

Principles of Conditioning - *Lori Warren, PhD, PAS Provincial Horse Specialist*

The success of a conditioning program relies on the body's adaptive response to the stress of exercise. If the horse performs the same amount of exercise every day, a certain level of fitness is attained as the horse adapts to the workload. However, without a further increase in training load (an increase in training duration, intensity, or both), there will be no further increase in fitness. To achieve a conditioning or training effect, the horse must be subjected to gradual increases in workload. Each new level of training is maintained until the body has adapted to the added stress, after which a further increase in training load can be applied. Alternating periods of increasing workload with a period of adaptation is known as **progressive loading**.

The idea behind progressive loading is to prescribe an exercise bout that will gradually stress the horse sufficiently, such that he will be able to tolerate the same exercise the next time with less stress. For aerobic conditioning, progressive loading is accomplished through gradual increases in either the duration or intensity (speed) of the exercise on a weekly basis. For anaerobic conditioning, progressive loading is accomplished by a weekly increase in the exercise intensity (speed) or in the number of repetitions of high-intensity activity.

For any equine discipline, performance is most effectively improved by training the specific muscles and systems involved in that discipline. In other words, training exercise must be focused on the specific demands of the particular event the horse is training for. The physiologic and psychological demands of competitive events such as the 3-day event, show jumping, dressage, endurance rides and racing over distances of 400 m to 3200 m are extremely different. Therefore, training should be specific to the event so as to train the appropriate structures and physiologic systems. This principle of conditioning is known as **specificity**.

Training of horses should be specific to the athletic event involved whenever possible. This principle need not be followed rigidly, since there are circumstances when alternative types of exercise may be appropriate for some horses. For example, working the horse over hilly terrain has the advantage of increasing heart rate (workload) without increasing speed, thereby sparing the bones, tendons and ligaments from excessive stress.

One of the most important principles of conditioning is that of **individual differences**. Horses vary in their individual response to conditioning. Some horses will respond quicker than others and will tolerate faster increases in training load. The magnitude of the overall training response will also vary among horses. Genetic factors play a major role in this variation in training response, but another consideration is the state of fitness at the beginning of a training program. A horse which has been inactive for a long time (12 months or more) will require a longer period of training to reach a certain level of fitness compared to a horse which has had a six or eight-week layoff after a season of training and competition. Age is also important. Younger horses are capable of greater adaptations in response to training. By comparison, recent studies have confirmed that older horses (age 20+ years) have a reduced capacity for exercise. Ultimately, **training programs must be individualized in order to attain maximum benefit while minimizing the risk of injury**.

Obtaining and Maintaining Fitness

Regardless of the horse's eventual occupation, the initial stage of conditioning is based on a period of low intensity exercise known as long slow distance (LSD) training. Some refer to this phase of training as "legging a horse up." This phase involves walking, trotting and cantering, and it may incorporate both

arena work and trail riding. This type of conditioning results in improved cardiovascular and muscular efficiency, enhances the horse's ability to regulate body temperature, and stimulates adaptive changes in the limbs. LSD training builds aerobic endurance or stamina, allowing the horse to exercise for prolonged periods at a low- to moderate-intensity.

The LSD phase may occupy a period of 2 to 12 months, depending on the breed and age of the horse, its previous conditioning history and the competitive objectives. LSD is particularly important in young horses that are being conditioned for the first time, when the rule is to make progress very slowly, with plenty of intervening rest days. In contrast to the young horse, the LSD phase is completed somewhat more rapidly in a sound horse that has been fit in the past. A period of LSD is also needed when a horse is brought back into work after a prolonged rest. For example, a horse that was fit the previous year but has not been ridden through the winter months is brought back gradually using LSD. LSD also plays an important role in rehabilitation following injury, with special consideration being given to strengthen the injured area.

The objective of LSD training is to prepare the horse to cope with 45 to 60 minutes of easy exercise at a walk, trot and canter, at an average speed of 6 to 8 km/h. When this stage is reached, it is time to evaluate the competitive objectives in relation to the conditioning requirements, and then gear the training program toward the specific activity for which the horse is being prepared. To make the conditioning program as sport-specific as possible, the intended activity should be analyzed to estimate the relative contributions of the aerobic and anaerobic energy systems. The longer the duration of the competitive activity, the greater the need for aerobic endurance. In contrast, anaerobic metabolism will be important during activities with rapid acceleration or deceleration, sprinting, jumping and abrupt changes of direction

In general, horses that will be used for pleasure riding or for low intensity sports, such as lower level dressage or hunter competitions, need only to maintain their present level of fitness by doing LSD workouts twice a week. For horses that will compete in endurance sports (endurance racing, competitive trail riding), the progression is from LSD to a more rigorous aerobic program, in which the prime consideration is to build the duration at moderate speed. On the other hand, horses that will specialize in power and speed events (barrel racing, cutting, roping, jumping) train these attributes by reducing the distance and increasing the intensity of the workouts. For sports requiring an intermittent pattern of energy expenditure (eventing, combined driving, reining, cutting), a combination of conditioning methods is used to maximize the aerobic base while maintaining sufficient anaerobic capacity for the bursts of high intensity exercise.

The appropriate frequency of exercise depends on whether the objective is to improve, maintain or reduce the level of fitness. When the objective is to increase cardiovascular fitness, workouts are usually performed three times per week on alternate days, which allows time for tissue repair and rebuilding between successive workouts. More frequent bouts of exercise are unlikely to produce a faster conditioning response and may predispose to injury by not allowing sufficient time between workouts for tissue repair. Light exercise may hasten the repair process, so it is not necessary for the horse to have complete rest on the intervening days. For maintenance of cardiovascular fitness, one or two workouts per week is sufficient. During a busy competition season, the actual competition may serve as the workout. Fitness is lost when the workouts are performed less frequently than once per week or when workload is reduced.

Too little stress on tissues will not produce a beneficial adaptation, but too much stress or insufficient recovery time between workouts leads to a state of **overtraining**. Excessive aerobic conditioning may overload the cardiovascular system causing poor appetite, poor performance and an increase in packed cell volume. Overloading of the muscular system through excessive training causes muscular strains,

which vary from mild to severe. However, it is the supporting structures of the limbs (bone, cartilage, ligaments and tendons) that adapt most slowly to the stimulus of exercise and are particularly susceptible to overloading injuries in the form of fractures or strains. Therefore, training intensity should be carefully monitored.

Monitoring Fitness

One of the difficulties in training horses is determining if, and when, the horse is fit. Scientists have the ability to measure a large number of parameters to assess changes in fitness while horses are exercising on a high-speed treadmill in a climate-controlled laboratory. Obviously, most of us do not have the luxury of such facilities. Fortunately, much information can be gained by monitoring your horse's heart rate. Heart rate is perhaps the best, and certainly the most practical, means for judging work effort during exercise. In addition, the heart rate during recovery from exercise can be a very useful guide to a horse's progress during training.

The usefulness of heart rate as a means to quantify work effort comes from knowledge that there is a linear relationship between heart rate and exercise intensity. More strenuous workloads or faster running speeds will produce higher heart rates. We also know that heart rate decreases at a given intensity of exercise after the horse becomes more fit. In addition, as fitness improves heart rate will decline more quickly following exercise. Therefore, at periods throughout the training program, heart rates can be compared during and after a bout of exercise. It is important that the exercise be standardized (same distance, terrain, footing, environmental conditions, etc.) to make heart rate comparisons more valid.

Methods of determining the heart rate include palpation of an arterial pulse, auscultation of the heart sounds with a stethoscope, and the use of an electronic heart rate monitor. Because the heart rate drops quickly once exercise ceases, palpation or auscultation of the heart rate will not accurately reflect the heart rate during exercise. Therefore, these manual methods can only be used to assess heart rate before and after exercise. The advantage of the heart rate monitor is that it gives a continuous reading of the horse's heart rate before, during and after a workout.

Because not everybody has an electronic heart rate monitor, measurement of recovery heart rate becomes the best option for assessing the horse's capacity to adapt to the training load. After a standard bout of exercise, take note of the heart rate at 2, 5 and 10 minutes after completion of the exercise. In well-conditioned horses, the heart rate will be around 60 beats per minute after 10 minutes of recovery, even following reasonably strenuous workouts. However, a recovery heart rate of 72 to 80 beats per minute or more might indicate that the work effort was beyond the horse's current level of conditioning.

It is important to remember that the heart rate during exercise and recovery is sensitive to a variety of environmental factors, including weather, the work surface and excitement. Hotter weather or more yielding footing usually result in higher heart rates and slower heart rate recoveries. And excitement may mask the true heart rate at lower exercise intensities. Monitoring the heart rate is also useful for detecting early signs of disease or lameness. If the horse's heart rate before, during or after exercise is elevated above normal, and it can't be explained by fear, excitement or environmental challenges, lameness or illness should be suspected and the horse should be evaluated further.

In contrast to what is commonly believed, the respiratory rate is not a reliable indicator of fitness. The respiratory system plays an important role in thermoregulation, helping to remove the heat produced during exercise. Therefore, the respiratory rate following exercise may be more of a reflection of heat dissipation (especially in hot conditions) than adaptation to training.

Detraining

The training program of most horses will inevitably be interrupted for any number of reasons (adverse weather, an end to a competitive season, injury, or sickness). When a horse ceases exercise training, it loses fitness. This loss of fitness is referred to as detraining. The rate at which cardiovascular fitness, musculoskeletal strength and suppleness are lost determines the time required to recondition the horse following a layoff.

Horses taken out of training for a month or less usually experience a minimal loss of cardiovascular fitness, especially if they had been in training for several months prior to the lay-up. However, the workload should be reintroduced gradually over a period of several days before resuming the previous work schedule, particularly if training was stopped due to injury.

Following a layoff longer than a month, there is a greater loss of cardiovascular condition, as well as musculoskeletal strength, that must be regained before progressing. While cardiovascular fitness may be regained relatively rapidly, the strength of the muscles, bones, tendons and ligaments will be regained relatively slowly. Therefore, just as in the original conditioning program, the rate of adaptation of the supporting tissues dictates the rate of progress during reconditioning. As a rule of thumb, each additional month off beyond the first month of lay-up requires a month's reconditioning.

When the horse is let down at the end of the competitive season, a baseline level of fitness can be maintained during the off-season by performing cardiovascular workouts twice per week at a reduced intensity and duration. If a baseline level of fitness is maintained through a reduced work schedule, reconditioning proceeds much more rapidly the following season. It is not recommended that horses be let down completely, except during recuperation from injury, because large oscillations in fitness may be detrimental to long-term soundness. In older horses, it is particularly important to maintain fitness in the off-season because reconditioning takes longer as the horse ages.

Conclusions

An adequate level of fitness is necessary for horses to perform to their potential. Proper conditioning also helps prevent injuries that may arise when an unfit horse is pushed beyond its physical capacity. When developing a conditioning program, it is important to remember that different tissues in the body vary in their rate of adaptation to exercise. The cardiovascular and muscular systems respond rapidly, with significant changes being produced in only a few weeks. This is in contrast to the supporting structures (bone, ligaments, tendons), which adapt much more slowly over a period of many months. Therefore, training programs should allow adequate time to condition all the body systems to withstand the rigors of riding and competing.

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