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FEEDING TO WIN

EXCESS PROTEIN
IS IT ADDING SECONDS TO
YOUR HORSES TIME?



THE SIGNS OF
IMPROPER NUTRITION
ARE SO COMMON, WE
THINK THEY'RE NORMAL

OVER 90% OF PERFORMANCE HORSES ARE
UNDERPERFORMING DUE TO THEIR DIET - ARE
YOURS?

MAKE FEED YOUR **ADVANTAGE** FOR IMPROVED **PERFORMANCE**

FEEDING FOR PERFORMANCE

The purpose of this brochure is to assist trainers in improving the mental and physical health and wellbeing of their horses, resulting in improved performance. This brochure will outline common illnesses and diseases and the signs that indicate a nutritional problem in the diet.

CLINICAL SIGNS OF IMPROPER NUTRITION

Unfortunately, the clinical signs of improper nutrition and management are so common they are deemed normal or in many cases they are dismissed. In reality, improper nutrition and management can reduce performance by producing the signs listed below.

- Poor doer / poor feed conversion
- Poor hoof quality
- Poor coat
- Decreased resistance to infection
- Nervous / excitable behaviour
- Reduced performance
- Anaemic
- Picky eater
- Suppressed / reduced appetite
- Eating hay in preference to hard feed
- Eating bedding, dirt, timber
- Cribbing
- Windsucking
- Weaving
- Training off
- Aggression at feed time
- Teeth grinding
- White sweat
- Strong ammonia smelling urine

COMMON FEEDING PRACTICES THAT ARE PROVEN TO REDUCE PERFORMANCE

Inadequate roughage supply

It has been argued that roughage provides a weight handicap to racehorses and that roughage should be decreased leading up to race day to provide a weight advantage. The basis of this argument was from a study of four thoroughbred type geldings in light to moderate work that resulted in an average body weight of 10kg more on the forage diet compared to the 50% forage 50% concentrate diet (Ellis et al 2002). More recently, a study of twelve adult standardbred horses in training concluded that the small increase in bodyweight on 100% forage diets compared to a 50% forage 50% concentrated diet

diminished with feed deprivation overnight and that high energy forage diets could be used as an alternative to high grain diets for athletic horses (Connysson et al 2010). Research has also shown that racehorses fed 100% roughage diets had comparable performance but lower blood lactate and higher venous pH after exercise than horses fed a cereal and roughage diet (Jansson et al 2012). This shows that the horses were able to perform aerobically which means it takes longer to fatigue and reduces stress and recovery. Feeding bicarbonate (milkshakes) to counteract acidosis has been a common practice and this study shows that this effect can be achieved naturally by feeding a

roughage diet. Low quality (mature and stemmy roughage) has been shown to increase the heart rate in exercising horses and also holds more water, resulting in a weight disadvantage and impairs performance (Ellis et al 2002). No such negative relationship has been found when feeding a high quality forage, leafy roughage is more digestible, has higher protein, holds less water and helps to replenish muscle and glycogen reserves (Connysson et al 2010). Studies into feeding leafy high quality roughage have reported no significant rise in body weight or heart rate during exercise (Jansson et al 2012). In conclusion, high performance trainers should be looking at roughage as the primary

carbohydrate source for horses in training and should be feeding concentrates only when required. Selecting a quality roughage source is key. The grass species is less important than the stage of growth. Any appropriate seed or meadow hay that has been well conserved with a high proportion of leaf to stem is best. Further to this, inadequate roughage has been directly linked to gastric ulcers, acidosis and colic.

Incorrect roughage selection

Selecting prime lucerne hay as the primary roughage source may cause two issues that reduce performance: excess protein and an unbalanced calcium:phosphorus ratio that may result in enteroliths. Grassy hay high in lignin also reduces digestibility and nutritional value. When selecting hay, choose hay that is less mature and soft to touch. Choose a lucerne/grassy mix in preference to a 100% prime lucerne hay. A good quality oaten hay is also suitable.

Inadequate or imbalanced mineral supply (including electrolytes)

Abroad spectrum mineral and electrolyte supplement is critical for performance horses. A broad spectrum supplement is preferable to adding several supplements as often there is an overlap in minerals which can change the balance and effect the absorption of other minerals. Whilst ensuring that a horse receives adequate levels of minerals is very important, the balance between these minerals is also an important aspect of mineral supplementation. Analysis of an individual mineral in the diet may indicate adequate levels are being achieved. However, if it is not correctly balanced with the other

minerals in the diet it can result in a relative deficiency. Minerals are grouped into two categories - macro minerals (required in grams per day) and trace minerals (required in milligrams per day). Macro minerals include phosphorus, sulphur and the electrolytes calcium, sodium, potassium, magnesium and chloride. Trace minerals include cobalt, copper, zinc, manganese, iron, iodine and selenium. Feeding a broad spectrum mineral and electrolyte supplement that has balanced ratios of these minerals takes out the guesswork associated with homemade mineral blends and avoids any crossovers when supplementing with more than one product.

Research shows that over 90% of performance horses suffer from ulcers and of these, less than 50% show clinical signs

Inadequate Vitamin supply

Whilst only required in small amounts, vitamins are vital for many bodily functions including vision, immunity, growth, bone development, blood clotting etc. Vitamins are classified into two categories; fat soluble (A, E, D & K) and water soluble (C, B Complex).

Fat soluble vitamins are stored in the body and transported in blood. Vitamin D is obtained from sun cured forages and from access to direct sunlight for as little as 20 minutes per day. Vitamin D is stored in the body. Horses that have access to paddocks and direct sunlight during spelling periods will store the excess Vitamin D obtained over these periods for use when access to direct sunlight is limited. Vitamin A may require supplementation particularly when green pasture is unavailable. Vitamin E is an antioxidant and

recommended to be added to the diet along with selenium. Vitamin K is manufactured in the gut. Symptoms of Vitamin K deficiency have appeared in horses that have eaten mouldy sweet clover hay and horses that are given Warfarin for therapeutic purposes.

Water soluble vitamins dissolve easily in water and need to be supplied daily. Unlike humans that require Vitamin C supplementation, horses synthesise Vitamin C in their liver. B group vitamins need to be supplied regularly and are produced by microbial synthesis in the large intestine. A disruption to the large intestine (inappropriate diet, high starch diet etc.) can affect the production of B group vitamins. Most horses in light work do not require supplementation with B group vitamins or vitamin C. Horses in hard work may require supplementation of Folic Acid and Vitamin B1. Horses on a poor diet of high concentrate and low roughage levels may require supplementation with other B group vitamins due to the reduced function of the gut. It is likely horses in this situation would also be suffering from other clinical signs including poor feed conversion, poor hoof quality, decreased resistance to infection, nervous or excitable behaviour, finicky appetite, reduced appetite or reluctance to eat hard feed in preference to eating roughage or stable bedding. Choosing a vitamin supplement that has Vitamin A, E, B1 and Folic Acid is important to achieve optimal performance.

Over supplementation

This issue is prevalent amongst high performance horses as owners are often adding supplements and extras in the feed. Over supplementation is the result of adding incompatible feeds and/or supplements where overlaps occur resulting in excessive intake of one or more nutrients.

All horses have six basic nutritional requirements. These are: water,

carbohydrates, fats & oils, protein, minerals and vitamins. The table below shows how each nutrient can be provided through a variety of products including a high performance racing mix, roughage, chaff, pasture, cereal grains, oil, protein meal and a variety of supplements.

As table 1 illustrates by adding one of the above supplements to the high performance racing mix it can result in over supplementation as the ingredients are duplicated. This table also shows the overlap of supplements that target specific areas of the horse, for example feeding a hoof supplement and calmer is duplicating magnesium and zinc. If you were to feed an electrolyte, a hoof supplement and a blood building supplement there would be duplication in phosphorus, magnesium, Folic Acid and Vitamin B12.

Reviewing table 1 it is clear to see why high performance racing mixes are so prevalent in the racing industry, they tick all the boxes and provide carbohydrate, fats & oils, protein, full range of macro and trace minerals, electrolytes, salt and vitamins. The area these products fall short are tailoring to each horse's specific needs. In an effort to overcome the fixed ratios between carbohydrates, fats & oils and protein, feed companies produce different mixes with varying protein content in an effort to customise the mix closer to the individual's requirements.

The inherent weakness of products with fixed nutrient ratios means that feeding the recommended quantity a horse may receive an over or undersupply of nutrients, adjusting the feeding ration to suit one nutrient will adjust the intake of the other nutrients. Incorrect levels of protein, excess starch, type of energy source, inadequate minerals and vitamins can all lead to decreased performance. The alternative to a high performance mix is to provide a meal of straights with a supplement like Equilibrium. This allows complete customisation

of each horse's feed giving trainers the ultimate control over their horse's feed. As Table 1 illustrates roughage provides all groups of nutrients. Cereal grains can be used to top up carbohydrates, oil is used to provide extra fat, and full fat soybean meal tops up protein, Equilibrium provides a broad range of macro and trace minerals as well as selected vitamins. When horses are fed a roughage based diet with minimal concentrates they are able to produce their own B group vitamins, Vitamin K and Vitamin C.

Excess Protein

In high performance horses, the optimal amount of protein needs to be fed. Inadequate protein reduces performance as does overfeeding protein. Research shows that excess protein increases race times (slows horses), with every 1kg of excess crude protein in the diet adding 1 – 3 seconds to the race time (Glade, 1983). Research in other performance horses indicates excess protein should be avoided because of the effects on water intake, urea and ammonia metabolism (Meyer, 1987).

Protein is vital for life and has numerous functions. It consists of chains of amino acids that are classified into two groups essential (required in the diet) and non essential (synthesised by the horse). Protein digestion begins in the stomach and is further digested and absorbed in the small intestine.

Excess protein in the diet is characterised by a strong ammonia smelling urine and/or a thick lathery white sweat. All performance horse trainers should aim for a clear watery sweat and clear low smelling urine.

Soybean meal and lucerne are good quality protein sources for horses, as both contain good levels of essential amino acids. Keep in mind that young growing performance horses will benefit from a higher percentage of protein in their diet than mature performance horses.

Prepared feed mixes can be

inappropriate due to the fixed ratios of protein, energy, vitamins and minerals. Feeding less than recommended levels reduces vitamin and mineral intake which is undesirable and can impact performance.

Excess Starch

Research by McLean in 2000 indicated that a maximum starch level of 2g/kg body weight per meal was tolerated by horses. In 2008 research by Vervuet halved the maximum starch level to 1g/kg body weight per meal. What should we make of this? The way a horse digests and utilises its feed has remained the same - it is our knowledge and understanding that is improving over time. The research in 2009 indicates that a 500kg horse should receive a maximum of 1.2kg of oats, or 900g of barley, or 700g of corn per meal. See table 2 with specific reference to body weight and maximum starch intake. Excess starch is linked to ulcers, acidosis, laminitis and tying up.

Inappropriate energy source selection

Energy requirements for a horse in very hard work is up to 90% higher than that of a horse at maintenance. Racehorses galloping over longer distances have higher total energy demands than those doing short sprints. Sprint races are mostly run anaerobically and for this the horse uses glucose and muscle glycogen as fuel. However, many racehorses run longer distances and use a combination of aerobic and anaerobic energy. Energy sources include fibre, starch, fats and oils. Grass, hay and sugar beet pulp are all high in dietary fibre and are the most suitable energy sources for horses. Starch is a carbohydrate source found in many plants. High levels of starch are found in cereal grains (40-70%) and horses can only digest limited amounts in the small intestine. Excess starch

Table 1 - Over Supplementation Guidelines

	High Performance Racing Mix	Combination of straights satisfying requirements						Targeted Supplementation				
		Roughage, Chaff, Pasture	Cereal Grain	Oil	Full Fat Soybean Meal	Equilibrium	Horse produces	Calmer	Blood Building	Hoof	Electrolyte	
Carbohydrate	✓	✓	✓									
Fats & Oils	✓	✓	Limited	✓	✓							
Protein (Amino Acids)	✓	✓	Limited		✓					✓	✓	
Minerals												
Calcium	✓	Variable depending on weather conditions, stage of growth, soil content, pasture type etc.	Imbalanced Ca:P ratio			✓					✓	
Phosphorus	✓					✓			✓			✓
Magnesium	✓		Limited considering quantities required to reach recommended dietary intake			✓		✓			✓	✓
Sodium	✓					✓						✓
Chloride	✓					✓						✓
Potassium	✓					✓						✓
Iron	✓					✓				✓		
Manganese	✓					✓						
Zinc	✓					✓			✓			✓
Copper	✓					✓						
Selenium	✓					✓				✓		
Cobalt	✓					✓						
Iodine	✓					✓						
Vitamins												
Vitamin A	✓	↑ when green				✓						
Vitamin E	✓					✓		✓			✓	
Folic Acid	✓	Variable				✓	✓		✓		✓	
Vitamin B1	✓					✓	✓	✓			✓	
Vitamin B2	✓						✓	✓	✓		✓	
Vitamin B6	✓						✓	✓	✓		✓	
Vitamin B7 (biotin)	✓							✓		✓		
Vitamin B12	✓							✓		✓	✓	
Vitamin D	✓	✓ sun-cured forage					✓					
Vitamin K							✓					
Vitamin C							✓					

Table 2 - Starch Maximum Levels per Meal

Body Weight (kg)	Maximum kg per meal if no other grain, concentrate or prepared feed fed			Mixed Grain Ration - Maximum kg per meal if fed in the ratios below when no other grain, concentrate or prepared feed is fed			
	Oats 40% Starch	Barley 55% Starch	Maize/Corn 70% Starch	50 :50 Oats & Corn Ration	50:50 Oats & Barley Ration	50:50 Barley & Corn	1 Oats : 1 Barley : 1 Corn
				Oats + Corn	Oats + Barley	Barley + Corn	Oats + Barley + Corn
400	1.0	0.7	0.5	0.50 + 0.25	0.50 + 0.35	0.35 + 0.25	0.33 + 0.23 + 0.17
420	1.0	0.7	0.6	0.50 + 0.30	0.50 + 0.35	0.35 + 0.30	0.33 + 0.23 + 0.20
440	1.1	0.8	0.6	0.55 + 0.30	0.55 + 0.40	0.40 + 0.30	0.37 + 0.27 + 0.20
460	1.1	0.8	0.6	0.55 + 0.30	0.55 + 0.40	0.40 + 0.30	0.37 + 0.27 + 0.20
480	1.2	0.8	0.6	0.60 + 0.30	0.60 + 0.40	0.40 + 0.30	0.40 + 0.27 + 0.20
500	1.2	0.9	0.7	0.60 + 0.35	0.60 + 0.45	0.45 + 0.35	0.40 + 0.30 + 0.23
520	1.3	0.9	0.7	0.65 + 0.35	0.65 + 0.45	0.45 + 0.35	0.43 + 0.30 + 0.23
540	1.3	0.9	0.7	0.65 + 0.35	0.65 + 0.45	0.45 + 0.35	0.43 + 0.30 + 0.23
560	1.4	1.0	0.8	0.70 + 0.40	0.70 + 0.50	0.50 + 0.40	0.47 + 0.33 + 0.27
580	1.4	1.0	0.8	0.70 + 0.40	0.70 + 0.50	0.50 + 0.40	0.47 + 0.33 + 0.27
600	1.5	1.0	0.8	0.75 + 0.40	0.75 + 0.50	0.50 + 0.40	0.50 + 0.33 + 0.27

TABLE 3 - Common Feeds Explained

Product		General Information	Advantages	Disadvantages	Maximum dosage
Chopped/Refined Forage	Lucerne (Alfalfa) Products	<ul style="list-style-type: none"> Commonly available as a hay or chaff in Australia Available as alfalfa pellets or chop in Europe 	<ul style="list-style-type: none"> Around 33% fibre High protein Good quality protein 	<ul style="list-style-type: none"> Excess causes white sweat and can reduce performance. Reports of behaviour issues in some horses 	<ul style="list-style-type: none"> Mix at least 2 parts chaff to 1 part concentrate. White chaff not necessary when adequate levels of lucerne/alfalfa chaff are added to hard fed. If ammonia smelling urine or has thick white lathery sweat reduce lucerne/alfalfa and add/increase white chaff
	Oaten Chaff	<ul style="list-style-type: none"> Also known as white chaff Bulks the hard feed to slow digestion of nutrients 	<ul style="list-style-type: none"> Around 35% fibre Bulk hard feed when lucerne/alfalfa unsuitable 	<ul style="list-style-type: none"> Variable nutritional content 	
	Wheaten Chaff	<ul style="list-style-type: none"> Also known as white chaff Bulks the hard feed to slow digestion of nutrients 	<ul style="list-style-type: none"> Around 38% fibre Bulk hard feed when lucerne/alfalfa unsuitable 	<ul style="list-style-type: none"> Variable nutritional content 	
Cereal Grains	Oats	<ul style="list-style-type: none"> 40% starch, fibre in hull Can be fed whole or soaked prior to feeding Most palatable of all grains 	<ul style="list-style-type: none"> Does not require treatment to improve digestibility Energy dense and consistent nutritive value 	<ul style="list-style-type: none"> Excessive intake causes LI disturbance resulting in tying up, colic, acidosis or laminitis Poor Ca:P ratio Phytates bind Ca absorption Untreated maize and barley have naturally poor SI digestibility. 	<ul style="list-style-type: none"> 500kg horse fed no other cereal grain, coarse mix or pellet. Feed up to 1kg p/day. If feeding more than 500g of Barley or Maize (Corn) per day then split into at least two feeds.
	Barley	<ul style="list-style-type: none"> 55% starch To increase SI digestibility to 90% feed extruded 	<ul style="list-style-type: none"> Higher energy than oats Energy dense and consistent nutritive value 		
	Maize (Corn)	<ul style="list-style-type: none"> 70% starch To increase SI digestibility to 95% feed micronised 	<ul style="list-style-type: none"> Higher energy than oats and barley Energy dense and consistent nutritive value 		
Cereal by-product Bran		<ul style="list-style-type: none"> Low nutritive value 	<ul style="list-style-type: none"> Appetite stimulant Administering medicine to fussy eaters 	<ul style="list-style-type: none"> Very poor Ca:P ratio Excess can cause bighead or 'bran' disease 	<ul style="list-style-type: none"> 1kg p/day. Feed with supplement containing good Ca:P ratio
Fibrous by-product Sugar beet pulp		<ul style="list-style-type: none"> Product left after the extraction of sucrose Available as molassed or unmolassed Very low risk of LI digestive disturbance 	<ul style="list-style-type: none"> High fibre 85% digestible Good Ca:P ratio Excellent carbohydrate source to top up energy levels without the fizz 	<ul style="list-style-type: none"> Can cause choke and stomach distension if not properly soaked prior to feeding <i>Expensive compared to cereal grains (Australia/NZ)</i> 	<ul style="list-style-type: none"> Follow manufacturers directions. Use to top up energy in ration, do not use as forage
Molasses		<ul style="list-style-type: none"> Residue following sugar extraction 	<ul style="list-style-type: none"> Palatable 	<ul style="list-style-type: none"> Unsuitable for laminitics, EMS, PSSM & sugar sensitive horses 	<ul style="list-style-type: none"> Feed to increase palatability or as a treat
Oil By-product Soybean Meal		<ul style="list-style-type: none"> By-product from extraction of oil from soybean 	<ul style="list-style-type: none"> High percentage & quality protein Small quantity required Can improve topline 	<ul style="list-style-type: none"> Excess can reduce performance. Some horses are allergic 	<ul style="list-style-type: none"> 1-2 cups p/day lactating mares, growing horses and horses lacking topline
Oil	Vegetable Eg. Corn, Soy, Sunflower, Rapeseed, Linseed	<ul style="list-style-type: none"> Corn oil most palatable Canola best omegas of vegetable oils Palm, coconut & extra virgin olive oil are mechanically extracted 	<ul style="list-style-type: none"> 2.25 x more energy than carbohydrates, excellent way to increase energy content Low GI, good digestibility Energy without fizz 	<ul style="list-style-type: none"> Palatability - introduce slowly to find maximum horse will tolerate. Poor Omega 3:6 ratio Most extracted using chemicals 	<ul style="list-style-type: none"> Total oil content up to 1 cup per day Underweight horses can have oil gradually increased up to 2 cups per day.
	Fish	<ul style="list-style-type: none"> Human research indicates benefit of high omega 3 and low omega 6 content Pasture has good omega ratio, issues arise when concentrates are added to the diet. 	<ul style="list-style-type: none"> 2.25 x more energy than carbohydrates, excellent way to increase energy content Low GI, good digestibility Energy without fizz Good Omega 3 : 6 ratio 		
Coarse Mix & Pellets		<ul style="list-style-type: none"> Mixture of cereal grains and by-products, oils and oil by-products, molasses and/or fibrous by-products. 	<ul style="list-style-type: none"> Convenient Contain carbohydrates, oil, protein, vitamins and minerals. 	<ul style="list-style-type: none"> Doesn't account for individual need To meet 100% energy needs there is an over/under supply of protein, minerals, vitamins. Costly compared to straights 	<ul style="list-style-type: none"> Feed according to protein or energy requirements (whichever is less). If feeding less than recommended top up with broad spectrum supplement or straights to meet needs.

Abbreviations: SI Small Intestine LI Large Intestine BW Body Weight Ca Calcium P Phosphorus GI Glycemic Index conc concentrates

travels to the large intestine causing digestive disturbance resulting in various conditions including colic, acidosis and laminitis. See table 2 for maximum starch levels per feed. As research has indicated (Jansson et al 2012) feeding roughage that is metabolised aerobically can increase time to fatigue and allow a horse to gallop longer. The horses natural diet is typically low in fats and oils, and while horses don't have a high requirement for fats and oils in their diet, they are metabolised aerobically and so provides more Adenosine triphosphate (ATP)-ATP is often referred to as the energy currency of life. ATP powers almost all of the cells activities including driving metabolic reactions, transportation of substrates, and mechanical work, such as moving muscles. Fat breaks down into long chain fatty acids and glycerol – the glycerol is then processed in the liver to glucose. When fed fat for three weeks, a horse is conditioned to use fat in preference to glycogen. The advantage is that the horse is getting maximum energy from food and saving glycogen for fast work. Horses that are able to fuel themselves in this way can work longer as glycogen depletion is a major cause of fatigue. Fat is an excellent way to increase the energy content of the diet without causing digestive disturbances. A maximum of 1g of fat per day per kg of bodyweight (eg 500g for a 500kg horse), is recommended as fat contains twice the energy of carbohydrates.

In summary, roughage should be the primary energy source for all horses. Sugar beet pulp is an excellent concentrated source of dietary fibre. Starch should be kept to a minimum and fats and oils can be fed to supplement the diet with extra energy.

Table 3 provides a brief description of common feeds and how they can be utilised in feeding programs.

Prepared feeds can be inappropriate for some horses due to the fixed ratio of protein, energy, vitamin and mineral content. For horses that are

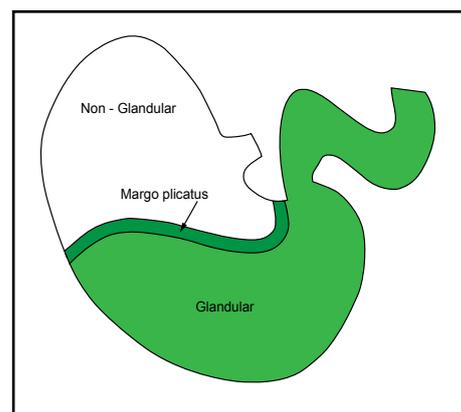
able to service their daily energy requirements on a high roughage lower concentrate diet, the reduced prepared feed intake results in reduced protein intake which may be undesirable in young growing horses. Reduced intake will also result in suboptimal vitamin and mineral levels which can negatively impact on performance.

Quantity of feed

Each hard feed should be no more than 2kg. The horses stomach is the size of a rugby ball (around 8 litres) and has a rapid rate of passage of 20 - 45 minutes. Total feed intake for horse in hard work varies from 2.25 – 2.5% of their bodyweight per day (see table 4). This equates to 11.25 – 12.5kg of feed per day for a 500kg horse of which half should be roughage. As a guide, racehorse trainers should work towards a rate of 2 – 4kg of concentrates per day. Other performance horses (eventing, endurance) should have a maximum of 1 kg of concentrates per day. The remainder of the feed is roughage. Taking into account maximum starch intake levels (Table 1) racehorses require at least 3 feeds per day with racehorses on high concentrate levels requiring 4 -5 feeds per day in conjunction with roughage being provided between feeds.

Feeding frequency and timing

In nature, horses roam 8 – 26 km each day and spend 16 – 20 hours grazing low quality high fibre feed. When we chew our food a signal is sent to release stomach acid in anticipation of food arriving. Horses are different to us in that they release stomach acid constantly. They have two parts to their stomach, an upper non-glandular region and a lower



glandular region. The glandular section produces hydrochloric acid (pH 1.5 – 2) and has a protective mucous layer. The non-glandular section has no protective mucous layer. Research shows that horses worked on an empty stomach have acid splash up from the glandular section to their non-glandular section causing acid to burn the non-glandular area. Saliva assists

Table 4 - Feeding Quantity Guidelines

Body Weight	Guideline for feed per day for a racehorse horse in full work (kg)	Achievable feeding rate for better gut function in racehorses (kg)			Min & Max Rates in kg per day		
		Forage	Conc	No. hard feeds	Min forage	Max conc	No. hard feeds
400	9 to 10	8.00	2.00	2	5.0	4.00	4
450	10 to 11	8.95	2.30	3	5.6	4.50	5
500	11 to 13	9.90	2.60	3	6.3	5.00	5
550	12 to 14	10.85	2.90	3	6.9	5.50	6
600	14 to 15	11.80	3.20	4	7.5	6.00	6
650	15 to 16	12.75	3.50	4	8.1	6.50	7

It is preferable to feed hay over chaff/small particle sized roughage. Hay requires more chewing and results in higher saliva production providing an increase in the buffer against stomach acid.

conc = concentrates min = minimum max = maximum no = number

in buffering the acid in the stomach. Saliva is released when horses chew roughage. In the absence of roughage, it is now believed that horses attempt to generate saliva by cribbing and windsucking to reduce discomfort associated with ulcers. A high quality leafy roughage is recommended to be fed ad lib to all horses including high performance horses. It is also not recommended to feed a large cereal concentrate meal less than 4 hours before a competition as the blood glucose levels are lowest 90 minutes after feeding.

DISEASE & ILLNESS ASSOCIATED WITH IMPROPER NUTRITION

- Colic
- Acidosis
- Tying Up
- Ulcers
- Laminitis
- Seedy Toe

Research shows that over 90% of performance horses suffer from ulcers and of these, less than 50% show clinical signs. The reality for the majority of performance horses is that they are performing well despite a poor diet. A balanced and appropriate feed ration will eliminate the barriers that are preventing optimal performance.

COST COMPARISON

It is a common belief in the horse industry that as the cost increases so does the quality. In fact many companies rely on this and deliberately position products in the premium price bracket so that the market perceives them as high quality. An astute and informed trainer can develop individual feeding programs tailored to each horse and make significant savings to the overall feed bill. Table 5 shows the potential savings that

can be made. Cost assumptions made to reach these savings estimates include: Prepared feed mix at \$1270/tonne, cereal grain (extruded barley) \$800/tonne, soybean \$950/tonne, oil at \$1800/tonne, supplement (Equilibrium Mineral Mix \$79.95/22kg). These savings do not take into account the additional costs of the labour required in mixing individual feeds.

WHAT IS EQUILIBRIUM?

Equilibrium supplements were developed by Dr Lex Wills BVSc MACVSc. Lex was a successful racehorse owner-trainer but with a growing veterinary practice his racehorse training interest had to be put aside. However, his interest in high performance equine nutrition remained.

“As horse owners we are often on a huge learning curve wanting to learn more about horse nutrition. We are bombarded with a lot of marketing information and hype. In this quest for knowledge we are often left more confused, with bigger feed bills and our horses doing no better. I am concerned that the real reasons for supplementing horses is being lost amongst this hype and misinformation – Equilibrium Australia wants to distance itself from this part of the industry. The formulation of Equilibrium was not developed for the market it was developed for the horse.”

Dr Lex Wills BVSc MACVSc (1956-2006)

Today Equilibrium Australia is made up of a passionate team of people that strive to cut through the marketing hype and present the factual information so that owners and trainers can make informed feeding decisions. If there is one idea we want you to take away from this brochure, it is that a horse's mental and physical health and wellbeing goes hand in hand with their performance. If you don't have one you won't have the other.

Our Company

In Australasia we market under the brand Equilibrium and in Europe and North America it is marketed under the brand LexveT. Our head office is located in Brisbane with our overseas offices located in Auckland, NZ and Newbury, UK. All manufacturing of Equilibrium branded and LexveT branded products takes place in our manufacturing facility in Brisbane and is distributed from there. As a family owned business we continually strive to provide a quality and economical product to tens of thousands of horses each year. We are proud to be able to help you improve your horses' health and performance.

Equine Specialist Manufacturer & Quality Assurance

Our in house manufacturing facility means that there is no cross contamination with feeds or supplements of other species. Our manufacturing facility has a Quality Control System and every batch is sampled and checked by a Quality Assurance Manager. Where possible, we source locally produced raw materials, where we value the quality and consistency of the raw material. When it comes to what goes in the product we do not compromise.

Pricing

The cost of a product depends on many factors including research and development, raw material costs, overheads, marketing etc. When our products were released onto the market we quickly gained momentum and our high turnover results in a competitively priced product.

Unique

One of our most unique qualities is that we have only two product

lines. Equilibrium Mineral Mix is a broad spectrum supplement that contains macro and trace minerals, vitamins and salt. Equilibrium Mineral Mix is recommended for all horses. Equilibrium B1 Cool Mix has higher levels Magnesium and Vitamin B1 which are both involved in the nervous system. Equilibrium B1 Cool Mix is recommended for

nervous, fizzy or excitable horses.

Availability

We are stocked in over 500 stores and over 3,000 stores are able to take special orders. Bulk quantities and discounts are available for delivery direct from our manufacturing facility in

Brisbane with your local feed store carrying your account. Contact sales@equiaustralia.com.au for bulk prices. Recommended retail price varies from \$79.95 - \$99.95 for a 22kg bag (depending upon transport costs) which will supplement a horse over 15hh in hard work for 5 ½ months.

Table 5 - Cost comparisons prepared feed vs straights

	Premixed Feed 10% Fat DE 15MJ/kg \$1270 /tn		Straights consisting of extruded barley \$800 p/tn, oil \$1800 p/tn, soybean meal \$950 p/tn and Equilibrium Mineral Mix \$79.95/22kg 10% fat and DE 15MJ/kg										SAVINGS PER YEAR using straights and Equilibrium Mineral Mix		
			Extruded Barley		Oil		Soybean Meal		Supplement		Total		1 horse	10 horses	25 horses
	kg	\$	kg	\$	kg	\$	kg	\$	kg	\$	kg	\$			
	per day		per day		per day		per day		per day		per day				
13% Protein	2.00	2.54	1.35	1.08	0.16	0.29	0.19	0.18	0.14	0.50	1.84	2.05	\$180	\$1,797	\$4,492
	2.50	3.18	1.69	1.35	0.20	0.36	0.23	0.22	0.14	0.50	2.26	2.43	\$271	\$2,706	\$6,764
	3.00	3.81	2.03	1.62	0.24	0.43	0.28	0.26	0.14	0.50	2.68	2.82	\$361	\$3,615	\$9,037
	3.50	4.45	2.36	1.89	0.28	0.50	0.32	0.31	0.14	0.50	3.11	3.21	\$452	\$4,524	\$11,310
	4.00	5.08	2.70	2.16	0.32	0.58	0.37	0.35	0.14	0.50	3.53	3.59	\$543	\$5,433	\$13,583
	4.50	5.72	3.04	2.43	0.36	0.65	0.42	0.40	0.14	0.50	3.95	3.98	\$634	\$6,342	\$15,855
	5.00	6.35	3.38	2.70	0.40	0.72	0.46	0.44	0.14	0.50	4.38	4.36	\$725	\$7,251	\$18,128
	5.50	6.99	3.71	2.97	0.44	0.79	0.51	0.48	0.14	0.50	4.80	4.75	\$816	\$8,160	\$20,401
	6.00	7.62	4.05	3.24	0.48	0.86	0.56	0.53	0.14	0.50	5.23	5.14	\$907	\$9,069	\$22,673
	6.50	8.26	4.39	3.51	0.52	0.94	0.60	0.57	0.14	0.50	5.65	5.52	\$998	\$9,978	\$24,946
15% Protein	2.00	2.54	1.25	1.00	0.16	0.29	0.29	0.28	0.14	0.50	1.84	2.07	\$172	\$1,725	\$4,312
	2.50	3.18	1.56	1.25	0.20	0.36	0.36	0.34	0.14	0.50	2.27	2.46	\$262	\$2,616	\$6,539
	3.00	3.81	1.88	1.50	0.24	0.43	0.44	0.41	0.14	0.50	2.69	2.85	\$351	\$3,507	\$8,767
	3.50	4.45	2.19	1.75	0.28	0.50	0.51	0.48	0.14	0.50	3.12	3.24	\$440	\$4,398	\$10,994
	4.00	5.08	2.50	2.00	0.32	0.58	0.58	0.55	0.14	0.50	3.54	3.63	\$529	\$5,289	\$13,222
	4.50	5.72	2.81	2.25	0.36	0.65	0.65	0.62	0.14	0.50	3.97	4.02	\$618	\$6,180	\$15,450
	5.00	6.35	3.13	2.50	0.40	0.72	0.73	0.69	0.14	0.50	4.39	4.41	\$707	\$7,071	\$17,677
	5.50	6.99	3.44	2.75	0.44	0.79	0.80	0.76	0.14	0.50	4.82	4.80	\$796	\$7,962	\$19,905
	6.00	7.62	3.75	3.00	0.48	0.86	0.87	0.83	0.14	0.50	5.24	5.19	\$885	\$8,853	\$22,133
	6.50	8.26	4.06	3.25	0.52	0.94	0.94	0.90	0.14	0.50	5.67	5.59	\$974	\$9,744	\$24,360
17% Protein	2.00	2.54	1.16	0.93	0.17	0.30	0.40	0.38	0.14	0.50	1.87	2.11	\$157	\$1,573	\$3,933
	2.50	3.18	1.45	1.16	0.21	0.37	0.50	0.48	0.14	0.50	2.30	2.51	\$243	\$2,426	\$6,066
	3.00	3.81	1.74	1.39	0.25	0.45	0.60	0.57	0.14	0.50	2.73	2.91	\$328	\$3,280	\$8,199
	3.50	4.45	2.03	1.62	0.29	0.52	0.70	0.67	0.14	0.50	3.16	3.31	\$413	\$4,133	\$10,332
	4.00	5.08	2.32	1.86	0.33	0.59	0.80	0.76	0.14	0.50	3.59	3.71	\$499	\$4,986	\$12,465
	4.50	5.72	2.61	2.09	0.37	0.67	0.90	0.86	0.14	0.50	4.02	4.12	\$584	\$5,839	\$14,598
	5.00	6.35	2.90	2.32	0.41	0.74	1.00	0.95	0.14	0.50	4.45	4.52	\$669	\$6,692	\$16,731
	5.50	6.99	3.19	2.55	0.45	0.82	1.10	1.05	0.14	0.50	4.88	4.92	\$755	\$7,545	\$18,864
	6.00	7.62	3.48	2.78	0.50	0.89	1.20	1.14	0.14	0.50	5.32	5.32	\$840	\$8,399	\$20,997
	6.50	8.26	3.77	3.02	0.54	0.97	1.30	1.24	0.14	0.50	5.75	5.72	\$925	\$9,252	\$23,130

The last fifty years has seen huge changes in our knowledge of horse nutrition and considerable advances have been made. This brochure has been prepared to assist horse trainers in making an informed decision to eliminate or reduce the barriers preventing optimum performance. Should you have any questions, or if you would like to discuss your feeding program email our nutritionists at sales@equiaustralia.com.au or contact your closest office using the details on the back of this brochure.