Lori Warren completed her B.S. at the University of Wyoming and her M.S. and Ph.D. in at the University of Kentucky with a dual emphasis in equine nutrition and exercise physiology. She served as Alberta's Provincial Horse Specialist from 2000-02 and the Extension Equine Specialist at Colorado State University from 2002-04. Dr. Warren is currently an Associate Professor and directs the equine nutrition program at University of Florida.

Schooling vs. Physical Fitness

If you've ever been to a gym after a long absence or started up a new exercise routine as part of your New Year's resolution, you have a good appreciation for the importance of gaining and maintaining fitness. The same concept applies to your horse when you put them back into training after giving them the winter off, after a layup from an injury, or when starting a young horse under saddle. Unfortunately, many horse owners and trainers are concerned only of working their horses over obstacles or schooling them on maneuvers specific to their sport, rather than ensuring horses are fit enough to perform such tasks.

Schooling horses can, and does, help build and maintain physical fitness. However, we must remember that it is not just the horse's mind we are working, but also the musculoskeletal system. Horses that lack sufficient cardiovascular fitness and strength are at greater risk of injury. We can quickly push a horse to the point of physical failure as we work towards getting him to learn to collect and engage his hind end, rate a steer, or tighten up the turn on a barrel because he is tired or not fit enough to withstand the schooling we are trying to accomplish. In contrast, a horse that is fit for the task will have the stamina to withstand those long training sessions, as well as greater strength and neuromotor coordination that allows correct positioning of limbs and body.

This intent of this article is to give insight into developing physical fitness in your horse, in addition to the schooling and mental discipline you work to achieve when training your horse. Specific conditioning programs are beyond the scope of this paper, as they are numerous and varied depending on the sport and an individual horse's ability to respond to training (the reader is referred to several excellent references at the end of this article that provide that level of detail). Instead, this article will highlight the principles of conditioning, the phases of conditioning, the use of different training methods, how to assess changes in fitness, and the length of time it usually takes to improve fitness in the horse.

Defining Your Training Goals

One of the first steps to be considered when designing a training program is your training

goal(s). Do you want to reduce the risk of injury? Do you want your horse to improve biomechanical skill and coordination? Do you want to maintain your horse's willingness to work? Is your goal to improve your horse's chances of winning? From a fitness perspective, in order to pinpoint your goals, it is usually helpful to identify the demands of the sport or activity that you will be using your horse for. What will he be expected to do in competition? Will improved stamina, speed, strength, or skill be needed to achieve your performance goals? Stamina generally refers to endurance or aerobic capacity, which is necessary for submaximal, more prolonged activities such as endurance riding, eventing, hunter/jumper, ranch work, reining, dressage, frequently used lesson horses, and recreational/pleasure riding. By comparison, speed and strength both characterize the anaerobic capacity needed for maximal intensity and/or high power activities performed for shorter periods of time. Speed would be important for Thoroughbred, Standardbred and Quarter Horse racing, rodeo timed events like roping or barrel racing, and polo. Some level of improved strength is useful for all equine sports, but is especially important for dressage, jumping, draft work, driving, and cutting. Few equine sports rely on just one area, but it is important to identify whether stamina, speed or strength is the most important for success and focus training to improve that characteristic. Often the sport relies on either stamina and strength or speed and strength. It is difficult to train for both stamina and speed, though this can be accomplished to varying degrees.

Principles of Conditioning

In order to develop an appropriate conditioning program, it is important to understand the principles of conditioning that will improve fitness. The 4 principles of conditioning should be followed at all stages of training and are described below:

1. Progressive Loading – to achieve conditioning, the horse must be subjected to gradual increases in training load. A given workload will result in a certain level of fitness. Without a further increase in training load, there will be no further increase in fitness (see Figure 1). For example, after a suitable amount of time, a horse's musculoskeletal system will adapt to an applied workload of 20 minutes of trotting in a round-pen. This level of fitness will not increase unless the horse is asked to perform more work. So if my goal is to have the horse canter for 20 minutes in a round-pen, I need to gradually work up to this heavier workload in a step-wise fashion.

In general, there are three ways to increase workload: 1) increase duration (time or distance covered), 2) increase intensity (speed or heart rate), and 3) frequency that the workload is applied. To increase fitness, the workload needs to be applied 2 – 3 times per week, whereas to maintain fitness the workload may only need to be applied 1 – 2 times per week. Due to the greater risk of injury with higher intensity workouts, it is important to increase duration before speed when adjusting workload. Every time you increase speed, back off on the duration and frequency of workouts.

2. Specificity – training should mimic competition as much as possible. The goal is to simulate the likely stresses and strains and intensity involved in the sport, without actually reproducing the competition workloads that could result in injury. If speed is critical, train for speed. If strength or endurance are critical, then training should be designed to improve these characteristics. The principle of specificity does not, however, mean the horse has to execute the exact activity or maneuvers he's expected to perform in competition during every training session. Not only might this lead to repetitive use strain in the back or limbs, it can also be mentally dulling for both the horse and the owner. Instead, use this as an opportunity to be creative with your training sessions.

As a form of cross (discipline) training, you could incorporate training methods used in other disciplines that work the same muscle groups important to your sport. Break down the tasks the horse must perform in your sport into smaller elements and see where you can apply different training techniques to accomplish that same training effort. For example, if you compete in barrel racing or roping, you might incorporate cavaletti or gymnastic jumping into your training to build strength and power in your horse's hindquarters. If your sport is dressage or hunter/jumper, consider uphill and downhill work (or even backing up hills) to encourage the horse to engage its hind end. Suppling exercises common to dressage, side-passing and leg-yielding work, reining patterns, and trail obstacles can be a fun way to improve strength and motor skill and add variety, even if your sport does not utilize the specific maneuvers you are exploring. The idea is to focus on the muscle groups that need to be worked or the intensity you are trying to achieve, and to mimic these outcomes without performing the same old daily routine.

You can also find ways to increase heart rate (which represents an increase in workload intensity) without increasing speed and stress on joints and tendons. For example, hill work at a walk or trot is a great way to add intensity (increase heart rate) without adding speed. Pulling logs or a drag or even adding weights to the saddle or surcingle can also increase heart rate to a level associated with fast gaits, even while the horse is performing the activity at a slower gait. Swimming and walking or trotting the horse through 10-30 cm of water or snow can also increase heart rate to levels you would normally see at a canter or gallop. Even asking for more impulsion or extending the walk or trot can increase heart rate up to a higher level without the same risk for injury that would be seen at similar heart rates at a canter or gallop.

3. Provide Adequate Rest – each new increase in training load will cause some damage to muscle, bone and soft tissues since they are not yet accustomed to the higher workload. Through repeated cycles of damage and repair, tissues will adapt to the workload. This is the

adaptation process and it takes place during lighter training and/or during sleep. Thus, there is a need to incorporate rest and “easy” days into your horse’s workout schedule. As a general rule, horses should not perform the same type of conditioning on consecutive days. For example, say you increase the workload you give your horse on Monday as part of your progressive loading plan. On Tuesday, you should work your horse with an easier activity that he is already conditioned for. On Wednesday, you can re-apply the training load you introduced on Monday. On Thursday you could give the horse the day off and start again with the training load on Friday, followed by an easy day on Saturday and another day off from work on Sunday. You could also apply this strategy to different types of work. For example, you might choose to work on cardiovascular conditioning on Monday, Wednesday and Saturday, strength exercises on Tuesday and Thursday, and complete rest on Friday and Sunday.

The concept of “tapering” is related to the principle of providing adequate rest. Tapering involves reducing the workload 3 to 7 days prior to competition. This strategy is proposed to allow adequate tissue repair to reduce likelihood of injury during competition. In contrast, a single day of rest or reduced workload is not sufficient to allow this to occur.

4. Horses are Individuals – horses respond to training differently, just as people exposed to similar exercise programs will respond differently. Where one horse can progress through a conditioning program at a faster pace without problems, another horse may take longer to adapt to a given workload. Some of this variation is due to genetic capacity; for example, a Thoroughbred is genetically more equipped for race training than a Shetland pony. The age of the horse, the state of fitness at the beginning of the conditioning program, and the training methods used will also impact the ability of a horse to respond to training. Ultimately, the training program must be individualized in order to attain maximum benefit while minimizing risk of injury.

Phases and Components of Conditioning

All training programs should progress in phases. In general, there are three phases of conditioning: 1) Long, Slow Distance work; 2) Sport-specific conditioning; and 3) High speed work (if applicable). These are described in more detail below.

Phase 1: Long, Slow Distance (LSD) Training – commonly referred to as “legging up,” LSD training is characterized by low intensity exercise with a gradual increase in duration. LSD comprises the initial stages of cardiovascular training with the purpose of preparing muscles, bones and soft tissues for exercise. The goal of LSD is to prepare the horse to cope with 60 minutes of walking and trotting (average speed 8-10 kph) interspersed with 2-3 minute bouts of cantering (16-20 kph). The duration of LSD workouts might last 15-20 minutes/day at the

beginning, and gradually increase to 60 minutes/day. In the early stages of LSD, workouts are generally performed 5 to 6 days per week, whereas in the latter stages, LSD might occur 2 to 3 days per week. The length of the LSD phase will depend on how physically fit the horse is when it is started, the age of the horse, and the intensity of the sport the horse will be used for. For example, the LSD phase may take 1 to 2 months for a mature horse with some previous level of fitness. It is worth noting that keeping the horse moderately fit throughout the year (which may only take 1 to 2 workouts per week) can prevent the need for a period of LSD training at the start of each competition season. In contrast, it can take 3 to 12 months for a young horse that is entering training for the first time. The more intense the sport or the longer the horse has been out of training, the longer the LSD phase needs to be to lay a proper foundation.

Phase 2: Sport-Specific Work – according to the principle of Specificity, conditioning should mimic the speed and movements of the sport. Thus, this phase of training introduces the type of work the horse will perform during competition. Sport-specific work should contain three components: 1) cardiovascular conditioning; 2) strength conditioning; and 3) suppling exercises. These components are described more below.

Cardiovascular Conditioning is continuation of the training started in the LSD phase. Cardiovascular workouts should be designed to stimulate the metabolic systems needed during the specific sport. A heart rate monitor can be a useful tool for monitoring intensity and workload of cardiovascular conditioning so that specific metabolic systems (aerobic or anaerobic) can be targeted. To improve aerobic capacity, the horse should be trained at heart rates of 150-180 beats/min (trot, canter, gallop). To improve anaerobic capacity, the horse should be trained at heart rates above 180 beats/min (canter, gallop, sprint). Following the principle of Progressive Loading, the volume of work should be increased gradually. The volume of work can be increased by manipulating the workout duration (minutes/day), intensity (speed, heart rate), and frequency (workouts per week). Remember that intensity is not just speed – intensity (reflected by heart rate) can be increased at a given speed by:

- working the horse with more impulsion
- use of cavaletti
- hill work
- adding extra weight
- working in loose, deep footing
- swimming
- riding through water or snow
- inertia drills (short bouts of acceleration and deceleration; take off and landing from jumps; gait changes, and changes in direction).

To gain fitness, cardiovascular conditioning should be performed 2-3 times/week. As training progresses, it may be necessary to limit cardiovascular conditioning to 2 times/week so that intensity and duration can be increased while still allowing adequate time for tissue repair. Once the horse has achieved the desired level of fitness needed to be successful in a specific sport, cardiovascular workouts need only be performed 1-2 times/week to maintain fitness.

Strength Training should begin early in sport-specific training. Furthermore, strength work should come before high speed work (Phase 3) to reduce risk of injury. There are generally two objectives for strength training: an increase in muscle endurance (aerobic strength) or an increase in muscle power (anaerobic strength). It is generally difficult to train for both. Muscle endurance is usually important for submaximal activities such as dressage, eventing, hunter/jumper, and reining. In contrast, muscle power is usually desired for maximal activities such as racing, roping, barrel racing, polo, and stadium jumping.

Similar to cardiovascular conditioning, strength training should follow the principle of Progressive Loading whereby the volume of strength work performed should be increased gradually. Strength exercises might include:

- hill work
- gymnastic jumping (low jumps for endurance; higher jumps for power)
- pulling loads or other draft work
- repetitions of dressage movements (eg, gait transitions, pirouettes, passage, piaffe)
- maneuvers specific to the sport that require strength
- torque work (trotting or cantering in circles, which get progressively smaller in diameter)

To improve strength, strength training exercises should be performed 2-3 times/week (alternating days with cardiovascular training works well, and follows the principle of Adequate Rest). To maintain strength, exercises can be performed once per week.

Suppling Exercises help to maximize flexion and lateral bending, thus increasing range of motion in joints. These exercises can also improve stride length and engagement of the horse’s hindquarters. Suppling exercises can be dynamic or passive. Dynamic suppling involves the use of turns, circles, voltes, and lateral work (leg yielding, shoulder-in, travers, renvers, half pass, etc). By comparison, passive suppling can be achieved by physically stretching and bending the horse’s limbs and lateral bending of the horse’s neck (via gentle pulling of reins or use of carrots or treats). Suppling exercises can be performed after a warm up or at the end of a

workout (eg, passive suppling), as well as during “recovery” periods allowed while performing cardiovascular or strength training.

Phase 3: High Speed Work – not all equine sports require sprinting or bursts of speed. However, for those that do, the third phase of a training program will focus on high speed work performed for short durations or distances. Speed work will become a component of the horse’s sport-specific cardiovascular training. The risk of injury is highest with speed work, so this phase of conditioning should only be undertaken when the horse has a reasonable level of cardiovascular fitness and strength. In addition, risk for injury will be reduced if speed work is performed in small segments, rather than one long burst of speed.

“Speed Play” is one way high speed work can be incorporated into the training program. Speed play consists of acceleration for 20-400 m, followed by deceleration back to the original canter/slow gallop speed. A modification of speed play is “acceleration sprints,” whereby the horse is asked to sprint starting from a standstill rather than from a canter. Acceleration sprints also usually involve more rapid acceleration and deceleration compared to speed play. “Turning drills” are another option where the horse is asked to sprint for a short distance, turn 180-degrees, and then sprint in the opposite direction. Progressive loading can be accomplished in any of these high speed drills by: 1) increasing the number of accelerations/decelerations (ie, the number of repetitions performed in a given workout); 2) Increasing the distance of accelerations; and 3) increasing the speed of accelerations.

Remember that you can increase intensity without increasing speed (eg, via hill work, draft loads, etc). Performing work at higher heart rates without higher speed will condition the cardiovascular system for high intensity work. This is a good way to help prepare a horse for the High Speed phase. However, if the sport requires speed, you will still need to mimic that component to train bone and soft tissue to withstand the mechanical demands of speed work. This does not mean a horse has to run at race speed for a mile, even if that is the type of activity that will be performed during competition. Instead, several repetitions of high speed galloping can be performed over shorter distances (15 – 20 strides), with slower canter/gallop in between repetitions.

Interval Training

Many horses are trained with a “continuous training” format where a fairly constant intensity of exercise is performed over a period of time. A popular and effective training format used in human athletes is “interval training.” Although interval training is gaining some attention in the horse industry, it has yet to be adopted by many trainers.

Interval training is characterized by short periods of exercise (called “works”) alternated with “recovery” intervals. The recovery intervals allow partial, but not complete recovery of heart and respiration rates. The number of works performed is called a repetition (or “rep”). Blocks of works and recoveries constitute a “set” and are interspersed with longer, more complete rest periods called “set rests” (Figure 2).

By dividing the workload into a series of short bouts of more intensive exercise, the horse will be able to perform more total work per day than in a single bout of continuous exercise. In addition, the risk of fatigue-related injury will be reduced. For example, a continuous bout of exercise might be a horse that is galloped for 1000 m. With interval training, we can split this up into 3 reps of 400 m each (with total distance covered of 1200 m).

Progressive loading can be applied within the interval training format by: 1) increasing the duration or intensity of works; 2) decreasing the duration of recovery intervals or set rests; 3) increasing the number of works per set (ie, reps); or 4) increasing the number of sets per day.

The interval training format can be used with aerobic (submaximal, prolonged activities) or anaerobic (power and speed) conditioning. Aerobic interval training generally involves a work to recovery ratio of 1:2, 1:1, or 2:1. In contrast, anaerobic interval training requires a greater period of recovery from very intense works, resulting in ratios of 1:5 or 1:6 work:recovery. The interval training format can also be applied to cardiovascular or strength training. In addition, suppling exercises can reasonably be performed during rest intervals.

Assessing Gains in Fitness

A relatively easy to perform, yet valuable index of fitness is your horse’s pulse or heart rate after a period of recovery from exercise. When a horse is more physically fit, it should have a lower heart rate (faster recovery) after exercise has ceased compared to the heart rates documented when the horse was less fit (Figure 3). Recovery heart rates are a more reliable indicator of fitness if the exercise performed just prior to heart rate evaluation is standardized as much as possible (ie, speed, terrain, distance covered, volume of work performed, outdoor temperature, rider weight, etc). For example, your standardization might involve cantering your horse in a roundpen for 3 minutes before heart rate measurements are obtained. You would want the horse to perform the canter at the same relative speed each time you performed this test during your conditioning program. Alternatively, you could evaluate heart rate following a “set” of interval training where you routinely perform the same types of exercise. Once the standard exercise bout is complete, obtain a heart rate at 1, 5, and 15 minutes during recovery. Note that

heart rates in the first 5 minutes post-exercise are least likely to be influenced by excitement and serve as the best gauge of ability to recover. Alternatively, you can pick a fixed heart rate value (eg, 60 or 80 beats/min) and time how long it takes for the horse's heart rate to drop down to this value. Normally heart rate declines fairly rapidly during the first few minutes after exercise, and then more slowly until recovery is complete. Persistent elevation of heart rate following exercise may be indicative of dehydration or exhaustion. Elevated heart rate above what is normal for your horse may also be an early indicator of lameness or illness.

Obtaining a heart rate on your horse does not require special equipment. Heart rate can be determined by taking a pulse behind the knee, the rear of the pastern (digital artery), or under the jaw bone (facial artery). Alternatively, there are relatively inexpensive (starting at ~$100) onboard heart rate monitors that offer the same technology used in human self-monitoring fitness devices (chest strap and watch). The advantage of these monitors is that they can be used to get real-time heart rate readings during exercise that can assist in training (Table 1). Additionally, an evaluation of heart rate can be performed during exercise or recovery without having to dismount and find a pulse.

Horsemen often comment that a horse will "blow" less as it becomes fitter. However, evaluating respiration rate during recovery from exercise can be misleading. During hot or humid weather, the horse will continue breathing fast for longer than expected, because more rapid breathing is necessary to reduce body heat generated during exercise. Pulse or heart rate is a more reliable gauge of the horse's recovery and how fit he is, and the most important reading to take.

Timeline

Most cardiovascular improvements occur fairly quickly, within a month or so of beginning training. Adaptations to bone, tendons and ligaments, as well as metabolic changes make take 4 to 6 months depending on the horse's original fitness level when the conditioning program started.

Horses will lose fitness during periods of inactivity, although the rate of fitness loss is less than in humans. In general, if a horse is out of training less than one month, there will be relatively little loss of fitness, but there will be loss of suppleness and flexibility. For these horses, work should be reintroduced gradually over 7–10 days. In contrast, if the horse is out of training longer than a month, there will be a significant loss of fitness. As a rule of thumb, for each additional month past the first month out of training, the horse will require a month's reconditioning. Cardiovascular and muscular fitness can be regained fairly rapidly, with the strength of supporting tissues (bone, tendons, ligaments) proceeding much slower.

Conclusion

Avoiding injury is one of the primary goals of any conditioning program. Therefore, it is imperative that you closely monitor your horse during training for any telltale signs that you are overdoing it. Become familiar with the appearance and feel of the horse's legs and monitor them for heat, swelling and any abnormalities. Detecting problems early can prevent a minor lameness from becoming a serious problem that could derail your conditioning program and competitive efforts. When in doubt, seek the advice of your veterinarian.

Further Reading

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