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FEEDING PRACTICES IN AUSTRALASIA

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Introduction

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 Thoroughbred racehorses in Australia competing at 400 racetracks. Over 18,000 Thoroughbred foals are born each year while there are about half that number of Standardbreds. Other popular breeds include Arabians, Quarter Horses, warmbloods and the various pony breeds. Equestrian sports are very popular and Australia has won the team three-day event at the last two Olympics Games. Horses are bred and trained in a variety of conditions and climatic regions, and can be kept outdoors all year round. In the North Island of New Zealand, pastures remain green and of high quality nearly year-round, and breeding of Thoroughbred and Standardbred horses is a very popular hobby and business. New Zealanders have excelled at three-day eventing in recent years and the New Zealand bred horse is renowned for versatility and toughness. 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. If further information is required, a practical 240 page review of feeding horses in Australia has just been published (Kohnke et al., 1999).

Forages

Pastures

Snow falls very rarely in areas where horses are kept, so horses can graze year-round. Most grazing horses are not stabled at night and have access to pasture all day. Overstocking, understocking and poor pasture management practices are common, so there is a great variation in pasture quality and quantity. In recent years, research and extension activities have been directed to getting more out of pastures and reducing the costs of supplementary feeding. In southern temperate areas, heat and lack of rain cause pastures to dry off over summer and autumn, which creates a need for supplementary feeding of horses at this time of year. Irrigation is used in some areas to maintain growth and green pasture during dry periods. In northern parts of the country, subtropical or tropical conditions prevail so the growing season occurs throughout summer. In northern Australia, introduced tropical grasses such as kikuyu, buffel and setaria are common. These grasses have high oxalate levels that interfere with calcium digestibility and can lead to the development of nutritional secondary hyperparathyroidism (big head) and various bone disorders. 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 areas that are intensively stocked with horses are relatively free of poisonous plants.

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 Standardbred horses. Pastures are mainly ryegrass and clover on both islands. South Island pastures may experience isolated snowfalls from May through 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. Mares are often managed without supplementary grain as the high quality pastures supply enough energy and protein year-round, but mineral requirements are not met.

Hay and Chaff

Australian horses are fed forage 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 hay is grown in all states and is widely available, whereas grass hay is made in southern temperate areas. Lucerne and grass hay is usually 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 haymaking 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 nutritious value and will be more palatable. However, it is hard to get clover hay year-round. Some studs use hayracks in the paddock for ad lib hay feeding and others use large round bales for ad lib feeding of hay to mares. In northern Australia the only hay available is lucerne and this can create problems for some performance horses with excess protein in the diet. The climatic conditions at the time of haymaking 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. Because hay quality is generally high, there is almost no use of haylage for feeding horses, although it is a common dairy feed.

Australian horses are fed large quantities of chopped hay or chaff. Chaff is made in commercial mills that produce 40 kg bags or it can be produced on the farm using a small-scale chaff cutter. Many horses are fed a mix of oaten or wheat chaff and lucerne chaff with their grain. 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 5 mm segments. Most commercial chaff is “steam cleaned” to remove dust and allow easier cutting. Some chaff is rough cut and contains portions of longer fiber. High 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 forage 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 weigh only 300g/2 liters for oaten or wheaten chaff and 250g/2 liters for lucerne chaff. There is considerable debate as to the merits of oaten chaff over wheaten chaff and vice versa.

Because chaff is so popular, use of forage cubes or pellets is not as common as in other countries. The use of lucerne pellets instead of chaff has increased recently on studs and spelling operations, where it can be stored in silos. This can reduce the cost and handling required compared to the use of chaff in a bag. Forage cubes have been developed only in recent times and have not made any significant impact on feeding practices. Unlike countries in the Northern Hemisphere, beet pulp and soy hulls are not available as alternative forms of digestible forage. However, alkali-treated sugarcane bagasse is used as a cheap fiber source in some commercial feeds made in North Queensland. In many Southeast Asian countries, all horse feed is imported. This makes forage very expensive, and there is a tendency to feed less than is desirable for digestive health. Compressed hay is imported, but bagged chaff is a more popular feed because it is easier to handle for shipping. In India fresh lucerne and very poor quality grass hay are the popular forages.

In New Zealand, lucerne and oaten chaff are the main forms of forage added to grain. Meadow and lucerne hay are fed in similar quantities to stabled performance horses and horses in the paddock. The haymaking season is shorter and more difficult in New Zealand, and therefore a great deal of care is needed to ensure hay is cured correctly. Because it is harder to make high quality grass hay in New Zealand, haylage is becoming popular and is made commercially or “on farm.” Average intakes for performance horses would be 2.5 kg of meadow or lucerne hays with approximately 300 to 400 grams of oaten or lucerne chaff. Access to pasture by racehorses varies from nil to about 8 hours, if available. Most racing stables have access to pasture and would often cut about 6 kg of wet pasture for stabled horses.

Concentrates

Grains

Australians have traditionally fed more “straights” than premixed feeds, although this pattern is changing with the development of better quality feeds and recognition of the performance, convenience and value these products can offer. 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. Oats are grown in many

of the cereal growing areas of the country and are often stored in a silo for bulk handling. Australian oats are usually lower protein than many Northern Hemisphere varieties averaging under 9% CP (as fed). 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 less than 2 kg and is most popular with racehorse trainers. Corn is fed cracked, steam flaked or extruded. Unfortunately, extruded corn is not always readily eaten by racehorses when they are under pressure and for that reason most trainers still feed cracked corn even though extruded corn is more digestible. Barley is perceived by many to be a “non-heating” feed and is fed either steam rolled, micronized, extruded or boiled, but again it is usually fed in small amounts. It is a popular feed in showing circles where it is often the first choice grain. Sorghum is an economical grain grown in Queensland but is not widely used. Triticale, a wheat/rye hybrid, is a recent addition to the grain menu for some Australian horses. It is reported to give good results by users, but there is no published information on its digestibility.

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 among showing circles 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.

Commercial Feeds

The range and quality of commercial feeds available in Australia have increased dramatically in recent years. Feed mills produce pelleted, textured and extruded feeds, but there is still a substantial prejudice against pellets by horsemen. Until recently, nutritionists who did not have equine nutrition experience have inappropriately formulated many processed feeds. In addition, the mineral and vitamin premixes added to cheap 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 diminishes the value of the vitamin and mineral premixes in the feeds. Some popular feeds are designed to be used as concentrates at for example 2 kg/d, and the user adds his own grain according to needs. These feeds are a simple and economic method of feeding but still give the user control over grain and energy intakes. Some lower energy textured feeds contain lucerne or oaten chaff as a source of fiber. These are popular for horses in light work. Recently feeds for performance and growing horses have been produced containing high levels of fat and specialist feeds have been developed for horses predisposed to tying up or behavioral problems.

Protein Supplements

In racing horses, protein supplementation is usually provided by feeding lupins, sunflower seeds, tick beans and peas. These also contain a higher energy

content than traditional grains, but they are fed in cups rather than dippers. Linseed meal and cottonseed meal were traditional protein supplements, but these have declined in use while canola meal use has increased. 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 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). Copra (coconut) meal has become a popular supplement in recent years.

Where horses have access to the good pasture in New Zealand, protein supplementation is not the major limiting factor to growth as good pastures vary between 16% and 28% protein. Commercial feeds tend to be formulated with lower protein content in New Zealand than similar target feeds in Australia, where pasture quality is not as good year-round. Protein supplements given to racehorses are mainly full fat soya, peas and sunflower seeds, even though sunflower seeds are very expensive.

Supplements

Australian horse trainers are major users of supplements even when using fortified prepared feeds. There are many brands and types of feed supplements marketed for horses and these promise a variety of benefits. 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 to meet requirements. It is common for a product to contain a particular nutrient, 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 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 and these products are widely used in feeding horses on studs, but are less popular in racing circles.

Feeding Practices with Racehorses

A survey on the feeding of racehorses in Sydney was published some years ago (Southwood et al., 1993). The results emphasized the dependence on straight

grains in the early 1990s as only one of every 50 stables fed a commercial sweet feed as the only concentrate feed. However, there has been a significant change in the last 10 years with a dramatic increase in the use of premixed feeds, especially sweet feeds, but no published figures are available. Some trainers feed a premixed feed as part of the grain mix, but still add other grains and supplements. The average amount of concentrate fed was 7.8 kg by Thoroughbred and 7.7 kg by Standardbred trainers in this survey, and my experience is that this ranges from 4-9 kg, depending on workload. Trainers in tropical areas tend not to work their horses as hard and feed them less total grain accordingly; however, I believe hot and humid conditions can increase energy requirements. While research has been conducted into the impact of cold on energy needs, nothing has been done on the impact of heat. Oats is still the major grain fed with corn being the next most popular grain in both home-mixed and premixed feed diets. Most trainers feed both grains, but some horses with behavioral or tying up problems are fed oat-free diets. There are several commercial feeds that are oat-free for horses prone to these problems. Extruded corn is available as a separate ingredient and as a component of several brands of feed; however, some horses leave the extruded corn, as it is not as palatable as cracked corn.

The average daily forage intake of a 3.3 kg (Thoroughbred) and 4.1 kg (Standardbred) in the Southwood survey is less than the recommended minimum intakes, particularly for Thoroughbreds. When part of the forage intake is chaff, its intake is ensured when horses eat the grain, whereas hay intake is optional so it is possible that a combination of chaff and hay allows lower total forage intakes. The average chaff intake was 1 kg (Thoroughbred) and 2.2 kg (Standardbred) with 88% of trainers feeding lucerne chaff at an average of 33-45% of chaff intake. Standardbred trainers used chaff as the principal forage source while Thoroughbred trainers used hay, but very few feed ad lib hay. The concern of trainers is that if they feed ad lib hay, horses will eat too much hay and too little grain. However, the biggest hay feeders also entice their horses to eat the most grain. Some trainers feed less than 2 kg forage per day and it should not be surprising that many of these trainers complain about the difficulties in getting horses to eat well enough when they are in full work. One benefit of lower forage intake will be reduced weight handicap related to the weight of the large intestinal contents.

In this survey Thoroughbred trainers fed an average of 129 MJ/day and Standardbred 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 Standardbred horses. It appears that Thoroughbred 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. However, the increased use of premixed feeds containing calcium appears to have reduced the incidence of this problem. Iron intakes were over 200% of requirements, yet iron

supplements and injections were popular. Some trainers fed potassium deficient diets, presumably due to low forage intakes. Salt was fed by 25% of trainers with higher intake (70 g) by Standardbred horses than Thoroughbred horses (30 g). Electrolyte supplements were fed by only 44% of trainers, so many horses in this study would have been electrolyte deficient.

About 20% of trainers fed glucose while only 14% added fat. The average amount of oil fed was less than 125 ml. It is common to feed relatively small amounts of added fat as oil, although sunflower seeds are a significant source of fat in most stables. In addition, the new premixed feeds for racehorses also contain considerable quantities of added fat. Injectable vitamins were used more commonly than oral vitamins, although 25% of trainers fed extra vitamins. Many top-dress vitamin supplements to a fully fortified feed.

Most trainers thought the major problem with feeding racehorses is getting them to eat enough as they reach racing condition or after gallops and races. This is one reason for the low forage intake; however the low forage 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 forage 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 intake in winter.

Tying up and excitability are other feed related problems that are addressed by feed substitution, reduced feed intake and supplementation. Most trainers feed insufficient forage 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 make them "thick in the wind."

Most New Zealand trainers feed three times a day, with some feeding four 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 horse's weight and workload. Most commercial trainers do not have this problem, as their experience has identified maximum intakes. Again, premixed sweet feeds have become very popular in recent years. More horses have access to grass during the day in New Zealand than is the case in Australia.

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. Low agistment (boarding) rates mean that Standardbred studs only feed hay, oats or cheap pellets, apart

from unusual circumstances. 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 weanlings and yearlings at sales force many breeders to overfeed young horses.

Most studs have silos for bulk storage of oats, pellets or extruded feeds and many use feed mixers to mix grain, supplements and chaff with or without molasses. This means the use of premixed sweet feeds is reduced, although 1 kg per day balancer pellets or 2 kg per day sweet feed concentrates are popular and economic methods of feeding. The availability of oats reduces, and the price increases as you move further north in Australia. Therefore, a proportionally greater use of prepared feeds on breeding farms in Queensland occurs. The use of powdered supplements for feeding horses on studs has dropped dramatically in recent years as breeders have recognized the value of balancer pellets and fully fortified feeds. Extruded feeds are effective and popular on studs, as the same growth or conditioning outcome can usually be achieved with reduced intakes of feed and greater digestive safety.

As horses are not boxed routinely, they are fed in groups rather than individually and it is impossible to control individual intakes. On some farms feed is poured onto the ground, but it is more common to put feed into feed bins on the ground with one feeder per horse. Of course, pecking order effects will influence choice of feeder and feed intake. Weanlings tend to be fed 2-3 kg concentrates (1% body weight) with some chaff, lucerne hay if required and 24 hour access to pasture. This means the concentrate portion of the diet is 50% or less which is lower than recommended by the 1989 NRC. If pastures are lacking in quality or quantity, the shortfall is made up by lucerne or more rarely clover hay. Satisfactory growth rates are achieved under this regime although most farms do not weigh horses, and there has been no published compilation of growth data. Some farms increase grain/concentrate intake as the weanling/yearling grows and appetite increases while others tend to maintain yearlings on the same intake as weanlings. Obviously, pasture quality and weather conditions play a big part in determining whether growth will be maintained on lower intakes of grain. During spring it is often possible to cut grain out entirely and just maintain yearlings on a mineral supplement and pasture, particularly with fillies. Total concentrate intake for yearlings ranges from 0 to 5 kg. During sale preparation, breeders often add corn, barley, sunflower seeds and oil to the basic mix. If rapid weight gain is needed, yearlings can be fed up to 10 kg concentrates per day (over 2% body weight) although some fat fillies are maintained on almost no grain. Feed intake during this period depends upon the need for increased body condition, amount of exercise, size, energy density of the feed and feeding practices of the individual breeder/manager. Some breeders present fat yearlings and try to sell by the pound while others have more athletic types. During yearling preparation, some yearlings are consuming over 3% body weight in concentrate and forage.

Generally, more attention is paid to detail in feeding the growing horse than the mare. Creep feeding is relatively uncommon, but foals have the opportunity

to eat from the mare's feed bin. While it is usual to feed supplementary minerals to young horses, many breeders are not aware of how important it is for the late pregnant mare. Some farms just feed oats or poorly fortified pellets to mares, without paying any attention to mineral intakes. One important consideration with mares is that owners expect mares to be in fat condition when they return from stud. To meet the owner expectations, mares need to be fatter than is necessary for reproductive performance and this often leads to a degree of overfeeding. Mares tend to remain on the stud where the stallion resides for several months until they are 45 days in foal. This means some mares are overfed so that the lightest mare in the group can be maintained in the desired condition. After weaning, many mares are run without any 'hard' feeding until winter arrives or they reach the last third of pregnancy. There is increasing recognition of the value of feeding extra minerals in the last third of pregnancy and many breeders also increase the grain intake at this time. Grain intakes range from 1 kg to 5 kg in the last trimester. Maiden mares are often fed so they foal in fat condition. Lactating mares can consume vast amounts of pasture, and under ideal conditions can maintain body weight on pasture alone. However, it is more typical to have Thoroughbred mares fed 3-6 kg grain to meet the significant energy and protein needs of lactation. If pasture is limited this is supplemented with up to one-half bale of lucerne or clover hay (10 kg) per day. As the foal gets older, it eats more of the mare's feed so intakes are maintained until weaning, even though the mare's nutritional needs are declining.

Feeding on studs in New Zealand has changed dramatically over the last 10 years mainly through the unfortunate 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 studs to investigate the importance of nutrition. Seasonal pasture analysis is now common and structured feeding programs are 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. Many mares are not fed apart from haylage in winter and supplementary minerals in late pregnancy.

Feeding of Performance and Leisure Horses

There is a wide variety of feeding practices used for performance, stock and pleasure horses in Australia. Some horses can be maintained on grass year-round or are supplemented with hay in winter. Others are stabled and fully fed using a mix of commercial feeds, chaff and hay.

A recent survey was conducted into the feeding practices of horses competing at high levels in the three Olympic disciplines (Owens, 1998). This covered six dressage horses, five show jumping horses and 11 three-day event horses and

involved measurements of feed intake and estimations of energy expenditure over a 5-day period. Average daily feed intakes and digestible energy intakes varied considerably with surprisingly low intakes for some show jumping and dressage horses (Table 1). Based on calculations of average dietary intakes, one-half of the horses were sodium deficient and six were fed diets deficient in trace minerals and vitamins.

Table 1. Body weight, digestible energy (DE) intake and dry matter intake of elite performance horses.

Type of Horse	n	Body Weight (kg)	DE Intake (MJ)	Dry Matter Intake (% B wt)
Dressage	6	570 - 760	75 - 130	1.0 - 1.8
Showjumping	5	487 - 555	60 - 140	1.1 - 2.5
Eventing	11	483 - 615	100 - 150	.5 - 2.5

There was a wide variation between predicted energy needs using the NRC equation or that of Pagan and Hintz (1986) and actual intakes. Equations used underestimated the energy needs of three-day event horses and produced underestimates for 60% of the show jumping and dressage horses. This may be due to poor feeding management or mismatching work and feed during the 5-day observation period. This period was not long enough to detect changes in body weight that reflected a real difference between energy intake and requirements. This study showed a suprising level of ignorance about basic principles of feeding and nutrition among elite riders. Horses managed by these riders showed greatest variation in feed and energy intake and energy requirements.

The concentrate and forage intakes of horses in various classes is shown in Table 2. The advent of well-formulated premixed feeds has made it easier to feed horses well; however many riders still make mistakes. That these riders can achieve good performance from their horses is a testimony to the marvelous athletic talents of the horses.

Table 2. Expected feed consumption by horses.

Horse	% of body weight		% of diet	
	forage	concentrate	forage	concentrate
Performance				
Horses				
Spelling	1 - 2	0 - 1	0 - 50	
Light Work	1 - 2	0 - 1	50 - 100	0 - 50
Moderate Work	1 - 2	0.5 - 1	50 - 80	20 - 50
Hard Work	1.5 - 2	0.5 - 1.5	0 - 80	20 - 50
Racehorse	0.5 - 1	1 - 2	30	70
Mares				
Maintenance/ Early Pregnancy	1 - 2	0 - 1	50 - 100	0 - 50
Late Pregnancy	1 - 2	0 - 1	70	30
Early Lactation	1 - 3.5	0 - 1.5	60	40
Late Lactation	1 - 2	0 - 1	65	35
Young Horses				
Weanling	1 - 2.5	0 - 1.25	50	50
Yearling	1.5 - 2	0 - 1	65	35
Sales Yearling	0.5 - 1	0.25 - 2	40	60

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