

# PREPARATION AND CONDITIONING

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Equine (as well as human) physiology naturally but gradually compensates and strengthens (shaping up) during times when more work is needed. But like us, horses can quickly lose conditioning or "get out of shape" during long periods of rest. That is, a strenuous mountain ride would not be an appropriate activity just after 3 months of pasture or stall rest. In this article we will briefly go over some of the factors you should consider as you prepare your horse for upcoming events and activities. These factors include: cardiovascular fitness, respiratory fitness, thermoregulation, muscle fatigue and skeletal fatigue.

Cardiovascular fitness- The resting heart rate of horses is approximately 35 bpm and can reach up to 250 bpm during extremely high intensity exercise. Each beat can pump between .8 and 1.2 liters of blood. Therefore, a horse exercising at maximum intensity can pump enough blood to fill a 55 gal drum in 1 minute! As a horse becomes more fit, the stroke volume increases permitting sufficient oxygen transport with fewer beats. Conditioning exercise will improve blood circulation through muscles. As blood circulates more efficiently through muscle, more oxygen is made available, and more heat can be removed.

Respiratory fitness- Respiration is of course how oxygen is introduced to the horse's blood. Limiting factors can influence the amount of available oxygen. These include, the volume of the lungs, the diameter of the airway from the nostrils through the windpipe, and their gait (since horses breathe in rhythm to their stride). One reason horses breathe faster during hard work is directly related to the pH of the blood. The more acidic the blood (from CO<sub>2</sub> and Lactic Acid) the harder the horse will breathe to get rid of excess carbon dioxide as well as to take in sufficient amounts of oxygen.

Thermoregulation (dissipation of heat)- Working muscles produce heat. Horses have two ways to remove it. One is through breathing heavily. Horse's lungs are very large and the expiration of hot air and inspiration of cool air helps to reduce the temperature of the body, especially the area around the heart. The second is, of course, through sweating. As a horse overheats, blood vessels in the skin become dilated so that they can hold more blood. Then evaporation/transpiration of sweat helps to cool the horse much like a

swamp cooler can cool a house. The sweating mechanism works best in cool, dry air. Warm and/or humid conditions may cause many horses to have more difficulty in keeping cool.

Fat horses and horses with heavy muscling are not able to eliminate heat as efficiently as leaner and lighter muscled animals. Safety becomes a concern when overheated horses become lethargic and uncoordinated. Conditioning exercise (particularly walking and trotting) in balance with proper feeding, will remove body fat and improve your horse's ability to dissipate heat. Also, as blood circulation through muscles improves, their heat can be more efficiently carried to the skin for cooling.

Muscle Fatigue – Working muscles need fuel. During normal (aerobic) exercise (walking or trotting on level ground), fuel stored in muscles is combined with oxygen from the blood to produce energy and motion. During intense exercise (exercise that causes the heart rate to exceed 150 bpm), oxygen is depleted more quickly than it can be supplied. Many of the cells in the muscles then switch to an energy system that does not require oxygen. The main problem with this anaerobic system is that it requires over 10x the amount of fuel to produce the same amount of energy. This system also produces lactic acid as metabolic waste. If too much lactic acid accumulates in one area of the muscle, inflammation and soreness result. With a proper conditioning regimen, your horse will gradually improve his ability to both take up oxygen and deliver oxygen to working muscles. Conditioning will also improve his ability to rid muscle tissue of metabolic wastes before they can build up and cause any damage.

One good way to help insure that your horse's muscles remain healthy after a high intensity work effort is to allow 30 minutes or so of walking and light work to allow the horse to "cool out" before going back into a trailer or stall. During this cool out period, lightly active muscles allow blood and lymph fluids to circulate and rid muscular tissues of metabolic waste and heat much better than if the muscles were not moving.

Skeletal Fatigue- The skeletal system includes your horse's bones, joints, tendons and ligaments. If overstressed, skeletal failure can cause abrupt and serious injury to both the horse and rider. Overworked horses are more likely to suffer sprains and strains when at a crucial moment in the horse's stride, a particular muscle fails to contract, resulting in a momentary and sometimes repeated mal-positioning of a related joint or ligaments.

During exercise, your horse's bones, joints and ligaments are constantly changing to adapt and compensate for activity changes and to the rider's added weight. How they compensate is specific to the type of work performed. For example, roping, cutting or barrel racing horses will not necessarily be prepared for a strenuous day of climbing steep grades on a long mountain ride. One big problem with skeletal conditioning is that compensatory changes occur much slower than circulatory, respiratory and muscular conditioning. It takes approximately 60 days of 5d/week riding for the density of a horse's cannon bones to adapt to more strenuous activity and to carrying the added weight of a rider. Therefore, while our horses may feel fit, the vast majority of us (weekend riders) do not ride enough to cause any significant changes in skeletal fitness.

Unconditioned bones, joints and ligaments are especially susceptible to shock, twists and torsion. For this reason, riders should always be careful to slow horses to a walk on surfaces that are hard, slippery, uneven or deep. To sum up, before you expect your horse to perform a new type of activity, consider how well his varied systems have been prepared. To avoid problems, always introduce high intensity work gradually, allow plenty of time after a high intensity work effort for the horse to "cool out" before returning to a stall, and keep in mind that physical limits vary with weather conditions or between horses and that fatigue may set in sooner than you expect. Good luck and safe trails.

### **10 steps to lameness on the trail for an "out of shape" horse (hypothetical):**

- 1st Work intensity exceeds oxygen supply to working muscles >>>
- 2nd Aerobic function is limited >>>
- 3rd Anaerobic function is increased >>>
- 4th Rider fails to recognize symptoms of anaerobic onset >>>
- 5th Lactic acid production increases >>>
- 6th Circulation is inadequate to remove lactic acid >>>
- 7th Fuel in individual muscles is depleted >>>
- 8th Fatigue and soreness cause changes in movement >>>
- 9th Changes in movement cause forces to be distributed differently on supportive ligaments, joints and bones >>>
- 10th A bad step causes a fall and/or injury.

## **How to tell that your horse is approaching his limitations:**

1. Panting or blowing respirations
2. Heart rate more than 150 bpm
3. Profuse sweating

## **If these symptoms occur:**

1st Stop and rest

2nd If your horse is still breathing heavily and/or the heart rate has not gone below 100 bpm after 5 minutes of rest, discontinue his exposure to intense work for a few days. For instance, if trail riding, it would be best to dismount and walk until the horse is rested, then choose less strenuous routes on subsequent rides until his conditioning improves.

3rd If your horse continues to blow and sweat after several minutes of rest. You may have overworked your horse. Immediately discontinue riding, cool him out and consider him off limits for at least a week.