a result of heat stroke/exhaustion, the most crucial treatment is anything to reduce the horse's temperature. When children have alarmingly high temperatures for an extended time period, they are often put in ice or cold-water baths to help rapidly decrease their temperature. The same theory applies to horses. Horse competing in the Atlanta Olympic games were cooled down with ice and cold-water baths and that was done based on the advice of the attending veterinarians. Other methods of cooling a horse down include putting the horse in shade and using fans. When a horse reaches such a state of exhaustion and hyperthermia fluid therapy via a nasogastric tube is usually essential also, thus veterinary attention is required.

The positive adaptations to exercise that a horse acquires can significantly increase its performance. These adaptations include improvements within the cardiovascular system, metabolic mechanisms, aerobic system as well as the temperature regulatory system.

Cardiovascular adaptations occur as soon as two to three weeks into a conditioning program for your horse. At this early date there is an increase in blood volume, by increasing the number of red blood cells as well as increasing the volume of plasma. This results in an increase in oxygen carrying capacity to the horse's working muscles. As with most muscles in the body, the horse's heart size increases with exercise and conditioning, though it does not happen as quickly as the increases in blood volume. This increase in heart size allows for an increase in maximum cardiac output during exercise. A third positive cardiovascular adaptation resulting from adequate conditioning of a horse occurs between the third and sixth month of exercise. At this time there begins to be an increase in the number of small blood vessels within the skeletal muscle. This improves the efficiency of oxygen extraction from the blood, thus providing more oxygen to the muscle tissues. Furthermore, as a horse's level of fitness improves there will be a reduction in heart rate during submaximal exercise (trot or slow canter). Along with that, the recovery heart rate (return to resting heart rate) will be faster in well-conditioned horses.

Metabolic function improvements as a result of conditioning have important implications. First, there is more efficient utilization of fuel substrates. During submaximal work an increase in the amount of fat utilized for energy production is seen. There is a subsequent decrease in the quantities of blood glucose and muscle glycogen used as energy sources known as "glycogen sparring". As a result a horse is able to sustain a higher work rate during prolonged exercise without the build-up of lactic acid. This allows the horse to exercise longer before becoming fatigued.

Aerobic adaptations generate an increase in VO_{2max}, which is the maximum rate at which the body can consume oxygen. Within eight to twelve weeks of initiating a conditioning program, a horse's system is increasing the oxidative capacity of its muscles. This is accomplished by a boost in the number and size of the cell structures that are responsible for aerobic metabolism. There is a complimentary increase in the quantity of enzymes involved in aerobic metabolism.

These aerobic adaptations coupled with the cardiovascular adaptations can increase a horse's VO_{2max} by up to 30% which results in a marked improvement in overall work capacity, meaning a horse is able to sustain higher speeds for longer periods.

Lastly, the thermoregulatory system also shows improvement with conditioning of the horse. Metabolic heat presents a potential problem for horses. Physical activity requires an enormous amount of energy; therefore, a huge amount of heat energy is released during exercise. When stored energy is converted to work it is only 20-25% efficient, which means that 75-80% of stored chemical energy is converted to heat within the muscle cell. This heat energy causes a rise in body temperature. Without a means to lose this heat, the horse's body temperature would reach dangerously high levels after only a short period of exercise. Seventy percent of this heat is removed by the evaporative cooling of sweating. Unfit horses lose more electrolytes and protein through sweating than fit horses. Their sweat typically is very white, lathery, and sticky with a strong odor, whereas the sweat of well-conditioned horses is clean and clear, and more watery. This allows them to retain more essential electrolytes and proteins needed during exercise.

So, how do you go about developing a conditioning program for your horse? The first thing you need to do is evaluate the current condition of your horse. Heart rate (pulse) is the best individual guide to condition response and status. Recovery heart rate is a universal means to assess fitness. It is important to monitor your horses resting heart rate as well. Most horses will have a resting heart rate less than 42 beats per minute (bpm). Similar to humans, horses in a high level of fitness will have a lower resting heart rate, maybe even as low as 26 bpm. While doing moderate work, a horse's pulse ranges from 75 to 105 bpm; however, it may increase to over 200 bpm during heavy work. The horse's heart rate should recover to below 60 bpm within ten to fifteen minutes of rest. Horses in poor condition recover in 30 to 45 minutes. If, after ten to fifteen minutes, your horse's pulse recovers to between 44 and 52 bpm, the horse can tolerate an increase in exercise. However, if your horse's pulse is greater than 72 bpm after the recovery period, then your horse was worked too hard.

One should also be aware of how the horse's resting pulse rate corresponds to its respiratory rate. A horse's normal resting respiratory rate ranges between 8 and 16 breaths per minute. The heart rate:respiratory rate ratio should be 3:1 or 2:1. If the heart rate:respiratory rate is 1:1 the horse is in a stressed condition and should stop exercising immediately.

Once you have determined your horse's normal resting heart rate, then what? Start your conditioning program early. Remember that approximately one month is required to achieve significant aerobic and cardiovascular improvements. Start with lower speed and longer distance exercise. Exercise the horse three to five days per week. Keep in mind though that it is important to give your horse a day off every third or fourth day. If you exercise your horse everyday without a day off you could create a situation where you horse becomes chronically fatigued, which may result in fatigue-related lameness or depress your horse's immunity, making him more susceptible to illness. For the optimum conditioning benefit your horse

should exercise at a level that puts his working heart rate in the target zone of 135 to 155 bpm, which is about 60%-80% of his maximum heart rate. As your horse's fitness improves, as evident by the lowering of his recovery heart rate, his level of exercise may be increased. This can be accomplished by increasing one of three aspects of the horse's exercise program. Either the duration, the intensity (speed), or the distance can be increased; however, it is important that only one of these aspects is increased at one time to prevent the horse from being overworked in the next phase of his conditioning.

An additional training concept to improve a horse's condition is interval training. By gradually overloading, interval training can effectively increase the amount of work a horse can perform prior to fatigue. Interval training is accomplished by having the horse do short, intense exercise periods during which the heart rate increases to 180 to 200 bpm. These intense intervals should not exceed 2 minutes in duration. After the intense phase the horse should be slowed to a jog until its heart rate returns to nearly 100 bpm. When a horse's heart rate is 180 to 200 bpm he is doing anaerobic work, meaning his muscles are working too hard and fast to rely solely on oxygen in the process of burning fuel. Anaerobic work is necessary in the process of conditioning a horse. It will increase the amount of work a horse can do prior to fatigue. Making the horse gallop on the flat or long trot up a hill can increase intensity. Keep in mind that conditioning is exercise specific. In other words, the type of conditioning must emulate the competitive event in which the horse will later be required to participate.

Every time you ride your horse you should perform a pre-ride check. This is the time to check your horse's resting heart rate. Keep in mind that some horses may have an increase in heart rate if they anticipate being ridden. Therefore, taking resting heart should be done before the horse is brought to the location where it is typically saddled. If the resting heart rate is higher than normal it could indicate one of several things: an adrenalin rush (e.g. startled by something, or has just been disciplined), pain, or illness. Prior to riding you should also determine your horse's resting respiratory rate realizing that the environmental temperature and humidity may affect this parameter. Additionally, as you are grooming your horse prior to saddling do a visual inspection for any injury, soreness or lameness, paying particular attention to back or loin soreness.

Another extremely important step to include in your horses conditioning program is an adequate warm-up period. Warming your horse up is key to minimizing the chance of exercise related injuries. The benefits of warm-up period are three-fold. The horse's body temperature is raised and blood flow is increased to working muscles. As a result, the muscles and tendons are loosened which increases the range of motion and helps avoid pulling or tearing of tendons and ligaments. In addition, the muscles are warmed up allowing them to accommodate harder work by more adequately relaxing and contracting. Finally, a moderate warm-up will better prepare the horse to dissipate heat during intense exercise. A successful warm-up routine consists of walking the horse for five minutes and then trotting for five minutes before moving on to more demanding work.

Just as important as the warm-up is the cool down. This is light work that will gradually bring the horse back to a resting state. Generally this is accomplished by simply reversing the order of the warm-up (five minutes of trotting followed by five minutes of walking). The importance of the cool-down period is that the slower work helps the blood remove lactic acid from the horse's muscles. This is necessary to minimize stiffness and soreness in the horse day after it's workout. Remember that the horse's recovery heart rate must also be determined ten to fifteen minutes post-ride. Furthermore, the horse should be again visually evaluated for injury, soreness or lameness.

During training, it is vital to be able to recognize dehydration in your horse. Water makes up more that 65% of a horse's mass. Water is an essential requirement for proper muscle and metabolic function, as well as thermoregulation in the working horse. As previous mentioned sweating is responsible for approximately 70% of the heat dissipation in horses. The major component of sweat is water. Thus water loss in the exercising horse may be great. Typically a horse cannot be identified as dehydrated until it has lost at least four gallons of water (about 32 lbs of body weight). A horse can die after losing about nine gallons of water (about 72 lbs of body weight). When the weather is very hot fluid loss can approach four gallons per hour. These data make the importance of recognizing dehydration obvious.

There are two simple ways to recognize dehydration in a horse. First is the blood capillary refill test. To determine a horse's hydration level using this method, press your thumb against the gum of the horse's upper lip until it turns white. Once the gum has turned white remove your thumb and record how long it takes for pink color to return to that area. A horse is normally hydrated if blood returns to that area within two seconds. Varying levels of dehydration are present if it takes longer than two seconds for blood to return to that area. If it takes close to 10 seconds for blood to return then the horse is severely dehydrated and needs immediate fluid therapy administered by a veterinarian. In addition to the 10 second capillary refill time the horse's gums may appear bluish in color and its membranes may be dry.

The second common test used to evaluate dehydration is the skin pinch test. Pinch a fold of skin on the horse's neck near the shoulder and release it. A normally hydrated horse's skin will flatten immediately. In a slightly dehydrated horse, its skin will take up to five seconds to flatten, whereas a moderately dehydrated horse may need as much as 10 seconds for it skin to flatten. If a horse is severely dehydrated the skin doesn't flatten. Furthermore, there will mostly likely be no saliva production and the horse's eyes will appear sunken.

There are several strategies to help prevent dehydration in the exercising horse. One of the easiest ways is to feed your horse a significant amount of grass hay. For every 2.2 lbs of dry hay a horse eats it will consume up to one gallon of water. Within the large intestine, the fiber in the hay or other forages traps this water. This reserve of water (and electrolytes) is then available for absorption during exercise. As a result this helps offset the fluid and electrolyte losses in sweat while the horse is working. Thus high fiber diets are beneficial for prolonged

exercise in horses. Additionally, horses should have free choice salt available to them on a regular basis, as large quantities of salt are lost when horses sweats.

Conditioning your horse for hot and humid weather will help prevent dehydration. Exercise that causes the body temperature to increase by 2°F in 70°F weather will cause almost a 4°F increase in hotter weather. Furthermore, high humidity can decrease evaporative cooling via sweating by as much as ninety percent. This means that performing the same amount of work in a humid climate requires the horse to sweat up to ninety percent more than in a less humid climate which translates into a ninety percent increase in water requirements. It takes at least ten days for a horse to begin to acclimate to higher humidity and increased temperatures. Be sure to take the weather into consideration during your training. In addition, pace your horse during his workout. Allow him to rest and catch his breath in between harder more strenuous maneuvers.

Hosing your horse down with water at the end of its workout can be very helpful in preventing dehydration. It provides evaporative cooling similar to sweating, helping cool the horse down in addition to helping him maintain hydration via less sweating. If your horse will be doing prolonged exercise (e.g., long distance riding or trail riding) allow your horse to drink at every opportunity. Sweating uses water faster than drinking replaces it. With significant salt loss via sweating, the horse's thirst response often is suppressed so his amount of thirst may not be an accurate indicator of hydration. Also, allow your horse to graze or eat forage at every opportunity. Fresh grass will provide a small amount of water for the horse and dry forage will increase a horse's desire and need to drink.

Identifying the fatigued horse is also essential in a successful conditioning program. A change in sensory state or attitude is often a sign of fatigue. If a horse is usually very alert and aware, traveling with a higher head carriage, he is most likely experiencing some degree of fatigue if he is hanging his head and appearing lethargic. As a horse becomes fatigued he is more prone to soft tissue injury (strained muscles and pulled ligaments). Furthermore, his stride may be less controlled, resulting in interference during his stride, or stumbling and tripping. When the quality and consistency of movement is compromised the horse is fatigued. The end result of fatigue is often lameness or at a minimum significant soreness. Determining your horse's recovery heart rate will tell you if your horse has been pushed to a state of fatigue. As stated earlier, if its recovery heart rate is greater than 72 bpm after ten to fifteen minutes of rest, the horse has been overexerted and is experiencing fatigue.

When it comes to maintaining condition in your horse it is useful to know that fundamental fitness remains with horses for six to eight weeks. Moreover, horses that have been trained up to a level of competition and given an extensive layoff, return to fitness much faster than horses that have never reached that competitive level of fitness. This is a critical point to keep in mind if you are conditioning more than one horse. Depending on the fitness history of the horses you may not be able to use the same conditioning program.

In summary, you should start your conditioning program early. Starting early allows you to go avoiding fatigue and injury in your horse. Conduct pre-ride checks, beginning with determining the horse's resting heart rate. Always begin workouts with a warm-up (five minutes at a walk and five minutes at a trot) to heat and loosen the muscles, tendons and ligaments which will allow them to function better during more demanding work. Move carefully to interval training and don't let it exceed more than 2 minutes time periods. Recognize dehydration and fatigue. Complete each workout with a cool-down (five minutes of trotting and five minutes of walking). Finish by conducting a post-ride check including determining recovery heart rate. Temper the duration and intensity of workouts during hot humid weather until your horse has been conditioned to the change (at least 10 days). Finally, keep in mind that when it comes to conditioning, horses are more similar to humans than Hondas.