



ENDURANCE TALKING HORSES ISSUE 1 2010

The newsletter with news, views and practical advice

In this issue...

- * **Antioxidants - protecting hard working muscles**
- * **Leg care - taking the heat out**

Plus handy hints and lots more!

Factsheet of the Month

Tying up - Managing the Problem Horse

A handy program to help reduce the risk of 'tying-up' in working and equestrian horses.

Obtain your copy: Ring 1-800 112227 or email Gary at newsletters@kohnkesown.com

From the editor...

Endurance riding is one of the fastest growing equine sports and it seems once you've been 'smitten' with the competitive endurance 'virus', it's hard to give it up for simple pleasure or trail riding.

Welcome to our first special Endurance edition of 'Talking Horses'. We publish Racing and Equestrian editions every 2nd month and a Breeding edition every 3-4 months.

We will compile a special endurance edition twice a year. If you would like to receive future newsletters by email in full colour, please email Gary at newsletters@kohnkesown.com to add your name to the mailing list. Of course, if you would like to obtain copies of the other Talking Horses editions, such as the Talking Breeding or the regular Equestrian editions, then please add these to your email request.

I hope you find 'Talking Endurance' interesting and informative. In this issue, we review antioxidants as they are important nutrients to protect hard working, aerobic muscles against fatty acid oxidation during long distance exercise.

We also include lots of handy hints and other helpful advice. All the best for the forthcoming season's rides.

Kind regards,

Dr John Kohnke BVSc. RDA

Antioxidants

Protecting Hard Working Muscles

Antioxidants are vital to ensure peak muscle function and athletic performance in endurance horses, reduce muscle damage, the risk of 'tying-up' and to boost a horse's immune defense.

What are antioxidants?

Antioxidants are normal nutrients found in feed which are absorbed into the body and amongst their variety of actions, they are essential in protecting muscle cells, red blood cells, blood vessel cells, liver cells and all other cells against the damaging action of other chemical compounds produced during metabolic reactions.

The common antioxidants include Vitamin E, Vitamin C, beta-carotene (one of the carotene compounds which forms Vitamin A in the body), and a selenium containing enzyme compound called glutathione peroxidase. In horses, Vitamin E, carotene for Vitamin A synthesis and selenium all have to be provided in the feed, whereas horses can synthesise limited amounts of Vitamin C in their livers.

Continued over page...

Avoiding Greasy Heel

As most endurance riders have experienced, a horse with white socks on the heels, pasterns and above the fetlock, especially on the hind limbs, is prone to developing chronic greasy heel. Greasy heel is caused by microbial invasion into the skin surface, producing a greasy discharge which mats the hair. The inflamed skin dries out, cracks and can cause chronic discomfort and lameness. The skin reaction is triggered by exposure to UV light, which causes a form of 'solar dermatitis' in sensitive horses.

Here's a useful remedy: gently scrub off the grease with a warm solution of laundry soap (eg sunlight soap) using a soft brush. If the skin is very inflamed, apply a cortisone/antibiotic preparation for 3-5 days (such as Prednoder® as prescribed by your vet) and then gently scrub off the scabs. Pat dry, apply a weak PVP iodine solution (eg Betadine® 10%) twice daily for 2-3 days, leaving it on for 10 minutes to enable it to release the iodine before rinsing it off), or longer until the infection is controlled and any broken skin is healed. If the condition still remains active, you may need to discuss a course of antibiotics for your horse as prescribed by your vet. After the reaction has settled down, apply a liberal coating of zinc cream or high UV factor sunscreen lotion to reduce UV reaction. It will help prevent recurrence and repel excess moisture and minimise skin cracking as it flexes during exercise.

Try it - it really works!

Handy Hint 1

Encouraging a Horse to Drink after Exercise or Travelling

With the warm weather approaching, it is important to ensure a horse maintains hydration to assist its work effort and recovery. Offering 4-5 litres of luke-warm water, with 2 teaspoonsful of plain, fine table salt added per litre (50g or 2½ tablespoonsful table salt in 5 litres luke-warm water) after taking the bridle and gear off in the wash bay, will help to rehydrate the animal within 5-10 minutes. Horses can be trained to drink this simple rehydration mix by offering it to them each time they come back from training or after they come off the float after travelling. Adding 50g glucose (dextrose) with the 50g salt in 5 litres encourages them to drink and the glucose assists in sodium uptake from the small bowel.

Handy Hint 2

Kohnke's Own® Contact Details

FREECALL 1800 112 227 - FREE FAX 1800 112 228

Website: www.kohnkesown.com - Email: info@kohnkesown.com

Postal Address: PO Box 3234, Rouse Hill, NSW, 2155

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Antioxidants cont...

Oxidation 'Stress'

Whenever oxygen is used in aerobic metabolic processes to produce energy, compounds called 'free radicals' or more scientifically 'activated oxygen species' (AOS for short), which include 'superoxide' compounds and other single oxygen chemicals as well as hydrogen peroxide, are formed.

Polyunsaturated fats (called fatty acids or lipid compounds) are an integral part of all cell walls and they are particularly prone to oxidation to produce damaging 'free radical' compounds during aerobic exercise. Free radicals are 'mobile' oxidation compounds which then are able to oxidise other fats and have harmful effects by damaging cells, as well as stimulating inflammation and cell wall breakdown.

Antioxidants and Muscle cells

Studies have shown that antioxidants in feeds have an important role in reducing muscle cell and other cell damage during exercise.

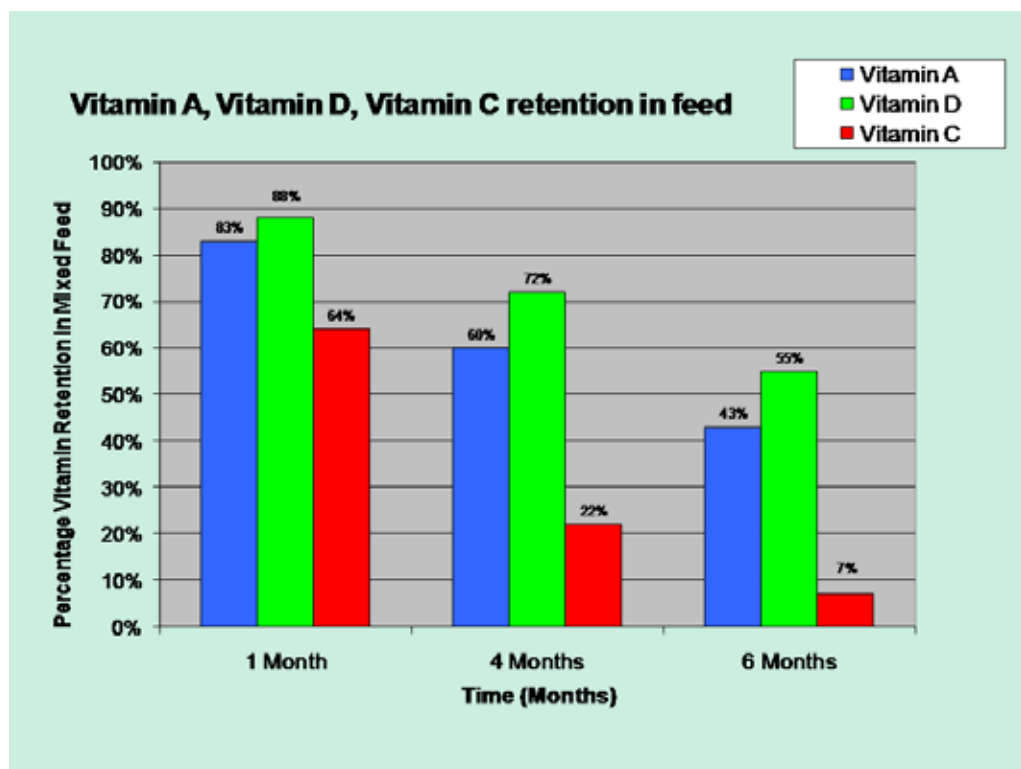
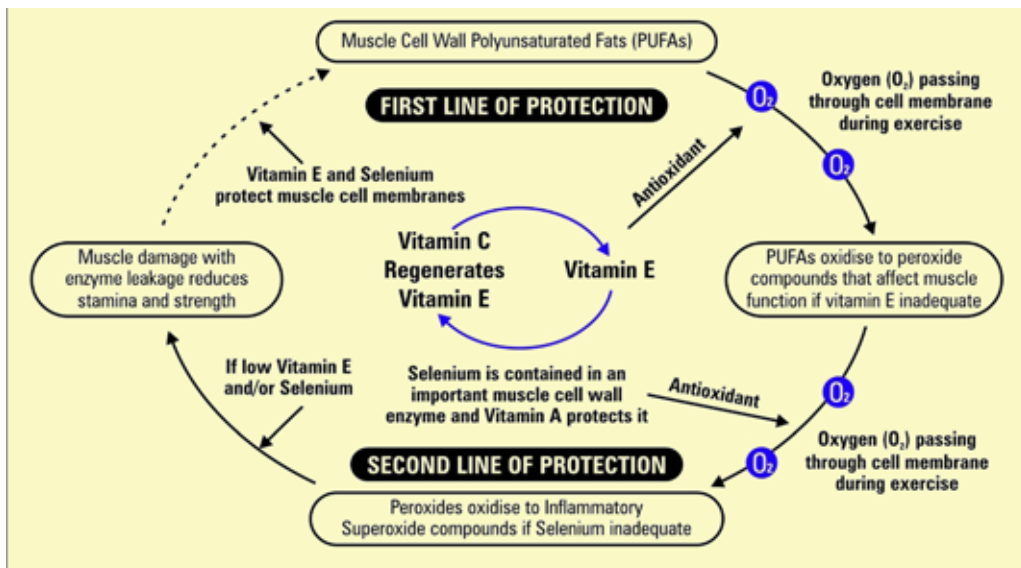
In the endurance horse, up to 90% of the energy in muscles is produced aerobically, using up to 30 litres of oxygen per minute for every hour during a ride, as energy is aerobically produced from the metabolism of carbohydrates, fats and other high energy compounds in muscle cells. The vast amounts of oxygen passing through the muscle cell membranes and the waste heat produced during muscle metabolism heats up the muscle environment, which combined with the presence of oxygen, results in a very high oxidation 'stress' on the polyunsaturated fatty acids in the muscle cell walls of the contracting muscles, which are an integral part of the cell wall and internal muscle cell membranes.

During long distance exercise, muscle damage occurs primarily due to oxidation of the lipids in the cell walls, resulting in the formation of harmful and inflammatory peroxide and superoxide radicals. These are even more highly reactive and trigger more oxidation and damage to cell walls due to cell wall inflammation. They can eventually lead to leakage of internal cell enzymes into the surrounding fluid and blood in severe cases.

Outlined below are some of the dietary antioxidants that are important protectants to ensure healthy metabolic function in exercising horses.

Vitamin C - Although horses can synthesise their own needs of Vitamin C from glucose in their livers, there is much controversy as to whether adequate synthesis occurs in horses, such as endurance horses, under the stress of long distance exercise. Horses at pasture have higher blood levels of Vitamin C than horses in training and older mares have lower blood levels than younger mares on the same feed.

Vitamin E - The National Research Council (NRC 2007) in the USA, which provides up-to-date guidelines on the daily nutrient requirement of horses has reviewed studies that suggest that on a cereal grain and hay diet, working horses require from 600-1800mg of Vitamin E daily to maintain adequate blood, liver and muscle tissue



levels when in training. Vitamin E cannot be synthesised in the horse's body and adequate amounts have to be consumed daily from the feed.

Unfortunately, Vitamin E in feeds is subject to deterioration during the maturing of the plant, harvesting, processing and storage before the feed is provided as dry hay and grain in the stable. Although lucerne contains a reasonable level of Vitamin E, up to 172 IU/Kg Dry Matter (DM) as fresh pasture, sun curing lucerne hay or chaffing the hay, reduces the level to between 10-20 IU/Kg DM. Air dried lucerne meal, which contains mainly leaves in contrast to lucerne chaff which contains leaves and stems), can contain from 100-120 IU Vitamin E/Kg DM, illustrating the destructive effect of sun curing on the natural Vitamin E content of hay.

As an added insult to Vitamin E intake in horses, fresh lucerne contains a Vitamin E antagonist compound, making much of the Vitamin E unavailable to the horse anyway, so sun-cured hay is the best source as the antagonist compound is destroyed during the curing process after cutting the hay and allowing it to dry and cure in the sun.

Although fresh oat grains on a plant may contain 50-60 IU Vitamin E/Kg DM, harvested and stored grain contains less than 15-20 IU Vitamin E/Kg DM. A horse eating 3Kg of oats in a daily ration as a primary energy source, is lucky to obtain 60 IU of Vitamin E from this

amount of oats. Corn (maize) contains up to 130-150 IU/Kg Vitamin E in fresh samples, but processing and oxidation of the oil content (rancidity) during storage reduces the Vitamin E content to 30-35 IU/Kg DM, or even less during long term storage.

Most diets of dried feeds and grains contain much lower than adequate levels of Vitamin E to sustain blood, liver and muscle cell levels. Supplementation with Vitamin E is required to ensure that adequate antioxidant protection is provided.

Although Vitamin E is added to ready-mixed feeds to help meet the requirement for exercise, much of this is destroyed within the first month during storage after manufacture, especially in molasses based 'sweet' feeds. Trace-minerals, such as non-chelated copper and iron, in the ready-mixed feed can also rapidly destroy added Vitamin E (and Vitamin C) in the damp environment within the 'fines' of the mix.

Normally about 750-1000IU of Vitamin E daily is recommended as a daily supplement for working horses, with up to 3000-4000IU daily being recommended in competitive endurance horses on each day for the 2-3 days before a ride to provide optimum antioxidant protection to working muscles.

Selenium - The micro-trace-mineral, selenium, is another vital antioxidant compound which needs to be supplied in the diet, as it provides a final 'last ditch' defense against harmful superoxide radicals and prevents their further oxidation to even more damaging superoxide and 'activated oxygen species' within the muscle cells. It is contained in the enzyme, glutathione peroxidase, which indicates that it prevents the formation of harmful superoxide radicals within the exercising muscles as polyunsaturated cell wall fats are stressed by the large scale perfusion of oxygen



Areas of Selenium Deficiency in Australia

through the muscle cell walls during exercise. Selenium also has other metabolic and immune functions within the body, but its main function in exercising horses is to prevent lipid superoxide formation during strenuous high oxygen metabolic processes.

Selenium contained in grains and hay is present as a selenium-methionine complex (called selenomethionine) or an organic form of selenium which is present in selenium yeast. The natural food source organic forms are significantly more bioavailable as compared to the inorganic forms, such as sodium selenate or selenite, which are used in some supplements. Selenium deficiency in soils and plants are common in high rainfall coastal areas.

Providing Antioxidants

(cost per day based on recommended retail price for large size packs)

GENERAL SUPPLEMENT

Marathon Endurance contains 2,400 IU of Vitamin E and 2.1mg of organic selenium per 60g dose, complemented by 50,000 IU of Vitamin A. Cost is around 90 cents per 60g daily dose.

ANTIOXIDANT BOOST

Cell-E Premium contains 1,000 IU Vitamin E in natural and synthetic forms, and 1.0mg organic selenium per dose, as well as 1.5g Vitamin C and 1,000 IU Vitamin A, in a high protein whey powder base, which is itself a useful antioxidant. Cost around 70 cents per 15g daily dose - compared with \$0.90-\$1.50 for straight Vitamin E in other brands.

PROTECTION OF FATS

Energy-Gold Omega-3 and Omega-6 oil contains 3000 IU Vitamin E per litre, or 750 IU per 250mL cupful - protects Omega-3 fatty acids in muscle cells. Cost around 58 cents per day for 100mL.

MUSCLE DEVELOPMENT

Muscle XL contains 500 IU Vitamin E per 60g dose, in a high protein whey powder, which assists glutathione activity in muscle cells. This product is used to build muscles and as a pre-ride muscle protectant, providing a high level of antioxidant activity. Cost \$1.30 per day for 60g dose. Only use when require to build and maintain muscle mass and aid muscle protection prior to and after a ride.

LEG CARE ~ TAKING THE HEAT OUT

Bones are living structures which have a blood and nerve supply and are continuously undergoing turnover of bone cells and reinforcement (called modelling) in response to exercise loading in the working horse. During training, the long bones and subchondral bone layers under the joints respond by increasing the thickness of the bone shaft (or 'cortex') and the density of calcium along 'stress lines' within the bone relative to the load bearing resulting from speed, rider weight and concussion.

THE 'LEGGING UP' PHASE

When an endurance horse is brought out of the paddock and first starts a training program, the bones begin to respond to exercise loading once the horse is either ponied at the trot, or ridden above walking speed. The bones respond by laying down more calcium to increase bone density and increase their strength to carry extra weight loading and transmit muscle power. This 'legging up' process of step-wise increases in speed and distance worked to improve fitness must be planned over at least a 3 month period to enable the bone shafts to model, the joint surfaces to thicken, the subchondral bone to increase in density and the muscles to adapt their blood and oxygen supply.

Legs and tendons only respond to the loading they have to carry. In a resting, grazing horse the bones and tendons are only as strong as required to withstand short term trotting, cantering and the occasional gallop. However, whilst they respond to loading during the 'legging up' phase of training, if the horse is turned out at the end of the endurance season, within 6-8 weeks the bones remodel to near their original thickness and density, resorbing calcium from along the stress pathways.

'Legging Up' for each Endurance Season

The process of 'legging up' needs to be repeated for each season of competition, although generally some increase in density and strength from previous training is retained from year to year. The first 'legging up' phase in a young horse is the most critical and care should be taken not to exceed the normal bone modelling process by working a young horse 'too fast, too early, with too much rider weight, up too steep a slope'. It should ideally be carried out in a 2 phase process of 4-6 weeks initially and then 2-3 weeks lighter work, followed by another 4-6 weeks.

Handy Hint 3

LEG CARE - COOLING IS IMPORTANT

The main focus on leg care during a ride is to remove excess heat accumulated by the high blood and body temperatures (up to 41°C). Elastic stretch energy in tendons also adds to their heat load, with temperatures reaching 44-45°C in the tendons. The hooves also generate heat from friction on the ground surface, with hoof temperatures reaching 43-44°C, especially on warm days when the trail surface heats up during the day, particularly on treeless sandy tracks. The accumulated heat in the tendons is potentially the most damaging, with internal 'cooking' of the collagen and matrix structures if heat is retained. The tendons can actually heat by an additional 1-2°C once exercise is stopped and air is not flowing over the limbs to assist cooling, such as when bandages are not removed after exercise. Warm sweat may prolong the cooling process as it runs down the limbs.

MAINTAINING THE LEGS

The bones are continuously modelling to maintain or increase their strength in response to exercise. Providing a diet adequate in bone minerals (calcium, phosphorus and magnesium), trace-minerals (zinc, copper, manganese and selenium) for joint cartilage, Vitamins A, E & C for tendon and collagen maintenance, as well Vitamin D for regulation of calcium and phosphorus uptake and bone density is essential for performance horses. Diets based on grains, with 2-3kg of lucerne daily as roughage, with a supplement such as **Kohnke's Own Marathon Endurance** to correct shortfalls in trace-minerals and Vitamins will help maintain bone and tendon structure during the competitive season. Avoid excess calcium during training as it can lead to an increased risk of 'thumps' during a ride under hot, humid conditions.

Cooling the Legs at Each Rest Period

Many riders focus on strapping the body to remove accumulated heat in the muscles to help reduce heat rates and assist recovery during a rest period. However, under hot conditions, the limbs should also be washed down with cold water and scraped off with the hands to remove excess heat. Water retained in the haircoat tends to heat up and slows cooling in a standing, resting horse. It is best to quickly strap the body and then the legs, as the warm strapped water from the body migrates downwards onto the legs and should be removed. Repeat the body cooling and leg cooling for 2-3 cycles. If available, iced water or cold water hosing after each day's ride is most efficient at removing heat. Cooling liniments and evaporative gels rubbed on after cooling with water may assist cooling and soothe minor discomfort before the next leg of a ride.

Handy Hint 5

Cooling Down to Stop Panting or 'Blowing' after exercise

Does your horse pant heavily or "blow" hard after an uphill workout? It may be trying to blow off excess heat generated by the strenuous exercise from its lung surface to try to cool itself. Horses dump excess heat generated during exercise which they cannot dissipate by sweating or cooling air movement over their body as they work into the large 'heat sink' of water reserve (about 50 litres) held in the hindgut fibrous digestive mass. Once back in the wash bay or at a rest point in a ride, hose or sponge the underbelly area for 30 seconds with cold water, walk the horse for 30 seconds and then hose or sponge under the belly again for 30 seconds to reduce 'gut' heat stores after exercise. This will aid recovery, lower the heart rate more quickly by removing heat and stop the excessive 'blowing' as the horse recovers.

Handy Hint 6

Refusal to Drink Water

Some horses will be reluctant, or will drink only small volumes of chlorinated town water when away from home, especially if they are accustomed to rain water, clean dam water or sweet bore water.

Either take your own water to provide for the horse when travelling, or blend it 50-50 with local chlorinated water to dilute the smell or taste.

Alternatively, mix in a tablespoonful of clean clay (from around the home dam or yards) per 10 litres of the town water to mimic the taste. The chlorine smell and taste can be removed by adding 25% (1 part to 4 parts) of freshly boiled water to the bucket. Allow it to cool before offering it to the horse to drink. A few drops of vanilla essence added to 20 litres of water may also help to improve acceptance.

Handy Hint 7

Remove Tendon Wraps Promptly after Training

Tendon wraps to protect the lower limbs from lacerations on sticks or interference are not widely used because sand is likely to collect between the wrap and the skin to cause abrasion and discomfort and they can become wet and shrink during training exercise. However, where a horse has a minor laceration or a healing wound which needs protection, a light working bandage may be worthwhile.

Remove tendon wraps and protective bandages immediately after exercise and apply ice or cold water hosing to cool tendons down quickly. Retained heat which increases tendon temperatures above 45°C for 10-15 minutes after exercise may damage tendon fibres and weaken tendons, increasing the risk of tendon failure.

Handy Hint 4

Kohnke's Own®

Product of the Month

After years of development - Muscle XL™ is a world first for horses - a natural muscle building feed supplement without hormones which provides specific nutrient compounds to help 'bulk up' and strengthen the major limb muscles in 10-14 days.

MUSCLE XL



Based on high protein weigh isolates, with added Vitamin E, organic sulphur and organic zinc for muscle protein synthesis, Muscle XL provides specific branched chain amino acids, glutamine and other amino acids to correct low or inadequate levels in grain and hay based diets.

For best result, give it as a water or milk slurry, as directed, over the tongue within 15 minutes of daily exercise (eg on leaving the wash bay), before offering other feed. This will ensure that the nutrients are taken preferentially into the muscle cells during the recovery phase.

Results can usually be seen after 10-14 days

Horses that had 'slabby sides', 'flat rumps', 'weak hindquarters' or 'poor muscle strength and stamina to finish strongly', will normally improve by bulking up and becoming stronger and more pliable in the muscles. After the initial course of 10-14 days, use Muscle XL as required to maintain muscle mass and strength.

For further information on Muscle XL - Ring 1800 112 227 or email info@kohnkesown.com

Available in 800 g (1 horse course), 2 kg, 6 kg and 10 kg packs.



...ABOUT Energy-Gold

The only Omega oil with Vitamin E to ensure optimum results at no extra cost!
Very palatable garlic flavouring.



...ABOUT Hoof-Seal

Its protective film limits moisture variations. It only needs to be applied twice weekly.
No mess or "rub-off" on your hands.
Dries in 10 minutes - does not collect bedding, sand or dust.

Disclaimer: The information and recommendations in this newsletter have been presented as a guideline based on the veterinary experience and knowledge of the author, Dr John Kohnke BVSc RDA. Whilst all care, diligence and years of practical experience have been combined to produce this information, the author/editor, Dr John Kohnke, accepts no responsibility or liability for unforeseen consequences resulting from the hints and advice given in this newsletter.

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