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FEEDING PRACTICES IN AUSTRALIA AND NEW ZEALAND

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Introduction

As well as producing top golfers, beer and sailors, Australia and New Zealand are great horse producing countries. Australia has the second largest horse population in the western world and New Zealand horses have long plundered Australia's richest races. There are about 36,000 active racehorses in Australia who complete at 410 racetracks for US \$140 million prize money. Horses are bred and trained in a variety of climatic regions and can be kept outdoors all year round.

New Zealand as a comparison has a total population of 3.5 million, about the same as the Australian city of Melbourne. It is made up of two main islands, the North and the South. In New Zealand pastures remain green and of high quality nearly all year. The double attraction of the Australian racing scene is the higher stakes and 25% higher value of the Australian dollar, as this helps offset the expense of air flights to the successful raiders.

This paper describes some of the common feeding practices in Australia and New Zealand, particularly where they differ from those used in North America or Europe.

Pastures

Snow falls only very rarely in areas where horses are kept, so horses can graze all year round. Horses on studs are not stabled at night and have access to pasture all day. Many pastures are poorly managed and suffer from overgrazing by horses, and inadequate pasture renovation. Although the country is large, many horse farms are overstocked and pastures suffer accordingly. In temperate areas of Australia, pastures dry off over summer and autumn which creates a need for supplementary feeding of horses at this time of year. Pastures are usually based on ryegrass and clover.

In Queensland, introduced tropical grasses such as kikuyu, buffel and setaria are common. These have high oxalate levels which interfere with calcium and phosphorus digestibility and can lead to the development of nutritional secondary hyperparathyroidism. In areas of North Queensland, pasture species such as *Morinda*

Spp or *Neptunia amplexicaulis* can accumulate selenium and cause selenium toxicity. Australia has an abundance of poisonous plants with regional distributions, although most of the intensively stocked areas with horses are relatively free of poisonous plants.

Climatically the North Island of New Zealand is a warmer, higher rainfall area and is host to the main Thoroughbred breeding studs. The South Island of New Zealand has traditionally been the main breeding area for Standardbreds. Pastures are mainly rye grass and clover in both islands. South Island pastures experience snowfalls from May through to September. Poisonous plants are not a concern in New Zealand horse pastures. Pastures rarely dry off over summer in the North Island; however they do dry off in the South Island.

Roughage

Australian horses are fed roughage in the form of hay, chaff, pellets and cubes. Lucerne (alfalfa) is the most common hay fed to horses, followed by grass (meadow) hay and oaten hay. Lucerne and grass hay are packed in small bales and the unit of feeding is a biscuit (flake). Unfortunately, wide variation in the density of hay and the width of a biscuit means that the weight of a particular biscuit can vary from one kg to three kg. Under those circumstances, nutritional evaluation can be inaccurate unless the weight is actually measured.

The value of grass hay can vary widely according to the composition of the grasses, time of hay making and other factors. A high clover content will increase the nutrient content of the hay and good quality clover hay can approach lucerne hay in value. The climatic conditions at the time of hay making are usually favorable and Australian hay is generally free of dust, molds and other contaminants. Prices for hay vary substantially according to its type, quality, balance between supply and demand and transport costs. Oaten hay is fed less commonly because production is lower and storage is more difficult. It is fed in sheaves or bales.

In times of drought, demand for hay by other livestock can create severe shortages and this has led to the development of several novel fiber sources. Lupin hulls contain 46% fiber and 8.5% crude protein and are used as a cheap fiber source in pellets and textured feeds. Rice hulls have also been used successfully in high fiber pellets and for mixing in with other feedstuffs. They are also used as bedding and unfortunately horses that eat the bedding can develop impaction colic.

Australian horses are fed large quantities of chopped hay or chaff. Chaff is made in commercial chaff mills that produce 40 kg bags or it can be produced on the farm using a small scale chaff cutter. Racehorses are often fed a mix of oaten or wheaten chaff and lucerne chaff. Immature oats or wheat crops are cut for chaff several weeks before harvest. The timing varies each season but is described as the 'early heading stage' or no more than 7 days after flowering. At this stage you can squeeze "milk" out of the head of the grain and the nutrient content of the stalk is higher than at harvest. It is made into sheaves which are stocked for drying in the paddock over

several weeks, then cut into 5mm segments as chaff. Most commercial chaff is “steam cleaned” to remove dust and allow easier cutting. Some chaff is rough cut and contains portions of longer fiber. Good quality chaff should not contain any formed grain, but chaff often does contain grain.

The principal advantage of chaff is that it can be mixed in with the concentrate portion of the feed and the horse consumes roughage with the concentrate. This can slow down the intake of concentrate and prevent starch overload in the large intestine. Horse owners commonly overestimate the weight of chaff fed because it is very light and may weight only 300g/2 liters for oaten or wheaten chaff and 250g/2 liters for lucerne chaff. Although chaff is principally fed as a source of roughage it is desirable that it contains high energy levels for horses in hard work. This is usually subject to considerable variation. The nutrient content of lucerne chaff is usually superior to cereal chaff (table 1). There is considerable debate as to the merits of oaten chaff over wheaten chaff and vice versa.

As in Australia, New Zealand lucerne and oaten chaff are main forms of roughage added to hard feed. Meadow and lucerne hay are fed in similar quantities to stabled performance horses.

The hay making season is shorter and more difficult in New Zealand, and therefore a great deal of care is needed to ensure hay is cured correctly. There are very limited additional sources of roughage available, unlike Australia with bran and pollard (2nd grade flour) being available in fluctuating quantities depending on the demand of the dairy season.

Table 1. NUTRIENT CONTENT OF SELECTED AUSTRALIAN FEEDSTUFFS (AS FED)

<i>Feed</i>	<i>DE**</i> <i>MJ/kg</i>	<i>CP</i> <i>%</i>	<i>Fat</i> <i>%</i>	<i>Fiber</i> <i>%</i>	<i>Ca</i> <i>g/kg</i>	<i>P</i> <i>g/kg</i>	<i>Zn</i> <i>mg/kg</i>	<i>Cu</i> <i>mg/kg</i>
Lupins	14.5	30	5.5	13	2	3	27	3.5
Sunflower Seeds	17	1020	1.5	23	4	9.2	97	3.7
Lupin Hulls	6.6	8.5	1.7	46	3	1.8	--	--
Rice Hulls	--	2	0.4	4.0	0.8	0.7	--	--
Coprice M*	13.2	12	5.4	7.5	10.5	6.7	60	14
Sustaina	13.4	11	8.5	6	4.5	3.5	30	65
Cereal Chaff	4-7	5-8	1.5	30-35	2-3	2-3	41	4.5
Rice Pollard	16	13	19	9	0.5	12	30	8

*Composition of pellets and sweet feed varies and some contain higher mineral and vitamin inclusion levels than others.

**4.18MJ = 1Mcal

Average intakes for performance horses would be 2.5 kgs of meadow or lucerne hays with approximately 300 to 400 grams of oaten or lucerne chaff. Access to pasture varies from nil to about 2.5 hours if available. Most racing stables have access to pasture and would often cut about 6kg of pasture for stabled horses.

Concentrates

Australians have traditionally fed more “straights” than premixed textured or pelleted feeds, although this pattern is changing with the development of better quality feed mill products. Oats are by far the most common grain fed to horses based on safety, price and the fact that there is no need for further processing. Corn or maize is higher priced than oats and cannot compete on a cost/MJ basis but it is often necessary to increase the energy density of the ration. It is usually fed in amounts of less than 1 kg. Barley is perceived by many to be a “non-heating” feed and is fed either steam rolled or boiled, but again it is usually fed in small amounts. Sorghum is an economical grain but is not widely used.

Bran has been a popular ingredient, particularly for combination in a wet feed (bran mash) with various supplements, but its use is now declining. Pollard is popular with people wanting to put condition on horses without feeding extra grain. Rice pollard is also used by some owners for conditioning, due to its high fat content.

Feed mills produce both pelleted and textured feeds but there is still a substantial prejudice against pellets by horsemen. Up until recently, many processed feeds have been inappropriately formulated. In addition the mineral and vitamin premixes added to the feeds have usually been inadequate for use in high performance horses or fast growing horses without extra supplementation. Many of these feeds are not used according to instructions, but are diluted with other grains which further diminishes the value of the vitamin and mineral premixes in the feeds. Rice based pellets (Coprice M) have been popular for a number of years. Those are high energy pellets (Table 1) purported to offer “cool conditioning.” Some lower energy textured feeds contain lucerne or oaten chaff as a source of fiber. These are popular with riders of horses in light work. Recently some feeds for performance and growing horses have been produced containing high levels of fat. An example is Mitavite Sustaina, a feed for racehorses (Table 1).

In New Zealand, a limited amount of commercially prepared feed is fed to both Thoroughbred and Standardbred racehorses with tradition and skepticism being the main reasons for this. Sixty percent of trainers might feed about 2 kgs of a balanced concentrate, the rest being basic oats and chaff feeders with some additional additives.

The price of grain in New Zealand is significantly higher than in Australia and this may go some way to explaining why 90% of the oats in New Zealand are crushed and crimped as opposed to the reverse in Australia.

Costs of bagged oats in Australia	\$A28 cents per kg
Costs of bagged oats in New Zealand	\$A48 cents per kg

(A \$1.00 = US \$0.70)

Protein supplements

In racing horses, protein supplementation is usually provided by the feeding of lupins, sunflower seeds, tick beans, soybean meal and peas. These also contain a higher energy content than traditional grains (Table 1). Linseed meal and cottonseed meal were common “meal” supplements but these have declined in popularity recently. Lupins are becoming increasingly popular as they represent good value, and they are a palatable energy and protein source with high digestible fiber content. However lupins have low levels of methionine and tryptophan. The contention that linseed meal or sunflower seeds makes horses “look better” is likely to be due to the high oil content, as both provide relatively poor quality protein. On the breeding farms the value of soybean meal is increasingly being recognized and it is fed as a soybean meal or full fat soybean meal. However some breeders still use protein supplements with lower quality protein e.g. sunflower seeds, cottonseed meal.

Where horses have access to 12 hours or more of good pasture in New Zealand, protein supplementation is not the major limiting factor. For example the foal ration of a major feed company supplying the total hard feed in a fully prepared ration was 14.5% protein.

Good pastures fluctuate between 16% and 28% protein. Protein supplements to racehorses are mainly full fat soya and sunflower even though sunflower seeds are very expensive.

Supplements

Australian horse trainers are major users of supplements as most people do not use prepared feeds, or use them as only part of the concentrate intake. There are many brands and types of feed supplements marketed for horses and these promise a variety of benefits for the horses. There is a strict registration process but despite this, many products provide spurious claims or contain inadequate supplementary minerals or vitamins. Some formulations are quite dated and they do not provide sufficient supplementary minerals and vitamins. It is common for a product to contain a particular ingredient, but not contain enough to make a meaningful contribution to balancing the horse's diet.

Overuse of supplements is common and many horses are fed five or six supplement products including several sources of the same nutrient. Iron supplements are still common despite the fact that all diets contain adequate iron intakes from natural sources. Most owners have little concept of the mineral and vitamin needs of their horses and labels are often difficult to understand, hence the choice of supplements becomes difficult. Most supplements are powders although liquid electrolytes, vitamins, buffers and iron supplements are available. Some products are presented in a pelleted form to enhance intake of the supplement. Many of these products contain protein supplements in addition to minerals and vitamins.

Feeding practices with racehorses

A survey on the feeding of racehorses in Sydney has recently been published (Southwood *et al.*, 1993). The survey work of Southwood *et al* (1993) revealed a number of interesting findings about feeding practices near Sydney. The results emphasize the dependence on straight grains as only 1 TB stable fed a sweet feed as the only concentrate feed. The average amount of sweet feed used was 1.6 kg and 0.75 kg by Thoroughbred (TB) and Standardbred (SB) trainers whilst 15% of trainers fed some rice based pellets.

The average daily roughage intake of 3.3 kg (TB) and 4.1 kg (SB) is less than recommended minimum intakes, particularly for Thoroughbred horses. The average chaff intake was 1 kg (TB) and 2.2 kg (SB) with 88% trainers feeding lucerne chaff at an average of 33-45% of chaff intake. SB trainers used chaff as the principal roughage source whilst TB trainers used hay.

In this survey TB trainers fed an average of 129 MJ/day and SB trainers 132 MJ/day based on average body weights of 490 kg and 440 kg respectively. There was significant variation in daily intake that presumably relates to workload, as would the increased energy intake in SB horses. It appears that TB trainers work horses for a shorter duration than trainers in the USA or Europe. Trainers fed more crude protein than NRC recommendations with an average of 1450 g or 12% dietary protein. The mean calcium and phosphorus intakes were slightly higher than NRC recommendations and only 20% of trainers used a calcium supplement, yet approximately 30% of diets required additional calcium. Iron intakes were over 200% of requirements, yet iron supplements and injections were popular. Some trainers fed potassium deficient diets, presumably due to low roughage intakes.

Salt was fed by 25% of trainers with higher intakes (70g) by SB horses than TB horses (30g). Electrolyte supplements were fed by only 44% of trainers so many horses in this study would have been electrolyte deficient. Twenty five percent fed commercial naturalizing agents and a considerable number fed sodium bicarbonate. About 20% of trainers fed glucose whilst only 14% added fat and the average amount of oil fed was less than 125 ml. Injectable vitamins were used more commonly than oral vitamins, although 25% trainers fed extra vitamins.

Most trainers thought the major problems with feeding is getting horses to eat enough as they reach racing condition or after gallops and races. This is the reason for the low roughage intake by most trainers; however the low roughage intake may also lead to inappetence as could the feeding of large meals twice daily, amino acid imbalances or B vitamin deficiencies. Ninety percent of trainers changed feeding prior to racing with a decreased roughage intake, increased grain intake and increased supplement intake being common practice. Seasonal variations were also evident with increased salt and electrolyte intake in summer and greater maize and barley intakes in winter.

Tying up and excitability are other feed related problems that are addressed by feed substitution, reduced feed intake and supplementation. Veterinary or nutritional

advice on feeding practices was considered to be important by relatively few trainers.

The daily feeding program of six leading Thoroughbred trainers is listed in Table 2 along with the nutrient content of those diets (Table 3). These are average feeds for a horse in full work. Some trainers feed twice a day but most feed three times a day. Most trainers feed insufficient roughage and this may be related to the high incidence of tying up in Australia. It is rare to find trainers who feed ad lib hay. Inadequate electrolyte supplementation may also contribute to the incidence of tying up. Some trainers do not feed lucerne as they consider it may lead horses to tie up and makes them "thick in the wind." A lot of feeding is done on the basis of following traditional practices, but there is an increasing use of premixed textured feeds which contain sufficient mineral and vitamins so that supplements are unnecessary. Whilst some use these feeds as designed, others use them as only a part of the concentrate ration which reduces the impact of the vitamin and mineral additives in the prepared feed.

Table 2. EXAMPLES OF RACING DIETS FED TO THOROUGHBREDS IN FULL WORK

<i>Trainer</i> <i>Ingredient (kg)</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>
Oats	5.4	1.3	6	5.2	5.9	4.2
R Oats	--	1.8	--	--	--	--
R Barley	--	0.6	--	--	--	--
Cr Maize	1.55	0.6	2.1	--	0.8	0.9
Lupins	0.3	--	0.33	1.8	--	--
Peas	--	--	0.33	--	0.4	--
Tick Beans	--	0.4	--	--	0.4	0.875
Bran	0.3	0.53	0.2	0.3	--	0.3
Sunflowers	0.25	0.2	0.1	0.1	0.4	0.075
Pellets	--	0.7	--	--	--	--
Oil	--	--	0.2	--	--	0.12
Cereal Chaff	0.4	1.8	0.45	0.8	0.65	1.8
Lucerne Chaff	0.3	0.75	0.7	0.8	0.9	1.2
Lucerne Hay	1.7	--	1.5	2	0.75	1.0
Oaten Hay	1.35	--	1.4	--	--	--
Supplements	5	2	3	1	5	4
Pasture		+			+	+

Surprisingly few horses are put out in a paddock to graze during the day although some trainers do give horses a few days on grass after a race. Trainers fear that horses won't eat the hard feed if they spend too much time grazing. Some stables have absolutely no access to grazing apart from a short "pick" whilst horses are being walked in the afternoon. Where a trainer has stables outside a city and has day

yards it is more common to put the horse out to graze during the day.

Table 3. NUTRIENT CONTENT OF THOROUGHBRED RACING DIETS

<i>Nutrient</i>		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>
Protein	g	1300	1071	1500	1690	1285	1727
Digestible energy	MJ	130	101	152	130	125	132
Vitamin A	IU	88258	45990	108350	150000	69400	144812
Vitamin D	IU	715	2664	13500	5800	6890	7887
Vitamin E	IU	2171	162	445	1425	255	387
Vitamin K	mg	6	2	7	31	7	12
Thiamin (B1)	mg	45	32	164	74	175	87
Riboflavin (B2)	mg	176	46	148	99	137	100
Niacin	mg	1079	246	594	395	360	337
Pyridoxine (B6)	mg	138	23	47	43	80	50
Pantothenic Acid	mg	331	77	137	185	200	162
Vitamin B12	ug	393	72	441	140	50	0
Folic Acid	mg	36	4	60	21	6	12
Biotin	mg	2	1	2.5	17	2	2
Calcium	g	41	24	38	77	36	59
Phosphorus	g	35	31	40	51	34	42
Magnesium	g	38	13	22	32	7	25
Potassium	g	89	55	78	100	75	118
Sodium	g	33	15	34	36	32	10
Iron	g	1371	1458	1863	2470	2010	2475
Zinc	mg	680	306	513	700	650	575
Copper	mg	71	51	133	200	96	87
Manganese	mg	398	414	430	788	440	562
Iodine	mg	0.8	0.5	1.5	1.3	1.0	1
Cobalt	mg	0.9	0.7	1.5	1.2	0.8	1.25
Selenium	mg	4	1	3	3.9	3.5	5

Most New Zealand trainers feed 3 times a day, with some feeding 4 times a day. Owners and trainers tend to feed through conscience and have difficulty understanding that more feed does not necessarily mean horses will run faster. Some dramatic improvements have been experienced by identifying energy requirements and lowering grain intakes to be more in line with the horses' weight and workload.

Most commercial trainers do not have this problem, as their experience has identified maximum intakes.

Feeding on stud farms

Feeding practices on studs vary widely throughout Australia. The size of the stud and the number of horses, climate, pasture development, irrigation, breed, location and commercial status all influence the feeding practices. Board rates vary from A \$8 to A \$12 for mares and young horses on Thoroughbred studs and A \$2 to A \$3 on Standardbred studs. This means that Standardbred horses are usually fed hay or oats only, apart from very commercial farms or unusual circumstances.

Examples of feeding programs for 12 month yearlings are listed in Table 4. Relatively few studs weigh young horses, so assessment of growth rate is subjective. Breeders are now realizing the problems created by pushing large amounts of grain into young horses. However demands by yearling purchasers for large, fat yearlings at sales force many breeders to overfeed yearlings.

Table 4. FEED INTAKE OF 12 MONTH OLD THOROUGHBRED YEARLINGS ON AUSTRALIAN STUDS (kg)

<i>Feed</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>
Oats	5	4	3.2		1	
Pellets				3	3	4
Sweet Feed						
Lupins	1					
Tick Beans		0.5				
Sunflowers		0.5				
Soybean Meal				0.5	0.4	
Lucerne Chaff	0.5	0.5	1.3	3		
Lucerne Hay	2	2			3	2.5
Cereal Chaff			0.7			
Grass Hay				1.25		
DCP g				50		
Limestone g	0.5	25				
Supplements	1	1	1			

*All yearlings have access to pasture

Creep feeding is relatively uncommon, but foals usually have the opportunity to eat from the mare's feed bin. Whilst it is usual to feed supplementary minerals to young horses, many breeders are not aware of how much copper and zinc are needed by young horses for rapid growth and minimal developmental orthopedic diseases.

Laboratory testing of the nutrient content of feeds is rare apart from protein testing of oats and some hay. This is due to a combination of ignorance of the benefits of testing and the high costs involved.

Feeding on studs in New Zealand has changed dramatically over the last five years mainly through the bad experiences of overfeeding, when it was common to sell to

the Australian market by the pound. The downturn in returns for the New Zealand yearling led to studs wanting to identify what was needed and what was not required.

Pasture analysis on a seasonal basis is now common and structured feeding programs justified by nutritional benefits and cost.

Most of the Thoroughbred studs in New Zealand are feeding commercially prepared steam flaked or extruded textured feeds to their sale yearlings. The convenience and labor savings to the commercial studs together with the definable nutritional contributions are the main reasons for this switch in feeding practices.

References

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