



Nutrition of the Aged Horse

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Introduction

The aging process in horses usually occurs over a period of years. There is no chronological threshold for determining old age in horses, but old age can be defined by changes in coat colour, lower muscle to fat ratio, dental disease, reduced mobility and body physiological function (NRC 2007). Some horses appear old at 12 years of age, whilst others are still active up to 25 years of age or into their 30s. The average lifespan is considered to be around 24 years.

The oldest recorded horse, Old Billy (presumably not his name in his earlier years) died at the age of 62 in 1822 in Lancashire in the UK. He worked as a barge horse until his late 30's. Donkeys generally live to a greater age than horses, with one donkey at the Good Samaritan Donkey Sanctuary at Clarence Town NSW passing away at 56 years of age. It is widely accepted that horses over 16 years of age need certain elevated nutritional needs, especially energy intake to offset body weight loss, as well as calcium to avoid osteoporosis and protein intake to maintain muscle mass. Arabians, except those with melanoma, stock horses and ponies and their cross breeds on average live to a greater age than Thoroughbreds and miniatures, although exceptions are not uncommon.

Horses over 20 years of age are regarded as aged or seniors in relation to feeding and nutritional needs, even though they may be in otherwise good general health. Over 30 years of age horses with organ or other diseases, such as arthritis which results in discomfort and reduced mobility, are regarded as geriatric. Many horses now live longer in retirement than the number of years during which they were in work.

The healthy, mobile aged horse is the easiest to care for nutritionally because its appetite and ability to graze and exercise helps maintain a better quality of life. A sick or diseased elderly horse may require specialised nutrition to maintain it in reasonable condition and provide a better chance that it will recover to live an extended, useful lifespan.

Symptoms of Old Age in Horses

Although, 20 years of age is often used to define the threshold for entering old age in horses, it can vary between individual horses and even breeds of horses. Surveys suggest that Thoroughbreds usually age more rapidly over 20 years of age as they suffer weight loss of old age before similar aged ponies, miniatures and genetically 'good doers' of any breed.

Ponies are often cited to live to a greater age as compared to larger horse breeds, but as in humans and other animals, genetics and organ disease can influence the lifespan of individual horses. Unfortunately, grey horses have a risk of developing melanomas, especially Arabians, which can end their lifespan prematurely.

The symptoms associated with changes in the physical appearance or condition is a better guideline to signify the threshold of old age in an individual horse.

The physical signs of old age include a low condition score and general ill-thrift which cannot be improved by specialised nutrition; chronic diarrhoea and dehydration, chronic weight loss over a 6-12 month period although they appear healthy and maintain their appetite if their teeth are in good condition; diminished muscle tone and mass over the topline with a more prominent back bone and a sway backed silhouette; reduced fat deposits above the eyes

(except in aged horses with PPID Cushing's Disease); greying of the muzzle and coat; sunken in perianal area; reduced mobility and loss of agility and increasing incidence of dental disease and its effect on digestive efficiency (NRC 2007). Some aged horses suffer loss of vision and others become deaf.

Common Digestive and Metabolic Changes of Old Age

Poor teeth, uneven bite or stepped mouth, masticating on tooth roots ('nubs') or loss of teeth, are the most common problems which affect feeding efficiency and well-being in an aged horse. Surveys have indicated that up to 33% of aged horses decline in health and condition due to dental problems. They often die prematurely because of poor teeth and secondary septicaemia from infected teeth and gums.

Cushing's Disease also appears to be a more common cause of weight loss and premature death in aging horses. In one survey in Queensland 30 years ago, there was around a 2% incidence of Cushing's Disease (PPID) in elderly horses over 20 years of age. In a recent survey, Equine Metabolic Syndrome (EMS) and middle-aged Cushing's Disease accounted for early debilitation and chronic laminitis in 16% of aging horses (Mc Gowan CM 2004).

In advanced old age, chronic low grade diarrhoea due to changes in the absorptive capacity of the gut lining can cause loss of condition and ill-thrift in 50% of aged horses. These conditions lead to eventual weakness and weight loss, especially during cold winter conditions when grazing at pasture. Arthritis, resulting in poor mobility and reduced ability to graze, also contributes to the loss of body weight and eventual catabolic condition in aged or geriatric horses.

As a horse ages, its digestive efficiency in the small intestine and hind gut also decreases and the animal will generally require more energy for everyday activities, such as walking, grazing and maintaining itself. The energy density and protein quality of the ration should be increased to maintain vitality, ability to exercise and a reasonable body condition score of between 4-5, especially during cold weather or over winter. Often pasture is not adequate to maintain condition and a hard feed at least once daily may need to be provided. An aged horse in retirement at pasture may fall away in condition during winter or summer when pasture is very succulent or sparse, despite adequate shelter and supplementary hay.

Unfortunately, once an aged horse loses condition, it is often difficult to regain the weight, even on a higher energy ration. Drought and cold weather are the two most stressful conditions which result in weight loss, rapid debilitation and death of aged horses.

As a practitioner, it is useful to be able to advise clients on the nutritional needs of an aging horse. The increase in hobby farms in semi-urban areas around cities and towns has resulted in horses and ponies being kept and maintained as family pets, with many animals living to their mid-30s or longer. The emotional attachment to horses and high disposable incomes increase the chances that hobby horse owners will look after horses to a greater age and be willing to spend money for veterinary services and health care.

Are Horses living to an Older Age?

It is generally accepted that over the last 20 years with client awareness highlighting the need for improved teeth care, focus on specialized nutrition for aged horses and regular and effective internal parasite control, horses have a much better chance of living to their late 20s or older. Improved health care has also reduced diseases concurrent with aging. Over the last 50 years, agriculture has become less reliant on horses as a form of traction power and transport, so that many horses are not being worked into their late teen years and are generally retired by 15 years of age. Location and affluence of the owner also has an influence on the level of aged care a retired horse will receive, as compared to a stock or farm horse turned out into a paddock to fend for itself in retirement.

A survey in the US in 1998 estimated that 7.5% of horse population was 20 years of age or older (NRC 2007).

A recent study in Queensland found that one third of the retired equestrian horse population surveyed were 15 years or older, with a range of ages from 15 to 44 years (McGowan TW et al 2010). Retired horses had reduced levels of basic husbandry as compared to non-retired horses. Rural areas had a lower level of preventative health care as compared to semi-rural and urban areas. Up to 61% of the aged horses surveyed in the study had not been visited by a veterinarian for the previous 12 months. Given this low level of service and that the highest concentrations of aged horses are in semi-urban areas, it provides the equine practitioner another opportunity to provide advice on specialised nutrition and health management to the aging and retired horse population.

Can an Aged Horse Contribute to Equine Society?

Older horses can be useful members of a horse group on a property, providing a mature, steadying influence on foals and younger horses in the same grazing area. Many horses age gracefully and if they are generally fed well, their teeth are maintained and they are wormed regularly, as is the practice for younger horses in work, then they have a good chance of living to over 30 years of age. The elderly companion mare or gelding in a weanling and yearling group on a stud is a prime example of the contribution provided by older horses as they live out their lives.

Although nutritional needs change with age, aging is not a disease as such. In many cases, elderly horses can be provided with the same feed as young growing horses when they act in a caretaking role. As an example, most of the diets fed to growing and working horses contain higher levels of energy, calcium and protein, the three important nutrients of benefit in higher amounts to a horse over 16 years of age. However, where aging is associated with teeth problems, organ disease or chronic diarrhoea, then specialised diets may be necessary to ensure that the elderly horse maintains adequate body weight and mobility to graze and fend for itself.

It is true to say that where a horse has been a champion on the race track, in the show ring, a retired child's pony languishing in the back paddock or has produced high quality offspring, then it is more likely to be looked after at a higher standard than the average working horse or one with a legacy of physical injuries from an earlier mediocre sporting career.

Energy Requirements in Aged Horses

Although, the maintenance energy needs reduce as an animal ages, possibly due to decline in free-fat mass and decreased exercise activity, the reduction in maintenance energy needs has not been quantified in horses. (NRC 2007).

Horses suffering from recurrent airway disease (COPD which is common in the Northern Hemisphere) have a 41% increase in resting energy requirement as compared to controls (NRC 2007). However, as would be expected, maintenance energy needs increase during cold weather conditions. Aged horses are less cold tolerant as compared to young horses, possibly because of reduced free-fat mass contributing to skin insulation.

Horses begin to lose increasing amounts of heat from their skin surface (about 3.5 square metres in a 500kg horse) as ambient temperature falls below 8°C, and exponentially more if the wind chill factor increases at near freezing overnight temperatures under paddock conditions. During cold weather, increases in energy intake must be made early to maintain comfort in aged horses with lower fat reserves, as compared to young or mature middle aged horses.

Aged horses in poor condition are highly susceptible to cold stress and therefore a shelter or light quilted rug should be provided at night during cold or wet conditions, especially in aged horses with a lower than moderate body condition score. Faecal energy losses increase as a horse ages over 20 years of age as a result of reduced crude fibre digestibility in the hind gut. However, the apparent reduction in fibre digestibility may be influenced by the reduced efficiency of mastication in an aging horse as teeth condition deteriorates. This could be a case for substituting part of traditional fibre sources in chaff and hay with more readily fermentable fibre sources such as sugar beet fibre,

soyabean hulls and lupin hulls which commence fermentation in the lower small intestine region and are generally more easily masticated to prepare the fiber for microbial attack in the large intestine.

In aged horses with Equine Metabolic Syndrome (EMS) and Equine Cushing's Disease (PPID, especially animals with concurrent Insulin Resistance, feeding a diet to provide more calories from digestible fibre, protein and fat sources, instead of energy from grain starches with a higher soluble sugar and non-structural carbohydrate (NSC) content, is of nutritional benefit to lower blood sugar spikes and insulin responses associated with Insulin Resistance. These conditions are discussed more fully later in this review.

Feeding Management of Aged Horses to Increase Energy Intake

For convenience and because of the large selection of commercial feeds formulated for aged horses, many owners feed the recommended amounts of senior horse feeds with good quality hay to supplement pasture grazing. If an aged horse is exposed to very cold conditions, additional energy can be provided by adding 100-200g per 100kg body weight of steam rolled barley or alternatively boiled barley (dry weight before boiling) and 50mL of polyunsaturated oil per 100kg bodyweight. Additional fat must be introduced in a step-wise manner over 10-14 days to allow lipase enzyme adaption to increased fat for efficient digestion and utilisation in the small intestine.

Lucerne hay (except for aged horses with renal disease) which is dampened (preferably soaked in double its volume of warm water for 60 minutes for EMS affected horses to reduce soluble sugar content) will contribute cost effective sources of additional energy, good quality protein and fibre for hind gut heat producing fermentation processes to help maintain gut fill and comfort under cold conditions.

Protein Requirement related to Age

The exact effect of aging on protein requirement is unknown. However, a 6% lower protein digestibility has been reported in aged horses over 20 years of age as compared to young horses less than 3 years of age (NRC 2007). It is suggested that the quality of protein with higher intakes of lysine and threonine may be worthwhile in elderly horses as it is in young growing horses. Considering the catabolic effects of aging, an increase in the protein content is recommended, especially in aged horses with lower body condition scores to help reduce the topline muscle decrease with aging.

The majority of the commercial pelleted and processed feeds marketed for aged horses have 4-5% increase in crude protein content as compared to feeds aimed at middle aged or working horses. In a paddock grazing situation where C3 winter grasses dominate the pasture content with minimum clover or legume content, it may be an advantage to feed a hard feed containing a higher level of crude protein. If an aged horse's teeth are in a good condition to macerate long stemmed hay or chaff, prime, higher protein leafy lucerne hay or chaff would be a suitable fibre base.

It would also assist hind gut heat production to help provide warmth under cold conditions, as excess protein overloaded into the hindgut, produces 6 times more fermentation heat as compared to carbohydrates or fats.

Feeding Management of Aged Horses to Increase Protein Intake

The majority of commercial feeds formulated for aged and senior horses contain from 13-16% crude protein. If an increased intake of protein is deemed necessary in an aged horse which has a poor appetite, recovering from high internal parasite burdens, anaemia severe wounds or a protein losing enteropathy condition with chronic diarrhoea, then suitable good quality sources of protein include soyabean meal [38% crude protein] (preferably extruded), extruded micronised lupins or canola meal [32-33% crude protein].

Copra meal is lower in protein [23% crude protein] with lower lysine and other essential amino acids. These can be offered at 50-100g per 100kg body weight relative to the protein content in the commercial feed or hay. Lucerne hay [average 15-17% crude protein] is also a cheap source of protein for healthy aged horses with good teeth.

Calcium and Phosphorus Digestibility Relative to Aging

The effects of aging on macro-mineral (calcium, phosphorus and magnesium) digestibility and bioavailability indicate that older horses over 20 years of age have reduced phosphorus digestibility as compared to younger horses below 3 years of age (NRC 2007). Although calcium digestibility has not been shown to be affected by aging, the loss of calcium from the bone mass may pose a problem in aged horses which are less mobile and during the winter months in southern Australia where skin synthesis of vitamin D is reduced in horses grazing at pasture to ensure optimum calcium and phosphorus homeostasis.

Practical Nutritional Management

The majority of commercial feeds formulated for aged or senior horses contain additional calcium and phosphorus relative to feeds formulated for mature middle aged horses.

Commercial pellets, extruded and micronised feeds formulated for broodmares and foals, are also suitable for aged horses as these feeds contain a higher content of protein, calcium, phosphorus and trace-minerals. In most cases, they are more economical to feed to aged horses, as specific feeds formulated for aged horses often attract a premium price because of the lower volumes produced. Aged horses grazing tropical pastures have an increased risk of reduced calcium uptake as a result of high levels of oxalate chemical in these grasses.

Oxalate chemicals contained in the leaves of rapidly growing tropical grasses and hay, such as Setaria, Buffel, Pangola, Para Grass, Guinea Grass, Kikuyu, Signal Grass and Green Panic when consumed by horses bind to calcium liberated from feeds or supplements during digestion in the small intestine of horses. In many areas, kikuyu grass which is well adapted to warmer climates is becoming dominant in horse pastures due to its hardiness under drought conditions. The oxalates form a calcium-oxalate complex which is not digested in the small intestine by enzymes.

The complex then carries the calcium into the large intestine where it is liberated during microbial digestion. Unfortunately, 90% of calcium is absorbed from the small intestine of the horse. The calcium-oxalate complex is not digested so that inadequate calcium is absorbed to maintain blood levels for muscle and tissue function.

The lower blood calcium triggers the release of the parathyroid hormone from the pituitary gland, which then reabsorbs calcium from bone stores, especially the non-weight bearing bones of the upper face and skull. This results in weakening of the face bones, which are pushed out by the nasal contents as the horse grazes, to result in an enlarged nose and forehead, or 'Big Head'. It can also result in premature loss of teeth in aged horses and can severely affect their digestive efficiency.

Intakes of large quantities of oxalate chemicals in tropical grass by grazing horses can cause a significant reduction in calcium uptake and over a 4-6 week period can lead to the development of weakened bones and the appearance of "Big Head" or "NSH".

Some sub-tropical pasture grasses, such as kikuyu, contain more oxalates during periods of rapid, lush growth, such as warm weather following rain or irrigation in spring or summer. Oxalate content increases when these grasses are fertilised with nitrogen and phosphates, such as poultry manure or N-P-K fertilisers. However, kikuyu grass, which is short and dormant, is generally not dangerous, even if large quantities are grazed, as the oxalate content is low. Even Lucerne

contains some oxalates, but studies indicate that the amount taken in by horses even on lucerne based diets, does not cause oxalate-induced NSH.

High calcium commercial feed mixes are available in tropical areas but to meet the need for energy and protein in horses grazing tropical pastures, These have to be fed at the recommended amount on the bag label. It is important that feeds fortified with calcium, or a feed with an added calcium supplement, are fed each day, or on alternate days, as a **bolus dose** in a feed bin in yard away from the grazing pasture. This is essential to ensure the effective uptake of calcium as opposed to the feed being offered adlib in bins in the pasture area. Grazing horses will not always consume the feed without wandering off to consume more oxalate containing grass between snacks of the calcium fortified feed.

Calcium lick blocks are an ineffective “hit and miss” method of providing calcium for this reason. Economical mixes of calcium and phosphorus include 2 parts of dicalcium phosphate to 1 part of fine limestone, fed at up to 40g (2 tablespoonsful) per 100kg bwt per day to high risk aged horses. Up to double this amount may be needed for 2-3 months to correct calcium deficiency and replenish calcium stores in severely affected horses.

Dolomite is a poorly absorbed source of calcium and is ineffective as a supplement to counteract oxalate ingestion in pastured horses. Special calcium supplements, such as Cal-Xtra™, are formulated to provide a palatable source of calcium, phosphorus, magnesium and Vitamin A and D. This product is acidified to assist calcium uptake from the small intestine and adheres to the feed to reduce waste and blow- away from yard feeders.

Normal Digestive Related Changes with Aging

As outlined in the introduction above, nutrient requirements in aged horses are influenced by the increase in metabolic needs and changes in the digestive system with reductions in nutrient digestion, absorption and efficiency of metabolism. When one or more of these changes in digestive function begin to develop as a horse ages, then the animal will have an increasing difficulty in either maintaining its body weight, strength and ability to fend for and maintain itself.

Dental Abnormalities

Progressive deterioration of the teeth and related decrease in efficiency of mastication is common in older horses. Age- related teeth wear is a naturally occurring condition in horses, with a reduction in preparation of small food particle size required for enzymatic digestive processes in the small intestine and microbial fermentation attack in the hind gut. Horses only have one opportunity to grind their food during mastication and the ingestion of large particle above 2mm diameter for grain and poorly macerated roughage leads to significant reduction in digestive efficiency and nutrient availability. Painful gum and periodontal disease which can reduce the pressure and duration of mastication, sharp edged molar teeth and uneven tooth wear and poor apposition of molars, can all significantly impair the value obtained from the food ingested and result in chronic weight loss and ill-thrift.

It is beyond the scope of these notes to describe the variety of teeth abnormalities and remedial management, but it is suffice to emphasize that as an equine practitioner, you have the best ability to provide advice and dental services to clients with elderly horses. Routine 6 monthly dental assessment and care is advocated in aged horses over 20 years of age, well before signs of dental problems such as ‘quidding’, slobbering and food impaction develop due to dental changes and disease. Aged horses grazing oxalate pastures, as explained above, require more regular.

Over recent years, there has been anecdotal evidence to suggest that the incidence of premature dental decay with tooth enamel erosion and gum margin periodontal disease is increasing. These changes have been linked to the increase popularity of molasses sweetened ‘sweet’ feeds in equestrian and show horses in particular.

Certainly it has been established that 'sweet' and processed feeds (eg pelleted feeds, extruded and micronised grains) reduce mastication time and the amount of saliva produced by the chewing action.

A horse chews grains and hays at a different rate as follows:

- Whole Oats 800-1000 chews/kg
- Hay 2000-2500 chews/kg

350-500 chews/kg – rapid consumption, reduced chewing and less buffering by saliva, possibly leading to an increased risk of gastric ulcers.

- Feed pellets and mash 400-480 chews/kg

Dental abnormalities often result in an increase in the retention time of the food bolus in the mouth, but efficiency of grinding of the food is reduced and salivation ('slobbering') more profuse without adequately preparing the food mass for digestive attack.

Practical Nutritional Management

Besides dental attention to improve the efficiency of mastication, providing elderly horses with a base diet of extruded or micronized commercial feed formulated for aged horses, supplemented chaff and chopped hay, will help provide a balanced and easily masticated diet. Pelleted feeds which are pressed from ground particles and fines which require less forceful grinding, will also help to reduce the effects of dental changes associated with aging. As aged horses require an increase in the calcium and protein content of their diets to offset the reduced uptake, feeding good quality prime lucerne chaff or soaked lucerne hay as a roughage provides these required nutrients as compared to cereal chaff and hay.

The feeding rate for horses and ponies is dependent on the individual animal's condition score, its body weight, appetite and ability to masticate effectively. However, a good start for an easily masticated 'hard' feed is a blend of 2.0kg per 100kg body weight per day in 3 divided feeds, consisting of 50% by volume of dampened pellets or commercial senior feed, 20% by volume of soaked beet pulp, soyabean or lupin hulls and 30% by volume of prime fine chop lucerne chaff. Where commercial feeds are not used, then a diet similar to that recommended for renal disease is also suitable for aged horses with reduced dental efficiency.

Choke in Aged Horses, Ponies and Miniatures

Choke can occur in aged horses as they attempt to chew dry long stemmed hay and dry stands of pasture, especially if their teeth are unable to masticate their food or they do not salivate sufficiently to lubricate the food bolus for swallowing. Reduced neurological control associated with the swallowing action and flaccid muscular tone in the oesophagus is muted as possible reasons for choke in aged horses. Miniature horses have a higher incidence of choke and impaction colic when competing for dry hay during cold conditions where they try to ingest large mouthfuls in a competitive herd environment and do not drink sufficient water during cold weather to adequately hydrate their hind gut.

It is good practice to recommend that miniatures be fed soaked hay (10 minutes soaking in luke-warm water) in individual bins under cold conditions for this reason. It is also helpful to suggest to clients to feed them in small groups rather than providing a communal portion of hay to share. Feeding hay in round bales for ad-lib consumption is wasteful and risks choke and impaction colic in greedy horses and ponies. Round bales also increase the risk of botulism as a result of anaerobic core areas when the hay becomes wet under rainy conditions. It is much more efficient to tease and feed portions of the round bale out, allowing the bale to be checked for dead animal contamination and mouldy areas within the hay.

Practical Feeding Management for Choke in Aged Horses

Often aged horses which suffer a choke episode have throat and oesophageal discomfort which makes them unwilling to try to eat any type of wet mash or soaked textured feed, or even chaff, soaked pelleted feeds and bran blends. If they are able to drink, then I recommend oral fluids containing 10g plain fine salt, 20g glucose or dextrose per litre of luke-warm water offered at 1 litre per 100kg body weight every 4-6 hours to provide fluids to maintain hydration and energy from the glucose.

It is nutritionally better to add glucose as compared to molasses to the saline drink, as the sucrose in molasses has to be enzymatically broken down to glucose in the small intestine. The drink is offered in an open dish to allow them easy access to drink. I have found this sweetened normal 'saline' strength drink well accepted until they regain their appetite and ability to take hard feeds. I then suggest a wet mash or blended gruel of a higher protein commercial feed formulated for senior horses, as well as 50:50 cereal and lucerne chaff blend, fed at 1.5 kg per 100kg body weight, divided into 4 feeds per day.

It can be sweetened just prior to each feed with molasses water to form a soft mash to encourage their appetite. If beet pulp is available, adding 20% by volume of soaked beet pulp to replace 20% of the chaff by adding readily fermentable fibre, should assist hind gut microbial action and help restore efficient hind gut function within a few days.

Reduced Gut Absorptive Capacity

There is some anecdotal evidence to suggest that aging can result in changes in the absorptive capacity of the small intestine and the integrity of the lining of the large intestine, based on the common observation that horses in excess of 30 years of age often develop low grade chronic diarrhoea. In 30% of aged horses exhibiting symptoms of chronic low grade diarrhoea, changes in the phospholipid content of the intestinal lining are hypothesized as being an underlying cause of an irritable bowel-like syndrome, resulting in the passing of faeces which have increased water content and are poorly formed with evidence of reduced digestion of fibre within the faecal mass.

Where an aged horse is harbouring a large population of hypobiotic or 'resting' stage Small Strongyle spp, the irritation to the integrity of the hind gut lining may be compromised, leading to inflammation, reduced water and food absorption and irritation from the large population of immature and mature Small Strongyles. Often the aged horse's immune status is compromised by concurrent disease or loss of condition and the suppression of Large Roundworm and the small degree of immune reaction to Strongyles is reduced as compared to a young or middle aged horse.

Practical Feeding Management of Aged Horses with Intestinal Lining Abnormalities

The attending veterinarian is faced with an aged horse which is slowly losing weight as a result of persistent low grade diarrhoea without an infectious origin or a recent history of high dose antibiotic therapy which may have altered the balance of hind gut microbial populations leading to reduced fibre digestion. There is no justification or benefit obtained from oral dosing with probiotic preparations, which are often recommended in the hope that they will re-establish hind gut bacterial balance.

If an aged horse in a weak or poor condition has evidence of a high Small Strongyle spp burden (above 1000 epg) as identified by faecal egg counts, I recommend that the horse be treated with Panacur 100 at 10mL per 100kg body weight daily for 5 days in the feed or over the tongue as a liquid drench. This low dose daily program will effectively reduce Small Strongyle spp, Large Roundworm and Pinworm burdens with no risk of colic or decrease in appetite which can be associated with a single dose of an ivermectin or moxidectin anthelmintic compound.

The natural mucilage and phospholipid compounds which are present in many feedstuffs, including lucerne hay and chaff, can be degraded by heat processing of grains and protein meals, reducing the natural sources of these compounds which primarily protect the intestinal lining.

Chronic Diarrhoea

Recent observations carried out over a 6 year period have indicated that in up to 93% of all horses with chronic diarrhoea of a non-infectious cause, often respond to a concentrated supplement form of whey powder phospholipids and yeast cell wall fractions to help maintain normal function of the intestinal lining. It is recently become available as the product Formex™. Full dosage recommendations are included on the label. It is important to ensure that water overload caused by excessive drinking due to habit or Cushing's Disease, intake of high moisture content pasture during the season flush or during wet weather, which are common causes of poorly formed droppings in aged horses without an elevated temperature, are considered before recommending supplementation with Formex™.

In the majority of cases reviewed in the filed study over the 6 year period (unpublished data by JR Kohnke BVSc RDA), an improvement in faecal form was noted within 10-14 days with faeces of normal consistency continued to be passed during the time of supplementation. About 60% of aged horses were able to be withdrawn from daily supplementation within 3-4 weeks with a low incidence of relapse. However, 40% of aged horses had to be maintained on a daily supplement for an extended time, some for as long as 2 years.

However, because owners were relieved that the aged horse regained weight and passed normally formed droppings while being supplemented with Formex™, most accepted the fact that the animal may have to be given long term maintenance supplementation so that it could live a more comfortable life and give the owner peace of mind.

Acute Diarrhoea

Aged horses can develop a rapid onset form of acute diarrhoea, or more long term, chronic diarrhoea with loose 'cow pat' like droppings. The underlying causes of diarrhoea can be related to age, breed, and diet. It can be caused by ingestion of certain feeds and succulent pasture plants, microbial contamination of feed and/or water, viral infection and organ diseases, such as chronic liver disease, gastro-intestinal ulcers, ingestion of sand, food allergies and fungal toxins in feed, heavy worm burdens, bowel or organ cancers and drug induced diarrhoea (eg antibiotics, high doses of 'bute' in aged horses).

In many cases, it is difficult to diagnose the underlying cause of a low grade chronic diarrhoea in an elderly horse. In many cases, the symptoms develop gradually with poorly formed faeces and 'cow pat' like droppings, often without an elevated temperature. This type of chronic, low grade diarrhoea invariably leads to weight loss and ill-thrift, chronic dehydration and lack of energy to exercise and the need to daily clean a scour soaked tail of the old horse to make it more comfortable.

Often bacterial culture of the faeces is unrewarding in an attempt to diagnose the underlying cause. Supplementation with multi-strain probiotics is often of little or no benefit and a costly exercise for the desperate horse owner.

Some elderly horses pass softer 'green' droppings, followed by a dribble of fluid from the anus which runs down the inside of the buttocks. In many cases, this is caused by feeding large amounts of lucerne hay. Lucerne hay has a fibrous structure which doesn't hold as much fluid as compared to cereal hay fibre. The excess water floods the rectum and 'dribbles' out after defecation. Reducing the amount of lucerne hay to less half the current amount and replace with more cereal or grassy hay may help reduce the problem in 80% of cases.

Sand Colic

Aged horses grazing on sandy country have an increased risk of sand colic as compared to younger horses. Over recent years, the risk has increased due to drought conditions where horses are forced to graze closer to the ground and are more likely to ingest sand as they graze. Fine drift sand and

coastal sandy areas increase the risk of sand colic as the fine sand particles, as compared to coarser river sand, are more likely to mix with ingesta and mucous to precipitate in the hind gut. Heavy rain on denuded pastures results in 'sand splash' onto the leaves of plants, which is also a problem following flooding of pastures, where sand is accidentally ingested during grazing. There is some evidence that the risk of sand colic is increased in horses harbouring large burdens of hypobiotic *Small Strongyles* as gut motility may be hampered.

Practical Feeding Management to Avoid Sand Colic

It is good management to advise a horse owner to restrict grazing of sparse pastures after heavy rain on sandy country until the next shower of rain helps to wash the sand off the leaves and stems of plants. The same applies following flooded pasture areas to reduce the risk of sand ingestion.

Although there is controversy regarding the efficiency of methods to remove sand for the hind gut of horses, it is generally agreed that laxatives such as paraffin oil drenches have little benefit as compared to high dose rates of psyllium husk mixed into a course feed blend in assisting the removal of sand. Dose rates of 70-100g psyllium husk per 100kg body weight, mixed into 5 times the volume of a feed containing very coarse seed hulls, such as sunflower or oat hulls, are a more effective way to remove accumulated sand when given for 2 consecutive days once per month to horses, including aged horses grazing on sandy country.

Feeding psyllium husks in a mixed feed each day is ineffective as a preventative for hind gut sand accumulation, as the hind gut microbes adapt to ferment the psyllium fibre and it loses its effectiveness. Providing feed bins for hay also reduces contamination with sand in sandy yards. Shifting vulnerable horses onto less sandy areas is also a good management initiative. Feeding large volumes of dolomite as a calcium supplement to offset oxalate binding of calcium in horses grazing high oxalate pastures, can increase the risk of sediment accumulation in aged horses and result in 'sand colic'. Dolomite is a poorly digested or absorbed form of calcium supplement to all horses.

Lipoma

Older horses tend to have a higher incidence of gut pedunculated lipomas which can strangulate the small intestine as a horse rolls. Careful observation by the horse owner on the signs of colic is paramount to diagnosis.

Melanoma

Melanoma formation around the anus and invasion of intestinal lymph nodes is also a higher risk problem which can occur in genetically susceptible aging horses, particular grey horses and in many cases elderly Arabians over 16 years of age. Most horse owners are aware of the signs associated with anal and intestinal melanoma formation. The only form of management to increase the lifespan and comfort of affected aged horses is to feed more laxative feeds, such as soaked extruded or micronized commercial feeds or alternatively soaked pelleted feeds, as well as wet wheat bran at 1 litre per 100kg body weight, combined with high quality fermentable fibre, such as beet fibre, soyabean or lupin hulls. It is important to avoid feeding coarse dry hay, especially in aged horses with poor teeth.

Endocrine Diseases

There are two main endocrine diseases associated with aging in horses.

Equine Metabolic Syndrome

Over recent years, a metabolically related condition has been identified and now recognised in horses and ponies from as young as 12 years of age and even more commonly in horses over 18-20 years of age. New research has linked a history of heavy weight condition, 'good doers' and

high GI sweet and processed feeds with abnormal fat distribution, lack of exercise and recurring laminitis (founder) in aged horses, ponies and minis to an Equine Cushing's-like syndrome, referred to as **Equine Metabolic Syndrome**, or EMS for short.

It is now more clearly understood that EMS is related to abnormal glucose metabolism and insulin resistance, rather than the previously held belief that these symptoms were consistent with hypothyroid activity which developed as a horse ages. More research is continuing.

How Does EMS Develop in an Aging Horse?

Many horse and pony owners are aware of Equine Cushing's Disease (ECD) in aging animals, but EMS often develops in middle aged horses and ponies which have a lifetime history of over-weight and heavy condition, especially when grazed predominately on improved pastures, fed on highly processed 'sweet feeds'; a diet high in soluble sugars or non-structural carbohydrates (NSCs) as grain starches; or a base diet of high quality grass hay (especially rye grass-clover hay) to maintain them in show condition for a greater part of the year. Many of these horses, most commonly show horses maintained in good condition, do not have a lean or 'strip off' period over winter to readjust their glucose metabolism.

Often by 12-14 years of age, and certainly by middle age, a metabolic change occurs as glucose intolerance and insulin resistance (IR) develops, which then displays the characteristic signs of an even higher risk of obesity and battle to maintain a moderate condition, even on maintenance rations.

In common with ECD, affected animals develop exercise intolerance, abnormal fat distribution and a repeated history of laminitic episodes and acute sensitivity to changes in sugar intake from pasture or hard feeds and changes in the glucose or starch content of their diet. They often develop the appearance of long toes, flat heels and recurring bouts of lameness associated with chronic founder, now linked to insulin resistance.

EMS is a term that describes the syndrome related to combined glucose intolerance and insulin resistance, similar in many respects to Type 2 Diabetes with increasing obesity, a sedentary lifestyle and altered glucose and insulin sensitivity that develops in men as they reach 50-60 years of age.

What causes Insulin Resistance?

An endocrine gland disorder, such as developing IR as horse ages, can have a direct effect on the onset of ECD and EMS, especially in horses that have a history of continued heavy condition and starch based grain diets.

At this time, research has not linked the risk of pituitary gland dysfunction leading to ECD, or pancreatic gland disorders in the case of EMS, to breed or bloodline, although some Thoroughbred and Warmblood bloodlines, pony breeds and miniatures tend to have a higher incidence because of their 'easy keeper' metabolism or tendency to be overfed relative to their exercise programs.

Although ECD appears to be common in middle to late aged grey ponies, this type of pony is very popular with children and there are many in retirement in the back paddocks of semi-rural areas in the outskirts of cities and towns suffering from weight control, a long shaggy coat which grows rapidly again after a clipping and a tidy up. They are often plagued by sore feet, white line disease, seedy toe and recurring episodes of laminitis. ECD was originally classified as a metabolic disorder related to pituitary gland dysfunction (PPID) resulting from a tumour growth in aged horses and responsive to medication with the drug pergolide. However, not all horses that have the signs characteristic of ECD are responsive to pergolide therapy. In this case many of these horses were found to have abnormal glucose metabolism or an intolerance to glucose due to developing IR, now classified as non-pergolide responsive EMS.

Insulin resistance (IR) is a result of decreased tissue responses to circulating insulin hormone which acts to control blood glucose within a set and safe metabolic range. This causes a decrease in the insulin-mediated glucose uptake in skeletal muscle tissue, fat storage tissues and the liver. Studies have shown that in IR affected horses and ponies, that these insulin sensitive tissues are less responsive to glucose when insulin is administered and blood glucose levels are monitored over a 4-6 hour period.

In the most common form of IR, classified as compensated IR, which develops in horses and ponies, serum insulin concentrations in the circulating blood are higher than normal because more insulin is being secreted from the pancreas to compensate for the lower tissue uptake of glucose. The mineral magnesium has a role in normalising tissue uptake of glucose in IR resistant animals. In some older horses, or following disease where the pancreas is unable to produce enough insulin, resulting in lower circulating insulin levels relative to the concentration of glucose in the blood, the changes are referred to as non-compensated IR.

Many horses with advanced ECD associated with the PPID form, become diabetic, because PPID increases circulating cortisone levels as a result of pituitary cancer. It acts to reduce glucose uptake into the normally insulin sensitive tissues, increasing circulating glucose levels in the blood (hyperglycaemia) because the glucose supply to high priority tissues, such as the brain, is increased during times of stress or danger when horses have elevated blood glucose levels to fuel the brain tissue.

Other Causes of IR

The stress of hard training and competition can increase the risk of IR as well. The administration of cortisone drugs to help reduce joint inflammation and skin reaction associated with the itch can trigger a transient IR and in obese animals already 'bordering' on clinical IR, may suffer an IR crisis and develop a secondary laminitis and founder.

IR increases naturally during the last 70 days of pregnancy in a mare as more glucose is delivered through the membranes, unaffected by the action of insulin, to provide the energy needed to fuel the very high rate of development where the unborn foal increases its body weight to time of birth by 45% in the last 2-3 months before foaling.

Obesity and IR

Although IR is a metabolic consequence of obesity in horses and ponies, in older horses gaining weight when fed on high energy rations and a more sedentary lifestyle during retirement, weight control by dietary management is essential. Feeding a diet to limit starch and NSC intake, including limiting pasture grazing when plants are in their early, rapid phase of growth after rain or irrigation, must be instigated before the horse becomes obese and progresses to clinical IR.

However, not every IR affected aged horse will be overly fat or obese, but as a consequence of developing IR, the horse may progress over a period of several months to clinical IR with signs of abnormal fat distribution, such as a 'cresty' neck, fat pads around the tail base (butt), bulging fat deposits above the eyes and increased soft pads of fat behind the shoulders and under the belly. Normally the development of a 'cresty' neck and tail-butt fat deposition are the most characteristic signs of early IR in an otherwise reasonably conditioned and healthy animal.

Practical Feeding Management to Reduce the Risk of EMS and IR in Aged Horses

EMS, unlike the other similar Cushing's-like (PPID) symptoms related to a pituitary gland cancer, can be effectively controlled by a combination of limiting grazing and restriction of high energy feeds, combined with regular daily exercise, preferably under saddle rather than lunging.

The aim of dietary control is to reduce body fat mass and abnormal fat distribution so as to improve insulin sensitivity, by selecting 'low glycaemic' feeds (GI), combined with other dietary measures

and increased, but not excessively hard exercise that would otherwise increase blood glucose responses.

Careful management will also reduce the progression to laminitis and founder in clinically IR horses and over-weight ponies. Obviously in PPID horses with developing ECD, pergolide therapy should be used in conjunction with dietary and exercise management to control IR and its clinical symptoms. This will help normalise metabolic function and in most cases, improve the horse's lifestyle for 3-5 years until the severity of PPID becomes non-responsive to pergolide therapy.

1. Restriction of pasture access to 1-2 hours total per day.

Advising owners to restrict EMS affected horses to short pastures (ie grazed by other horses or animals or slashed to remove excess foliage is helpful in restricting excess soluble sugar and NSC intake during periods of pasture flush. Recommending the purchase of a grazing muzzle so that the horse or pony can exercise without consuming too much 'sugary' (non-structural carbohydrate NSC) grass, especially rye grass based pasture in its early phase of growth in early Spring, or a growth flush following late summer or early autumn rains. Both these conditions can cause an increase in the risk of laminitis due to excess fructan or soluble sugar/ NSC carbohydrate intake where susceptible middle –aged and aged horses (especially 'good doers' such as pony and Warmblood breeds) which have access to unrestricted grazing on a 24/7 basis.

2. Ensure a regular exercise program – daily walks for 15-20 minutes without grazing to utilise excess blood glucose.

3. Controlled intake of NSC sugars in hard feeds and hay.

Especially good quality grass hay which was early growth phase pasture before being cut and cured as hay, as it can be even more dangerous in small amounts as dehydrated pasture in the same way that it was as rapidly growing, high NSC yielding, lush grazing pasture.

These measures include...

1. Choice of low GI or low NSC feeds

By avoiding cereal grain based pellets, sweet grain mixes or grain based extruded feeds. Feed restricted amounts of millrun based equestrian pellets and rice bran (it too contains 20% NSCs). Feeding Omega balanced vegetable oil blends (oils are very low or zero GI feeds) at a rate of up to 5% by weight of the ration, introduced in a step-wise manner over 10-14 days, will help ensure efficient digestion and reduce blood sugar levels as apart replacement for grain or high GI feeds. Ideally, the daily hard feed and hay should be split into 2-3 meals, with some during the day to avoid a large meal, especially at night, which can lead to a higher glucose peak and compensatory IR.

Low GI feed products such as Equi-Jewel® and Rebuild® are also recommended, but it is important to feed only the amounts recommended, preferably split between 2- 3 feeds. This is also important when feeding other commercial feeds recommended to help avoid laminitis and founder, especially to over-weight horses with classical symptoms of IR.

2. Suitable roughages include hay which has been soaked in double its volume of warm water for 60 minutes and then taken out to drain and air dry before feeding.

Recent studies suggest that soaking in at least **double** its volume of warm water. A standard small bale biscuit or slice of hay has a 15 litre volume, so recommend to soak it in a tub containing 30 litres of warm water for 60 minutes. If too small a volume of water is used, (ie enough to just cover the hay in a small bucket), then the removal of the soluble sugars will reach an equilibrium quickly and a reduced amount will be leached from the hay. Soaking grass hay in double its volume of warm water will leach out up to 30% of the soluble sugar content, and around 25% from lucerne

hay, which has a lower natural soluble sugar and NSC content as compared to grass or immature cereal oaten hay. Rye grass hay has the highest soluble sugar content of all the grass hays available.

As a part or full substitute for oaten chaff, feeding 5% of the total ration weight of dry sugar beet fibre and then soaking it for 10 minutes before feeding to supply low GI, highly digested fibre or 10-15% by weight of lupin or soyabean hulls, will help to minimise the glucose peak after feeding. Remember that sugar beet fibre contains some NSC – so avoid large single feeds, especially in over-weight horses and ponies.

Good quality oaten chaff has a higher GI and NSC content than an equivalent weight of lucerne chaff, with wheaten chaff having the lowest GI of chopped hay roughages.

3. Supplementation with the product TRIM™

Which by way of its magnesium content has a role in normalising blood sugar by facilitating glucose use by the tissues and thus lowering blood sugar and its direct effect on the level of circulating insulin which peaks after a meal. TRIM also contains organic chromium which has a role in mimicking the action of insulin in response to blood sugars elevation after a meal. It also contains choline and manganese which have roles in normal fat metabolism and regulation of fat build up in the crest and tail butt areas.

TRIM is best given at double doses for 5-7 days or until the 'crest' or tail butt deposits become soft, then reduced to a standard dose for another 5-7 days. After this time, it is a good idea to monitor the 'hardness' of the crest and tail butt area at 2-3 day intervals. If they again become packed HARD with sugars and fat, then reintroduce TRIM at double doses, as outlined above, until the crest and tail butt soften. The risk of a horse foundering due to EMS if the crest and tail butt area remains soft is much reduced.

The addition of a supplement containing calcium, trace-minerals, including organic zinc and chromium, and a full range of vitamins, such as Cell-Provide®, as well as adequate salts, such as Cell-Salts™, will help maintain water intake and make up the shortfalls of water soluble nutrients and salts leached out by soaking hay when soaked hay is a provided as a roughage base. These supplements, along with TRIM as required to maintain a 'soft' neck, have a role in maintaining metabolic function and vitality in IR affected horses. Research is continuing on other specific supplements that may help maintain metabolic function in horses prone to IR in retirement.

Instruct the client to monitor the horse's body weight every 5-7 days, but do not recommend to starve the horse, particularly a pony or miniature, so that it will rapidly lose weight. Rapid weight reduction due to starvation can trigger fat mobilisation and the onset of hyperlipaemia in certain bloodlines of horses and ponies, which if not recognised early, can be fatal within 10-14 days.

Organ Disease

The most common organ disease in aged horses is hepatic fibrosis. Kidney disease, usually as a result of neoplasia or chronic ingestion of pasture contaminated with lead as a fall out near lead smelters, is rare.

Occasionally an aged horse will develop hepatic fibrosis due to the ingestion of grazing plants containing pyrrolizidine alkaloids, most commonly Paterson's Curse (Salvation Jane) (*Echium lycopsis*), and to a lesser extent, cotton fireweed (*Senecio quadridentatus*) and heliotrope (*Heliotropium europaeum*) as these plants are less palatable to horses. They may be grazed during drought where there is little other feed available.

It is beyond the scope of these notes to discuss the symptoms of hepatic disease related to plant ingestion, although practitioners in high risk areas, particularly where heavy infestations of Paterson's Curse (Salvation Jane) dominate the pasture in the rosette stage, will be well aware of the seasonal

occurrence of liver disease after 1-2 seasons of ingesting these plants in both young and elderly horses.

Feeding Management of Horses with Liver Disease

Aged horses with liver disease require specialized dietary management in an attempt to maintain adequate body condition and quality of life. Dietary management includes feeding a low fat diet, preferably less than 5% fat such as good quality roughage, including soaked grass hay and beet fibre in horses with PPID Cushing's Disease and earlier EMS. Lucerne hay must be avoided so as to reduce protein intake to less than 12% crude protein. Millrun based pellets are suitable, but should be offered in 3-4 small feeds per day to avoid large soluble carbohydrate meals which can overload the remaining functional liver tissue.

It is unwise to recommend commercial feeds formulated for aged or senior horses as they often contain higher amounts of starches, protein and fat.

If a horse is not consuming the bland feed, then small amounts of molasses, apple sauce or blended apples and carrots mixed into the feed may help tempt the horse to eat.

Other supportive nutrition includes the recommendation of B group supplements, including choline chloride which provides methyl donors which may assist liver function. Providing supplementary levels of branched chain amino acids, including leucine, isoleucine and valine, which are not metabolised in the liver after uptake into the blood, may provide a source of these essential amino acids to the body tissues. Small amounts of 60-100g of high protein WPC 80 whey powder provide concentrated amounts of branched chain amino acids and other essential amino acids, including glutamine, which may assist liver function. These are contained in supplementary doses of a product such as Muscle XL™.

A practical home mixed diet would be as follows:

Ration per **100kg** body weight total daily, divided into 3-4 feeds. Mix total as dry, add soaked beet fibre and molasses at feeding. Suitable for miniatures to large horses based on a body weight basis.

- | | |
|---|------------------------------------|
| • Steam rolled, extruded or micronised barley | 500g per 100kg bwt |
| • Cereal chaff (oaten) | 500g per 100kg bwt |
| • Beet fibre, soyabean or lupin hulls (dry weight) | 100g per 100kg bwt |
| • Soyabean meal (extruded for palatability) | 50g per 100kg bwt |
| • Molasses (mixed 50:50 with warm water) | 100mL per 100kg bwt |
| • Salt 5g (1 teaspoonful) | per 100kg bwt |
| • Vitamin and mineral supplement (eg Cell-Provide®) | 10g per 100kg bwt |
| • Dicalcium phosphate (DCP) | 15g per 100kg bwt |
| • Grass hay (no clover or lucerne) dampened adlib | 500g per day per 100kg bwt |
| • Vitamin C powder | 2.5g (½ teaspoonful) per 100kg bwt |
| • Vitamin E | 200IU per 100kg bwt |
| • Branched chain amino acid supplement rate | per 100kg bwt |
| • Good quality grass, meadow hay or mixed 50:50 | |
| • lucerne hay dampened, adlib | 500g per 100kg bwt |
| • Avoid brewer's yeast for B group vitamins and do not supplement with polyunsaturated oils for energy. | |
| • Fresh water adlib. | |

Kidney Disease

Renal disease is not common in horses and there is no increased incidence in aged horses. The most common cause of reduced renal function is medication with high doses of aminoglycoside and tetracycline antibiotics for diarrhoea or septicaemia, especially if the horse is dehydrated during the period of medication. Extended courses of non-steroidal anti-inflammatories, such as

phenylbutazone, given to an aged horse to improve comfort from a skeletal or joint injury to mobility, may also have a damaging effect on renal function. Studies have indicated that up to 75% of the renal nephrons have to be non-functional before the signs of renal disease become apparent.

Feeding Management of Horses with Kidney Disease

In order to avoid complications related to kidney excretion of calcium to avoid hypercalcaemia, the diet should be formulated to reduce calcium, provide 8-10% protein and a low phosphorus content. This means that commercial feeds formulated for healthy aged horses containing higher levels of these nutrients, are not suitable for aged horses with renal disease. Acid-base balance, dehydration and excess electrolyte levels in the blood may need to be maintained with intravenous fluids initially to maintain urine flow. It is more appropriate to recommend a home blended ration based on a limited amount of starch from grains such as barley or corn, fed in conjunction with cereal chaff and beet fibre, with added soyabean hulls or lupin hulls which have a low contamination with grain fragments which would contribute additional protein. Lucerne and legume hays are off the menu, and even meadow hay containing clover can contribute excess protein to a renal patient's diet.

Wheat bran, rice bran and wheat pollard additives should not be included in the diet as these feeds are high in phosphorus. If electrolyte abnormalities are detected by blood tests, the hay should be soaked in twice its volume of luke-warm water for 60 minutes and then air dried prior to feeding, as recommended for an EMS patient, which will leach out soluble calcium, sodium, potassium and chloride.

Excess salt must be avoided as this can increase the need for sodium excretion and interfere with acid-base balance, nerve and muscle function.

A practical home-mixed diet would be as follows:

Ration per **100kg** body weight total daily, divided into 3-4 feeds. Mix total as dry, add soaked beet fibre and molasses at feeding. Suitable for miniatures to large horses based on a 100kg bwt basis.

- Steam rolled, extruded or micronised barley 400g per 100kg bwt
- Cereal chaff (oaten) 500g per 100kg bwt
- Beet fibre, soyabean or lupin hulls (dry weight) 100g per 100kg bwt
- Polyunsaturated oil (step-wise introduction) 50mL per 100kg bwt
- Molasses (mixed 50:50 with warm water) 100mL per 100kg bwt
- Salt 5g per 100kg bwt
- Vitamin and mineral supplement (eg Cell-Vital®-low calcium) 5g per 100kg bwt
- Grass hay (no clover or lucerne) dampened (soak if sodium /potassium elevated, delete salt) adlib 500g per day per 100kg bwt
- Fresh water adlib
- If pasture grazing is available, limit to 2 hours twice daily and avoid legume based pastures.
- Avoid high phosphorus millrun or millrun based pellets.

Conclusion

The nutrition of the aging horses has received much more attention over the last 20 years as more research has targeted the needs of the increasing numbers of horses which are living longer in retirement.

Knowledge of the specific nutritional needs of an aged horse is essential to be able to advise clients on the feeding and management of a cherished elderly horse, as well as providing routine and regular health care.

Although many aged horses can fend for themselves with access to good quality pasture, cold weather in particular, increases their nutritional needs and overall stress, which can result in a rapid

decline in condition which becomes increasingly difficult to regain in aged horses with dental abnormalities and reduced digestive function.

With increasing age, reduced digestive efficiency and mobility to graze, usually requires that aged horses be confined to small areas and fed on a hard feed 2-3 times daily in order to maintain their condition and overall general health. There is a large variety of commercial feeds formulated for aged horses which increases the convenience for horse owners and helps ensure that aged horses are provided with suitable, well digested diets.

Geriatric horses with arthritis or organ disease, melanoma and lowered immune status will require specialised diets.

Suggested Reading

It is often difficult for a busy to find the time to read research papers. Published books and the internet can provide a good source of information, although internet information may be inaccurate or commercially biased.

- NRC **Nutrient Requirement of Horses**. National Research Council Washington DC 2007 pp
- Lewis, Lon D **Equine Clinical Nutrition- Feeding and Care** Williams and Wilkins 1995 p 237-238
- Kohnke JR, Kelleher F, Trevor-Jones, P, **Feeding Horses in Australia** RIRDC 1999 pp McGowan C (2004) Pers.com.
- McGowan TW, Phillips CJC, Perkins N, Hodgson DR, and McGowan CM (2010) A survey of aged horses in Queensland Australia, Part 1: Management and Preventative Health Care, AVJ **88**-11: 420-427
- Rose RJ, Hodgson DR **Manual of Equine Practice** WB Saunders Philadelphia, 1999 Clinical Nutrition chapter pp 651-710

