

Issue 2 2011

For Eventers &
Show Jumpers

Talking Performance



From the editor...

It has been 6 months since our first issue of Talking Performance. It has proven to be a popular addition to our stable of 8 newsletters as it provides more targeted information on training and management of upper level equine athletes.

This issue is no exception. We discuss the broad topic of 'Soundness to Perform', including musculo-skeletal soundness, cardiovascular fitness and metabolic efficiency in relation to performance. Preparing and conditioning a horse for upper level competition takes months of strength and fitness training as outlined in Talking Performance issue #1. This back issue can be obtained by emailing Gary at newsletters@kohnkesown.com.

It is often a struggle to keep elite horses sound as they age because their experience in competition takes years to gain. Lameness still dominates as the most common reason for lay-off and downtime from training, with an increased time required to rest horses to assist recuperation as they age above 10 years of age.

We hope that you enjoy reading this latest issue of Talking Performance.

I take this opportunity to wish you all a safe and relaxing festive season and a successful year of competition for 2012 and beyond with your horses.

All the best,

Dr John Kohnke BVSc, RDA

SOUNDNESS TO PERFORM

important considerations

Many owners and trainers of performance horses consider that 'soundness' is relative to musculo-skeletal strength and freedom from lameness in a well trained and fit eventer, showjumper or Western competition horse. However, 'soundness to perform' can have a broader meaning, encompassing other aspects of a horse's physical fitness and ability to compete successfully and recover from competition.

'Athletic' soundness can also include performance related influences, most importantly efficient airway and lung function, metabolic fitness and freedom from exercise related problems, such as 'tying up' and muscle soreness, as well as digestive efficiency and even mental attitude to compete willingly and competitively, especially during a long competition season or long term training.

Continued over page...

In this issue...

* Soundness to Perform - Important Considerations
Plus handy hints and lots more!

Handy Hint 1

Feeding Lucerne and Mucilage/Buffering Compounds Before Exercise

A practical method to minimise the risk of gastric burn and ulceration is to feed a 'snack' of 4 litres dampened lucerne chaff, 3 scoopsful of **Kohnke's Own Gastro-Coat™** (assists chewing and salivation by providing mucilages lost in heat processing of feeds) and 2 tablespoonsful (40g) of fine limestone (Ag-lime) to buffer excess gastric acid, given 30 minutes before training each day and before travelling to a competition. This small amount of 500g of feed prior to exercise does not cause discomfort when the horse is working - in fact it helps the horse settle and get back on its feed after exercise as it helps reduce gastric acid 'splash' onto the sensitive stomach lining during exercise. If this daily routine is commenced from the day a horse is brought into training, reports indicate that most horses, including known 'ulcer' horses, appear to be very less likely to develop gastric burn and associated loss of appetite during training for competition. The 'snack' feed can be given 30 minutes before travelling to help make the trip more comfortable for an anxious horse and prior to the trip home after competition.

Handy Hint 2

Flooded stables?

If your stables, or even house, risk being flooded after heavy rain or a river overflow, use bags of 'kitty litter' placed on the ground across the doorway where water is flooding in. It absorbs more water than sand and more rapidly forms a water tight barrier at the door entrance if the levy of bags are packed tightly against the flooding side of the door.

Handy Hint 3

Progressive Introduction to Loading the Legs During Exercise

Bones are living structures. They are continually reinforced and strengthened in response to loading during exercise. Their thickness and density increases in response to the increase in forces of momentum relative to body weight, speed of exercise and the weight of the rider. It is essential that the legs are progressively loaded during the initial exercise phase. This will provide the stimulus for the bone to increase its cortical thickness and load-bearing strength relative to the loading forces. This is particularly important in young horse coming into work for the first time. The bone increases the thickness of its outer wall and density of the calcium and mineral deposition within the bone along the load-bearing 'stress pathways' relative to the loading stimulus. This should be carried out over a 6-8 week period to avoid 'too fast, too early' exercise which can overload the bones and joints. Joints and tendons are the weakest structures but they are able to respond to loading if given adequate time and a step-wise increase in load forces. If a horse is rested at any time, extra bone laid down at areas of weight-bearing stress can be resorbed and the bone itself becomes weaker, less dense and less able to withstand loading forces. When a horse is put back into work, the bones again respond to the loading and model again along critical stress pathways.

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SOUNDNESS TO PERFORM - important considerations

Limb Soundness

Lameness and associated pain and discomfort is the most common cause for lay-off from training and reason for spelling a competitive horse. Acute and cumulative structural damage to bones, joints, the hooves and reduced tendon strength and resilience is the major underlying cause for partial or more serious physical breakdown and long term lameness. There are four major underlying causes of limb and structural unsoundness in horses in training.

1. 'Wear and Tear' - Concussion from hard working surfaces, especially in heavyweight horses or horses competing at speed, causing trauma and cumulative stress on lower limb structures. The influence of 'wear and tear' breakdown is much higher in 2-4 year old immature horses in training when subjected to high speed loading and concussion on poorly maintained, compacted galloping surfaces and working arenas. A well planned training program to facilitate increase in bone strength and density, especially the front cannon bones to stimulate thickening and improved resilience of joint cartilage and flexibility and strength of tendons and ligaments, is paramount to improve the long term soundness to perform in all upper level horses.

2. Conformation - Poor conformation, particularly of the lower limb below the knees and hocks, can predispose skeletal structures to abnormal loading forces and weight bearing weakness. The major conformational defects that lead to musculo-skeletal failure include long sloping pasterns and 'back at the knee' front limb alignment which acts to increase the risk of tendon and lower limb joint overload. Many horses have offset cannon bones or 'bench knees' which increase the risk of developing 'high splints' just below the knee joints in young eventers and jumpers worked on heavy or concussive surfaces. Upright shoulders and straight hocks are likely to increase knee and hock loading and risk of concussive and cumulative breakdown in these joints as a horse ages.

Offset Cannon Bones

Predisposes to:

- High splints
- Knee weakness
- Hoof concussion



Varying degrees of 'offset' cannon bones are the most common conformation fault, which shifts upper limb weight onto the inside splint bone on the front limbs, with risk of high splints in young, heavy horses worked on a hard, concussive surface or lunged on a tight circle.

Poor farriery techniques, especially excessive lowering of the heels, allowing the toes to become too long, or failure to balance the hooves and maintain the ideal pastern angles to ensure correct and efficient flight of the hoof, can not only magnify the degree of load bearing and abnormal weight distribution, but increase the influence of underlying poor limb conformation in athletic horses. Long toes in the hind hooves, especially when combined with low heels, increases the weight loading on the lower back and can increase the risk of sacroiliac ligament tearing in the lower back, particularly in horses being trained in jumping and dressage disciplines.

Did you know that...

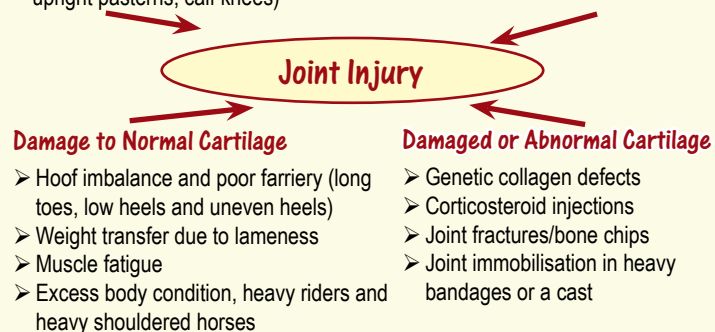
Studies have shown that as horses with inherited poor lower limb conformation grow, in some cases, the limbs will compensate to develop 'a way of going' and stride characteristics which match the limb abnormality, such as 'turned out' or 'turned in' conformation. If this abnormal conformation is corrected by radical hoof trimming once the bones have 'set', then there is a 60% increase in the risk of limb breakdown due to altered load patterns which the horse has 'grown into' and compensated for and adapted to a 'way of going' which is comfortable and will help maintain a reasonable level of soundness in training. Unfortunately, overloading of immature skeletal structures in overweight young horses, particularly in Thoroughbred yearlings over-conditioned for sale, increases the risk of breakdown in the first two race preparations and when retired into horse sport training. Many of the relatively young horses retiring from racing to be trained and competed in upper level equestrian competition carry the legacy of limb overloading and breakdown into these high risk equestrian sports.

Abnormal Exercise Stress

- Repetitive impact loading
- Overloading/high speed exercise/accidental falls
- Concussion on hard surfaces, sprain on deep working surfaces
- Conformational abnormalities (eg upright pasterns, calf knees)

Normal Exercise Stress

- Joint membrane inflammation
- Joint 'looseness' - weak or strained ligaments
- Cartilage and/or bone inflammation
- Ageing and deterioration
- Joint infection



3. Overload Injury

High speed exercise, particularly on loose, deep or shifting surfaces is a common cause of overload and failure of tendons and joints, particularly as a horse ages over 4 years of age and is subjected to cumulative 'wear and tear' of lower limb structures. Tendons, in particular, are prone to cumulative overload due to heavy loading at speed or excess body weight and weight of work riders in racehorse and equestrian performance horses. Tendon fibres adapt and repair themselves slowly and are more likely to develop chronic fatigue and strain, with failure under sudden overload exercise in upper level jump training. The superficial digital flexor tendon (SDFT) has only a 16% overload capacity, even in a well conditioned horse. In older horses over 7 years of age, the risk of tendon failure increases from 3-4% of breakdown injuries in young horses to 12% or more as horses are subjected to cumulative loading and repeated structural fatigue to almost the elastic limit during long term training. Where a working circuit has a deep or sandy section, the incidence of tendon injury may increase by 300%.

4. Nutritional Influences

Although not as common nowadays because most horse owners and riders are aware of the need to provide calcium and trace-minerals to maintain bone strength and density as horses adapt to increased loading during exercise, horses fed on poorly balanced, high energy diets during their formative years generally have a higher risk of bone and joint unsoundness as they age in equestrian sport training, even if their limb conformation is within accepted standards.

Respiratory Soundness

Both acute and chronic, long term respiratory disease and reduced airway function can have a significant impact on oxygen uptake and hence soundness to perform.

Studies have highlighted the importance of efficient airway function in exercising horses. **It has been found that 40% of ongoing, lowered respiratory efficiency and chronic airway disease is caused by the direct, and often lingering effects, of viral respiratory disease, with lower airway inflammation, increased mucus and fluid build-up and reduced oxygen uptake during exercise.**

Did You Know That...

The late Professor Daria Love and her colleagues at Sydney University in the mid 1990's, found that fast or prolonged exercise increased the numbers of bacteria in the lower airways by 10 to 100 times, mainly from bacteria and allergenic compounds trapped in the nasal secretions that were 'swept' off by the airflow of up to 70 litres/second at the gallop and deposited deep into the lungs. Horses which were fed at chest height, with little opportunity to drain their upper and lower airways by head-down feeding from feed bins on the floor, or daily outside grazing, had higher levels of lower airway contamination as compared to horses fed at ground level with dampened hay.

Studies have also indicated that the remaining 60% of airway related dysfunction and reduced oxygen uptake in an otherwise healthy and 'fit' horse, is often caused by environmental factors. These include dust inhaled from feed and bedding, along with inhalation of cold air in early morning training at the gallop in horses which that are not warmed up adequately prior to fast exercise. Inhalation of airway allergens and 'asthma' type conditions due to microscopic mould particles and pollen inhaled from the feed and air can lead to a 20% incidence of broncho-constriction and lower airway shutdown during exercise in susceptible horses. Studies to compare bedding materials in stabled horses have found that the relatively large dust particles in 'virgin' sawdust and de-dusted shavings, which are predominately trapped in the nasal and upper airways, are less likely to trigger chronic lower airway disease.

The risk of inflammatory and chronic reactive airway disease with increased mucus accumulation and inflammatory fluids is greatest when recycled, dry plant materials, such as straw and rice hulls are used as bedding. They can harbour microscopic moulds and dust particles which are inhaled as the bedding is disturbed by stabled horses, or during daily cleaning of the bedding. Feeding horses at chest height can increase the risk of stomach ulcers and severely reduce upper nasal clearing and natural drainage of trapped dust and other larger inhaled particles, as well as significantly limit lower airway cleaning mechanisms which are highly developed in the horse as an athletic animal. Inhalation of fine dust from working surfaces is also a contributing factor under dry climatic conditions. Loose hay is the major source of dust during feeding.

Metabolic Soundness

Although often overlooked, the influences of muscle dysfunction, centred on the problem of 'tying up', and muscle weakness due to inadequate energy intake or poor antioxidant protection of working muscles, can have a significant impact on overall performance.

'Tying up', as it is commonly known, or exercise induced rhabdomyolysis as it is technically referred to, is a universal problem in exercising horses. It is a higher risk in fillies and mares, and in horses fed on high grain diets, particularly oats, as the major energy source to meet exercise needs. It is a multifactorial condition, related to energy metabolism, electrolyte abnormalities and low antioxidant levels in working muscles, predominantly associated with vitamin E and selenium deficiency in feeds, although this has never been proven. Recently, a genetic influence in certain bloodlines of horses has been found. These horses abnormally accumulate or 'over-store' excessive muscle glycogen (muscle energy) in the working muscles, usually in the hind limbs, which cannot be mobilised during exercise and has been linked to chronic, repeated 'tying up' problems in horses in training. It is referred to as 'Equine Polysaccharide Storage Myopathy', or EPSM.

Research by Dr. Stephanie Valberg in the USA and Dr. Patrica Harris at Newmarket in the UK, has shown that careful dietary management, especially by choosing low starch feeds to reduce the intake of cereal grain starch in the **evening meals** in susceptible horses, can significantly reduce the incidence of muscle 'tie-up' and associated reduced performance in exercising horses.

Refer to Fact Sheet # C2 on Management to Avoid Tying Up. Email Gary at newsletters@kohnkesown.com.

Cardio-Vascular Soundness

In most athletic horses, efficient heart function and vascular efficiency is taken for granted. In some cases, impaired cardio-vascular function can contribute as a significant underlying cause of poor performance. Such conditions include atrial fibrillation, impaired ventricular fill and weakened cardiac muscle strength due to inherited abnormalities and even Vitamin E deficiency in some horses, as well as vascular inflammation. Conditions such as atrial fibrillation, where the atrial chambers develop fast, result in less forceful contractions that fail to deliver blood to the larger heart chambers. Although, atrial fibrillation affects less than 0.25% of athletic horses, it can severely affect athletic speed and finishing ability in upper level horses with the condition.

Handy Hint 4

Paddock Rest Facilitates Recovery from Respiratory Virus and Lower Airway Disease

Paddock rest and head-down grazing helps to drain the build-up of mucus from the upper and lower respiratory tract, which can be facilitated by an initial course of antibiotics and mucus clearing agents, as prescribed by your vet. Low grade secondary bacterial airway infection is a common problem associated with long term lower respiratory disease. The rest period also enables the immune system to mount a stronger defence against the virus as the stress of training and daily physical exercise is reduced. Many trainers have observed that a 3 week course of **Kohnke's Own Active 8**, given as 1 scoopful morning and night for the first 7-10 days after turnout, then 1 scoopful daily for a further fortnight, helps to supply nutrients which have a role in maintaining an active immune response.

Studies have shown that up to 60% of young horses become 'carriers' after the Equine Herpes Virus (stable virus) has colonised the throat tonsil area, acting to spread it to other horses in the immediate vicinity.

Handy Hint 5

Recognising a Virus

It is important to recognise the symptoms of viral respiratory disease before the virus multiplies and 'breaks' from the throat lining cells and is inhaled into the lower airways. The incubation period is from 4-7 days and the earliest signs include a subtle reduction in work capacity and stamina, mild depression, loss of appetite, elevated temperature of above 38.5-39°C.

Did you know that...

Studies have shown that dampening hay prior to feeding can help reduce the amount of inhaled dust and mould during feeding by up to 30 times.

Reduced airway efficiency has a direct effect on a horse's performance capacity because horses predominantly use aerobic metabolic pathways during all speeds of exercise, with 80% of the muscle energy metabolised using oxygen at the gallop, which is the highest oxygen consumption of any athletic animal, including cheetahs, greyhounds, racing camels and human athletes.

Stable Air Quality

- A study by researchers at Michigan State University concluded that improving the ventilation within the stable environment to limit exposure to inhaled small particulate allergens and monitoring seasonal variations, had a direct effect on airway function. They found that stable construction directly influences air quality. Stables featuring roll-up sides, vaulted high ceilings, or access to outside yards had significantly lower concentrations of large dust particles than conventional older-style brick boxes with low ceilings and closed windows.
- The air in stables located on busy roadways had high concentrations of allergenic, small pollutant particles (smog) which were inhaled deep into the lungs during early morning traffic peaks, compared to more secluded stables. Unfortunately, this is the period when many horses in metropolitan stables are being trained or returned to their boxes with lungs under insult from cold air, combined with the stress from fast work.
- Particle concentration was higher in spring and summer, as compared to autumn, and also under colder temperatures when the stable doors were closed to help keep horses warm. It is also probable that horses which walk their boxes or those which roll after exercise in a dry, dusty sand roll, when their lungs are most vulnerable to inhalation of dust, or when fed on dry hay in hay nets or racks above chest height increasing the inhalation of microscopic moulds from hay, are more prone to airway disease.

Ref: Dr Melissa L. May and associates (2007) AAEP Proc 53 pg 77-79

Handy Hint 6

Exercise Test for Subclinical 'Tying Up'.

Trot at a steady, free flowing speed for exactly 15 minutes. Take a blood sample (serum tube) at exactly 5 hours after the test. A 3-4 fold increase in CK enzyme levels can confirm subclinical 'tying up'. CK levels of up to 20,000 U/L have been found in fillies which had been suspected of 'tying up', but showed no clinical signs. Most normal horses show little change in CK enzyme readings after the standard 15 minute trotting test.

Handy Hint 7

Managing 'Tying Up' in Nervy Fillies

Many highly strung young fillies respond to relaxant medications, such as a low dose of ACP or Sodium Phenytoin in training, which can help to take the 'edge off' and allows them to settle down. As some fillies have a tendency to 'tie-up' when in season, a course of synthetic progesterone, such as Regumate™, will help to suppress seasonal cycles and minimise the risk of 'tying up'. These drugs **cannot** be used in competition and have to be withdrawn under veterinary advice. In many cases, a daily double dose of an organic magnesium/Vitamin E supplement, such as **Kohnke's Own Mag-E**, will help maintain muscle and nerve function and help young timid, immature and nervy fillies work without 'tying up'.

Digestive Soundness

The ability to efficiently digest and absorb energy sources, protein and other nutrients is paramount to exercise capacity. Poor tooth condition can reduce the efficiency of food preparation into particle sizes that can be digested by enzymes in the small intestine and facilitate microbial fermentation in the hind gut. Gastric ulcers, now associated with the major underlying cause of loss of appetite and poor appetite following exercise, can affect up to 90% of Thoroughbred racehorses, and 60% of equestrian horses, especially those that are stabled and fed on predominantly 'hard', grain based feeds, including sweetened and processed feeds, that require less chewing and salivation that would otherwise naturally buffer gastric acid. This can make it difficult for many horses to consume an adequate amount of feed as gastric discomfort reduces appetite and overall wellbeing, with a significant number of horses losing their appetite and 'picking' at their feeds for 24-36 hours after competition or hard training, which affects their recovery.

Mental Soundness

And lastly, mental willingness and attitude to train and compete is an important attribute in competitive horses. Studies by Professor Reuben Rose and his colleagues at Sydney University in the mid 1990's, based on a long term training program in Standardbred horses exercised daily on a high speed treadmill, found that although horses can attain maximum oxygen uptake (VO2 max) to perform to their peak during a long training program, failure to consistently perform was related to 'sourness', resisting preparation for training and mental exhaustion. In this classical study, long term treadmill training was probably the major cause of mental "unwillingness", but in any training program, variety in training and change of surroundings and regular let-ups is an essential part of soundness to perform.

Horses in upper level training are often regarded as machines which require little rest and regular let-ups from a heavy training, travelling and competition schedule between events and on the showjumping, dressage or eventing circuit. Even in between competitions, horses are still worked daily, often by stable riders. Horses need time to rest and relax between strenuous competitions to not only enable skeletal structures to recuperate, muscle energy stores to be replenished, but also mental attitude to be re-invigorated to face the next event. Often horses may be given one day a week with light work, but even missing 2-3 days with a rest in the paddock or a change in training scenery on a relaxing ride can help to keep a horse willing and freshen-up its attitude towards training, especially after long distance travel on return from an event. It is a good idea to turn the horse out for at least 48 hours after a hard competition and long distance travel to allow head down grazing to facilitate airway drainage. Feed lucerne hay to help buffer its stomach, along with 4 litres of lucerne chaff, with 3-4 scoopsful of **Kohnkes Own Gastro-Coat** and 2 tablespoonsful of limestone (refer to Handy Hint 1) as part of a reduced grain hard feed when resting up. In terms of maintaining fitness, even 2 weeks of paddock rest at grass will not affect oxygen uptake fitness (Vo2 Max) within the muscles, but it will allow a horse to recharge its mental and physical 'batteries' in preparation for ongoing training and competition.

Facts and Stats ...

- Lameness accounts for up to 70% of the downtime or lost training days in racing and upper level horses, which often increases as a horse ages as 'wear and tear' injuries of the lower joints accumulate. Lameness is claimed as a direct cause for scratching from a race in 40% of race horses on race day, with temperature increases and signs of viral respiratory infection being the major reason stated for scratching on the morning of a race.
- In racing and performance horses, 80% of the lameness problems occur in the lower limb, with 80% of these focused on the front limbs below the knees. The major joints which suffer from over-extension and overload, as well as 'wear and tear' in young horses are the fetlock joints, with the risk of hock and knee soreness increasing in the second and third year of competition.
- Respiratory disease due to bacterial and viral airway disease is the direct cause for a rest-up from training and competition in around 21% of young Thoroughbred race horses. Many trainers consider that respiratory disease is a more common problem as compared to lameness as symptoms are more easily noticed in horses which are off their feed, are depressed, fail to work at their normal level or have a cough when saddled up for training.
- Long term or chronic airway disease is the underlying cause for poor athletic performance in up to 63% of performance horses which fail to perform to their earlier standard following symptoms or a lay-off from training due to respiratory disease.
- Metabolic problems related to energy metabolism and related muscle function account for around 10% of performance related failure and downtime from training in upper level equestrian horses. 'Tying up' and related muscle soreness is the major underlying cause of metabolic related unsoundness, especially in fillies and mares.
- Research studies indicate that up to 90% of racing horses and 60% of equestrian horses suffer digestive problems, such as acidic reflux, gastric irritation and ulceration. These problems can limit appetite, energy intake and overall ability and 'soundness' to compete to full potential. Many eventers and show jumpers are re-schooled Thoroughbred race horses which carry a legacy of lameness and even gastric ulcers into their new careers after retirement from the race track.
- Mental 'soundness' has an important influence in horses undergoing long training and repeated event competition and show jumping circuits, with 'sourness' and loss of willingness, due to chronic physical fatigue, underlying discomfort from gastric ulcers and low grade lameness ultimately affecting their on-going competitiveness and exercise recovery.

Handy Hint 8

Plan Regular Rest Days during Training

Horses in upper level training are often regarded as machines which require little rest and regular let-ups from a heavy training, travelling and competition schedule between events and on the showjumping, dressage or eventing circuit. Even in between competitions, horses are still worked daily, often by stable riders. Horses need time to rest and relax between strenuous competitions to not only enable skeletal structures to recuperate, muscle energy stores to be replenished, but also mental attitude to be re-invigorated to face the next event. Often horses may be given one day a week with light work, but even missing 2-3 days with a rest in the paddock or a change in training scenery on a relaxing ride can help to keep a horse willing and freshen-up its attitude towards training, especially after long distance travel on return from an event. It is a good idea to turn the horse out for at least 48 hours after a hard competition and long distance travel to allow head down grazing to facilitate airway drainage. Feed lucerne hay to help buffer its stomach, along with 4 litres of lucerne chaff, with 3-4 scoopsful of **Kohnkes Own Gastro-Coat** and 2 tablespoonsful of limestone (refer to Handy Hint 1) as part of a reduced grain hard feed when resting up. In terms of maintaining fitness, even 2 weeks of paddock rest at grass will not affect oxygen uptake fitness (Vo2 Max) within the muscles, but it will allow a horse to recharge its mental and physical 'batteries' in preparation for ongoing training and competition.

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