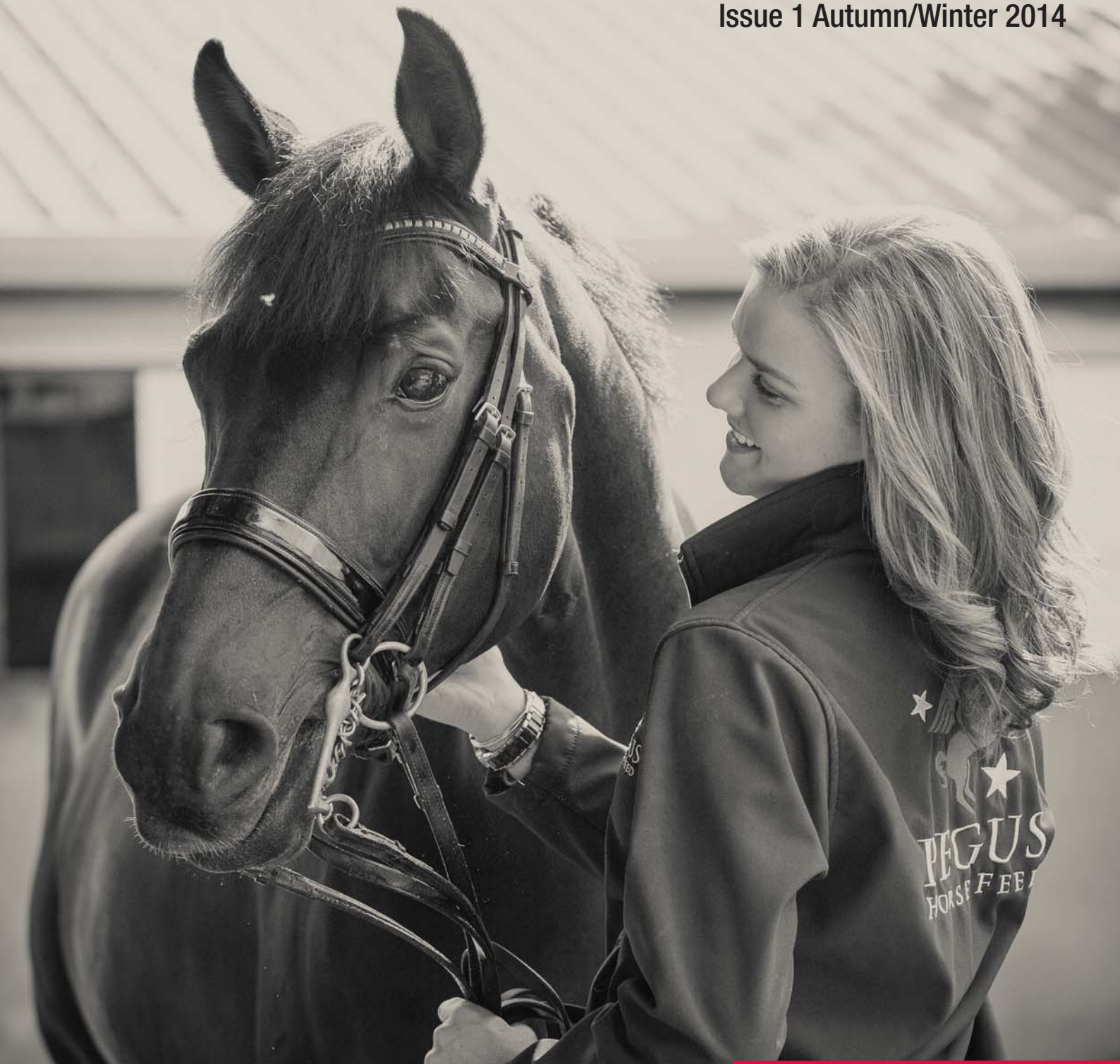


FEED TIMES

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FEED
THAT
PERFORMS

The Digestive System

The horse is a single-stomached animal that shares with the ruminants (cattle, sheep and deer) the ability to digest fibrous plant materials. The stomach is small, and the fermentation chamber is in the hind guts. The horse is thus classified as a hind gut fermenter. Some basic information on the physiology of the equine digestive system is given in the table opposite.

The stomach of the horse

The stomach is adapted to a continuous feed intake, and has a comparatively small volume (15-20 litre for a medium sized, 500 kg, horse). The stomach can be subdivided into three main parts:

1. The oesophageal part which has no glands
2. The fundic part which has glands producing hydrochloric acid, enzymes and mucus
3. The pyloric part which has gland-producing mucus

The oesophageal part of the stomach usually has a high concentration of microbes (up to 1000 millions per gram). These ferment (break down) ingested feeds. The high temperature in the stomach, and the liquids which are mixed into the feed during chewing together with the neutral or moderately acidic pH provides an excellent environment for bacteria. (This part of the stomach is also inhabited by the bots fly larvae (*Gastrophilus*) which lives and overwinters in the stomach of the horse. When fully grown, the 1-2 cm long larvae are passed with faeces, pupate in the soil and emerge as flies which lay their yellow eggs on the legs of the horse.) This microbial activity leads to a partial digestion of carbohydrates and sugars, and begins the hydrolysis of soluble proteins. The fermentation produces lactic acid, short-chain fatty acids, and some carbon dioxide gas. Gas is potentially harmful because the horse has a poor ability to expel it from the stomach.

Fermentation stops as the gastric contents gradually become acidified by the fundic secretions which contain pepsin, a protein-cleaving enzyme, and hydrochloric acid which rapidly reduces the pH of the ingested feed to between 2 and 3. It is in the pyloric part of the stomach (the lower half) that the muscles in the wall first produce sufficiently strong contractions to mix the contents fully. In horses fed infrequent, large meals, gas production and over distension of the stomach can become a problem. Horses should therefore be fed many small meals, particularly when they are exercised heavily and need large quantities of hard feed.

LENGTH, VOLUME AND PASSAGE TIME THROUGH DIFFERENT PARTS OF THE DIGESTIVE TRACT OF A 500 KG HORSE

	Length in meters	Maximal capacity in litres	Passage-time
Pharynx	Up to 1.5	1 / 6	10 - 15 seconds
Stomach	-----	18*	1 - 5 hours
Small intestine	16 - 24	64	1.5 hours
Caecum	1	34	7 - 15 hours
Colon	6 - 8	96	8 - 16 hours
Rectum	0.2 - 0.3	---	1 - 2 hours
TOTAL	20 - 30 hours		

*Normal volume about 1/3 of maximal capacity

In the horse's stomach, the only breakdown of carbohydrates, such as starch, occurs as a result of microbial fermentation since the stomach does not produce any carbohydrate- or fat-digesting enzymes.

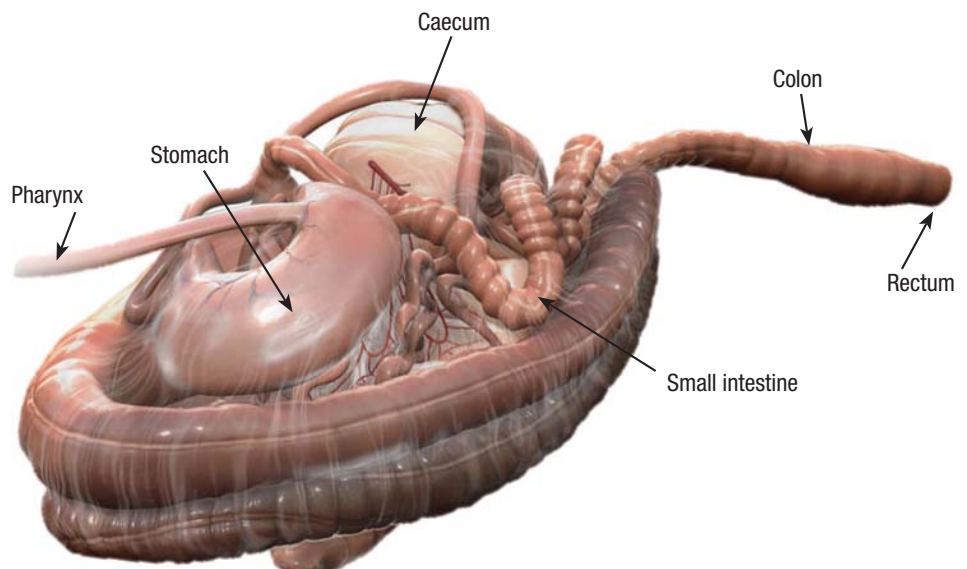
The secretion of hydrochloric acid is regulated by the hormone gastrin in a negative feedback manner. Increased secretion of gastrin leads to increased concentrations of HCl in the stomach, which in turn reduces the secretion of gastrin. The secretion of gastrin is primarily stimulated by the presence of food in the stomach through specific receptors in the stomach wall which react to being stretched and to chemical substances such as amino acids in the feed. The lower section of the stomach is the pyloric part where glands produce mucus which lubricate the digesta.

The stomach starts to empty its contents into the small intestine whilst the horse is still eating.

Stomach contents with a dry matter percentage below 18% will pass rapidly, and may overtake fibrous contents by following the small curvature of the stomach towards the pylorus. Generally, fibre-rich diets will remain longer in the stomach. Proper mixing of the feed with digestive juices is necessary for normal digestion. Failure in mixing may be caused by:

- Too few gastric secretions, often resulting from too much physical or psychological stress soon after feeding.
- The feed being consumed too rapidly (the horse is too hungry)
- Too much feed being given (in particular concentrates and grains)
- Concentrates containing cooked (micronized) wheat or rye-starch which may prevent the hydrochloric acid from sufficiently reducing the pH of the gastric contents to stop microbial fermentation, resulting in excessive gas formation, stomach dilatation and colic.

THE DIGESTIVE TRACT



The Mouth Cavity

The horse has strong, sensitive and highly movable lips. Grass and other vegetation is cut using the front teeth, and the lips and the tongue are used to collect and ingest feed. Horses are highly selective grazers and can efficiently avoid unpalatable or indigestible herbage. Ingested food is ground between the large enamelled surfaces of the cheek teeth (premolars and molars). Horses chew on one side of the mouth at a time; large horses chewing 60-80 times per minute. The time spent eating varies greatly depending on the structure of the feed. Ponies usually take more time to consume their feed than larger horses. The time taken to consume 1kg of oats or pelleted concentrate is about 10 min and 1 kg hay is usually consumed in 40-50 min. However, there is a large variation between individual horses.

Table 2 gives estimates of consumption for rations with different proportions of grains and roughage. If rations are consumed too quickly, bad habits such as excessive licking, crib biting, and eating dung may develop.

It is commonly recommended that horses are fed at least 0.5 kg of roughage dry matter (hay, haylage or straw) per 100 kg of body weight. Normal diets usually contain more roughage than this minimal amount. The chewing process grinds the feed between the molars in the upper and lower jaws, and reduces the particle size to about 2 mm diameter and 1-4 mm length. Young grasses are more juicy and may be swallowed before the particle size has been reduced by this much. Thorough grinding of the fibrous parts of the diet is required to ensure the passage of the digesta through the alimentary canal. Chopped roughages with a particle length shorter than 2cm may not be chewed sufficiently, and this may cause colic.

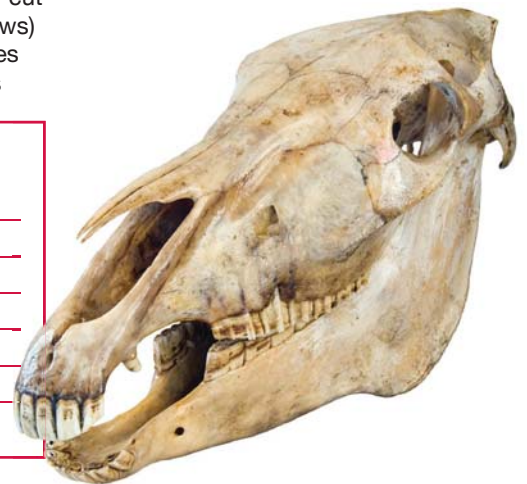
For a horse with normal teeth there is usually no problem with chewing grains or pelleted concentrates. It is recommended that teeth are inspected and if necessary rasped twice a year to prevent protruding edges which may bruise or cut the epithelium of the cheeks (upper jaws) or the tongue (lower jaw). Young horses may periodically experience problems

with chewing when milk teeth have been lost and permanent teeth are emerging. Bad teeth result in reduced consumption, chewing rates and digestion. The periods when teeth are lost or emerge are shown below.

AGE AT WHICH TEETH ARE LOST OR EMERGE IN THE HORSE:

Tooth	Change	Type
I1	2 ½ years	Front
I2	3 ½ years	Front
I3	4 ½ years	Front
p1	2 ½ years	Premolar
p2	2 ½ years	Premolar
M1	6 - 9 months	Molar
M2	2 - 2 ½ years	Molar
M3	3 ½ - 4 ½ years	Molar

Premolars (P) and molars (M) are the cheek teeth of the horse and are the teeth that need to be rasped. Incisors (I) are the front teeth.



CONSUMPTION TIME OF DIFFERENT RATIONS (min/kg feed)

Type of feed	Large horses	Ponies
Hay	40	80
Straw	40 - 60	
Mouth cavity	100	
Oats, whole or crushed	10	40
Concentrate (non-pelleted)	20	30
Pelleted concentrates	10	40

EQUI-BALANCE

Equi-Balance is a low-starch, low-calorie concentrated source of vitamins and trace minerals for all classes of horses. Supplying optimal nutrient intake without providing excess calories to those with low energy needs, particularly those with metabolic issues, can be especially challenging. Easy keepers at risk of, or exhibiting signs of metabolic syndrome or insulin resistance will benefit from careful management of the amount and type of forage and feed, with special attention to carbohydrate and caloric intake. Equi-Balance is a natural product helping to maintain effective digestion by the inclusion of Equisaf Yeast Cultures and Bioplexes. In pursuit of further benefits for your horse's health we have included bioplexes, which are mineral proteinates of Zinc, Iron, Copper and Manganese. These are bonded to a range of amino acids to allow a number of potential absorption routes within the horse's system. Bioplexes have been shown to improve equine health in general and in particular, immunity, development of bone, muscle structure, fertility and condition.

Why should I use Equi -Balance for my horse

- Concentrated low-calorie, low-non-structural carbohydrate source of vitamins and trace minerals
- Fulfills the vitamin and mineral needs of horses and ponies that are on forage-only diets or that consume less than the recommended daily amount of fortified feeds
- Features elevated zinc concentration
- Contains yeast culture to enhance digestion of fibre and other nutrients
- Low-intake, palatable pellet allows for easy feeding

Call Equiform on +353 (0)1 627 7093/94



Horses have 16 muscles in each ear, allowing them to rotate their ears 180 degrees... A horse's knee joint is the equivalent to a human wrist, and their hock joint is equivalent to the human ankle...

Winter Feeding

Now we are coming into the cold season and the challenges it brings. In general, horses can tolerate cold well and they should preferably be allowed outside as much as possible. "The lower critical temperature" is the external temperature at which a horse needs to increase its heat production in order to maintain body temperature, or "keep warm". When it gets colder than this temperature outside, horses will increase their feed consumption, and increase their use of body fat stores. For adult horses in normal condition and getting enough food, the "lower critical temperature" is around minus 15 degrees. Thin horses, old horses and young horses can tolerate cold less well and for them the lower critical temperature can range between minus 5 and minus 10 degrees Centigrade. In wind and rain, horses will lose heat more rapidly than in dry, calm weather. If they are out a lot in winter it is important that they receive enough roughage (hay or haylage). These roughages have a long retention time in the hindgut of the horse, and will contribute to heat production in more than 24 hours after being eaten. Ideally our horses should be allowed out daily also in winter, and forage or have other roughage available according to their appetites.

Allowing our horses to be exposed to outside conditions as temperature falls in October and November will promote growth of a winter coat and prepare metabolism for colder winter conditions. A naturally dense and long winter coat will keep horses warm under most conditions. If this coat has been cut for training or competition reasons, however, extra blankets will be needed for outside in cold weather, even at temperatures considered being above the lower critical temperature.



Trained horses are usually sweating after a workout, and should be allowed to rest inside or be covered with a rug until they are dry. As a rule, horses should only wear blankets outside in dry weather.

A critical factor for horses kept outdoors in winter is water. Take extra care to see that your horses always have free access to water. In winter it is easier for them to develop colic? This is often because they have too little water or that the water is frozen.

With the Pegus PC-Horse programme, Pegus consultants can easily keep track of how much forage your horse gets. Trying therefore to provide as much as possible of the basic ration as roughage during winter, and to give grain and other concentrates to match the requirements calculated by Pegus PC-Horse for training and other activities.

If horses are kept permanently outside, then stricter requirements for their welfare and environment may apply. Legislation and practical rules will vary from country to country, and it is always important that such requirements are observed. As a minimum, and in general, our horses should always have access to a dry, draft-free place where they can find comfort sheltered from wind and rain. Good shelters will lower the temperature at which horses start shivering to maintain body temperature (the lower critical temperature), and thus enables them to cope with lower winter temperatures without having to increase feed consumption.

To select a feed plan with Pegus Horse Feed just visit www.pegus.ie and request a diet for your horse this winter.

WHICH MIX?

COOL MIX (LITE)

A special formulated low molasses, oat free mix with a blend of grains and fibres. This delicious mix has been developed with cooked grains and fibres coated with soya oil for cool energy. Offering a lower sugar index than standard feeds. Providing a slower release of energy for the excitable competition horse and pony. Fully fortified with Pegus Equine pre-mix supplement ensures that your horse has their fully daily balanced vitamins and minerals.

Call Allison on
+44 7894 295844



COOL MIX (SWEET)

This classic sweet feed has an oat-free formula uses the finest blended and 'toasted' grains to ensure maximum digestibility for your horse allowing for a safer digestion of starch in the gut system. This highly palatable feed is fully balanced with the Pegus Equine pre-mix supplement. Protein is added for excellent muscle tone and tissue strength during exercise, and soya oil is added for slow release energy, better stamina and shiny glossy coats.

Call Eugene on
+353 86 174 0300



You can tell if a horse is cold by feeling behind their ears. If that area is cold, so is the horse... Horses will mourn the passing of a companion....

Mega Omegas for Horses

It is only in the past number of years that horse owners have been using fat or oil in their horse's diets. As fat is relatively rare in forage for horses it may seem to many an unnatural source of energy. But recent research has noted the nutritional benefits for the equine athlete. With many conditions been associated with starch laden diets i.e. tying up, gastric issues, cushing's, laminitis and joint problems in young horses. Other means of fuelling the horse for performance was undertaken.

It is accepted universally the advantages of feeding fat or oil by researchers, riders, vets and has focused the attention of leading researchers to investigate what is the best oil suitable for the equine. The main focus point of the investigation were the two principle Omegas, Omega 3 and Omega 6. The Omega 3 derives alpha-linolenic acid (ALA) and Omega 6 originates from Linoleic acid (LA). Both (ALA) and (AL) are both considered "essential fatty acids" both vitally important and must be consumed as they are not created by the horse itself. Omega 3 can be divided again into another two groups (EPA) and (DHA).

Both EPA and DHA may not be found naturally in horses. But the main source is derived from cold water fish (fish oil). Another source which is more tasteful than fish oil is flaxseed (linseed) oil as an Omega 3 source.

The main source of Omega 6 fatty acids is LA and these are commonly found from the oil of seeds and grain. Both corn oil and sunflower oil contain large amounts of LA.

The Balancing Act 3 versus 6

For the true benefit of the oil for the body to use correctly, there must be a balance of the fatty acids. Both oils have different effects on the inflammatory process, cell membrane stability, and development of the nervous system, oxygen transfer and immune system Research has pointed out the effects and benefits of

Omega 3 and Omega 6 ratio and how some practices have uncovered some unwanted trends.

The Omega Benefit

Equine researchers have recently studied the benefits of Omega 3 fatty acids and the effectiveness for performance horses and the studies revealed.

- Performance horses were studied revealing reduced signs of pulmonary induced haemorrhage (EIPH) pulmonary inflammation and joint irritation.
- Omega 3 fatty acid were found to help blood plasma and also red blood cells which may impact with the inflammation process.
- Breeding stallions were also seen having benefits in the quality of the sperm and increase spermatozoa in the semen. Broodmares passed the essential fatty acid in their milk and foals were found to have better immune systems than foals without the Omega 3 diet.

Where to Look for Omegas

All feeds have varying levels of Omega 3 & 6 from manufactures. Rich in Omega 6 are Corn Oil, Sunflower Oil Canola Oil, Safflower Oil, increased use with high grain diets may unbalance the diets

Omega 3: 6 Ratio

Rich in Omega 3 fatty acids: Fish oil from the cold water species and flaxseed. Fish oil is a direct source of EPA and DHA, but has been found difficult with its flavour with its equine clients. While Flaxseed on the other hand provides ALA which the horses can convert to EPA and DHA, with fewer problems on the taste test.

Pegasus Horse Feed supplies 3 different sources of Omega 3 XLINT (flaxseed jelly), Karron Oil and pure Linseed Oil.

Horses that are been fed high levels of grain in their diets, broodmares and performance horses are perfect for the re-addressing any ratio issues that may be occurring with current feed plan benefitting from supplementation of Omega 3 fatty. For more information on diet support contact www.pegus.ie diet request.



XLINT GEL

A natural animal feed supplement, specially extracted from the finest Irish flax and carefully processed so that it is rich in Omega-3 Oil, protein, fibre, calcium phosphorous and vitamin E. Xlint supports the horse's health, condition and appearance by helping their digestive and excretory system, producing a marked improvement in their coat.

The equine athlete that is provided Xlint can benefit from the difference in inflammatory response, as well as gaining benefits to the cardiovascular system, reproductive performance, and bone development. The consumption of Xlint is the only natural way to ensure that essential fatty acids are available for metabolism of the "less-inflammatory" compounds and other metabolites beneficial for the horse's overall health and well-being.

Call Equiform on +353 (0)1 627 7093/94



You can tell if a horse is dehydrated by pinching their skin, if it takes time for the skin to return from the pinch, they need water... Horses thrive on routine, especially when it comes to food...

Choosing Roughage

When we buy roughage it is important to purchase a quality that suits the particular horses we have. Ponies and horses that tend to get fat should be fed forage with a lower energy content than that for young horses, broodmares and horses in training. Whether we choose hay or haylage is of major concern, but nutrient content and hygienic quality will always be crucial.

In rations for horses there should be at least 1.5kg forage dry matter per 100 kg body weight. This is important both for maintaining normal digestive functions and for the horse's well-being. Unless it has enough chewing-time, the horse will not feel satiated and happy.

Select forage with an energy content in the lower range for horses that tend to get fat. Such forages will give them enough chewing time without creating a too high energy intake. Horses in training, on the other hand, should preferably have roughages with a higher energy content. By feeding the best roughages to trained horses, we can cover more of the requirements from the roughage, and limit the overall amount of concentrate in the ration. When energy requirements are high, this can have a positive effect on health and well-being and also, in some cases, lead to better performance.

Hay v Haylage

Hay is dry (about 15% water and 85% dry matter, DM), while haylages for horses may vary widely in water content (dry matter between 60% and 75% is common).

Since it is the dry matter and not the water which contains the energy and the nutrients, we must always compare the nutrient content of different batches of haylage per kg dry matter, not per kg of the feed. In the same way, all assessment of what will be an appropriate amount of roughage for a horse should be done on a dry matter basis, and not as kg of roughage feeds with varying water content.

A practical example

From the discussion above it should be obvious that a horse getting 7kg of hay will get more forage dry matter than a horse fed 7kg of haylage. The difference depends on how moist the haylage is (DM%). Let us assume that the hay has 85% and the haylage 60% DM:

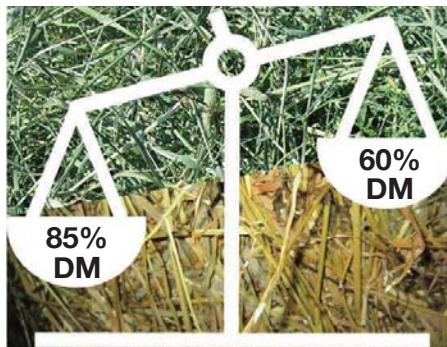
7kg hay equals

$7 \times 0,85 = 5.95\text{kg dry matter.}$

7kg of the haylage equals

$7 \times 0,60 = 4.2\text{kg dry matter.}$

The example shows that the horse that was fed 7kg hay got almost 2 kg dry matter more than the horse that was fed 7kg haylage. This also means that the



horse receiving haylage with 60% DM had to be fed about 10kg haylage for the amount of roughage dry matter in the ration to be equal to a ration with 7kg hay!

Be sure to buy roughage that is analysed

A roughage analysis is very helpful when you are deciding how to feed your horses. As shown above, it is also vital to consider the nutritional content on a per kilogram dry matter basis. Otherwise you can pay for expensive water with no nutritional value!

When you get the calculations right, either hay or haylage will make great rations for your animals. Below are some general recommendations on what quality of roughage is best suited for the different types of horse.

Recommendations

Ponies and horses on low activity levels, with a known tendency to grow fat: A suitable roughage will have maximum 8.3 MJ of digestible energy and preferably not more than 112 grams crude protein

per kg DM. With such quality, we can give the horse a fair amount of roughage without expecting it to grow obese.

Ponies and horses at maintenance or on light exercise levels: A roughage quality of 8.4 to 9.4 MJ and preferably not more than 133 g crude protein per kg DM is suitable.

Ponies and horses on light to moderate exercise levels: A roughage quality with 9.5 to 11.7 MJ and preferably not more than 158 grams of crude protein per kg DM.

Ponies and horses in hard training: Horses in hard training have a high demand for energy. A roughage quality with at least 12.0 MJ of digestible energy and preferably not more than 175 grams of crude protein per kg DM is suitable. With appropriate amounts (at least 1.5 kg DM per 100 kg body weight!) horses will receive a significant proportion of their energy requirement from roughage and we can use PC-Horse to calculate the amounts of concentrate necessary to make a balanced ration.

Young horses and broodmares: A suitable roughage will have at least 10.7 MJ and more than 128 grams of crude protein per kg DM. For young horses and mares in late gestation it is especially important to ensure that the content of crude protein is not too low.

For more information about feeding your horse and arranging a feed plan, contact Pegus Horse Feed: www.pegus.ie info@pegus or tel 0044 7710 883088.

We will miss you, Missunited!

Back in 2013, at the scene of his memorable Guinness Galway Hurdle success with Rebel Fitz, Mick Winters struck again at Ballybrit when his classy mare Missunited made every yard of the running to justify 8/13 favouritism in the Easyfix Rubber Products Novice Hurdle.

Back over hurdles after flat wins at Ballinrobe and Clonmel, Missunited dictated the pace under Bryan Cooper and, although untidy at a few hurdles, was always in command, readily quickening clear on the run-in to beat Zuzka by three and three-quarter lengths.

Fast forward to summer 2014 and the action moved to Royal Ascot. Given an outstanding ride from Jim Crowley she finished third in the Gold Cup, behind Leading Light and Estimate, beaten only by a neck and a short head.

A month later, the Missunited roadshow moved on to Glorious Goodwood. Hollywood superstar Tom Cruise had added more than a touch of glamour

when appearing to present the prize for the Magnolia Cup charity race but Mick Winters brought something entirely different to the occasion.

The Cork trainer, dressed in sandals and a Panama hat, was present to see his mare run, despite a dates clash with the Galway Races.

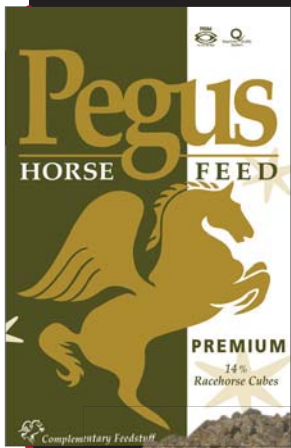
Missunited was just as tenacious this time in holding off all-comers in the Sterling Insurance Lillie Langtry Stakes.

Unfortunately, as soon as she had beaten Arabian Comet by half a length, she was dismounted on the racecourse and it emerged later she had picked up a career-ending injury to a suspensory ligament in a leg.

Winters, who can turn a phrase as quick as he can turn out horses, said of Missunited's younger days. "I'd be looking at her hind quarters and do you know what, she was able to flex as good as a kangaroo," he said.

"Her long thin legs, and the way she could move, reminded me of Sonia O'Sullivan - the way Sonia would run with those long strides. In all fairness, she was mighty - and so too was Missunited,"

We wish her well.



PREMIUM RACEHORSE CUBE

Designed for the higher demands on the equine athlete. This highly digestible and energy dense cube uses only the best tested Irish oats and toasted cereals to provide readily available energy to meet the needs of the horse's anaerobic respiration during periods of fast and demanding work.

It also provides the organs and tissues with essential vitamins and minerals for improved function with Pegasus Equine pre-mix supplement and proteins for excellent muscle tone and tissue strength during exercise.

The higher levels of antioxidants are also essential to aid recovery and reduce tissue damage.

Premium Racehorse Cube also contains Super Fibre technology; this increased fibre availability offers almost equal energy as typical grain diets, yet adding by reducing starch dependency and reducing muscle fatigue and chances of hind gut acidosis.

Call Declan on +44 7710 883088

A very busy Berry

The Iveagh Pony Club based at Moyallen in Co. Armagh, is likely to be considered one of the most successful pony clubs in Ireland and the UK in terms of successful graduates. Having produced Olympic and World Champion jockeys Dermott Lennon, Sonia and Sherelle Duke, Alfred Buller, Steven and Trevor Smith, the Club has found another winner.

Susie Berry from Banbridge, Co. Down has represented Ireland at the Pony Europeans and twice at the Junior Europeans, this year winning team gold at Bishop Burton College. Riding her mother's Carsonstown Athena, Susie has produced the 7 yr old Limerick mare from the start, accumulating 50 eventing points. As part of the young horse development programme Carsonstown Athena benefits from training arranged by Janet Murray at Abbotstown Campus, Co. Dublin.

Many of these young horses go on to the World Breeding Championships in France. But Susie and her mother have decided this time to stay closer to home and target the British Young Event Horse Championship at Osberton in October to finish off the season.

Horses are in the blood of the Berrys. Susie's mother Cally is a well-known Thoroughbred breeder and equine fertility vet, having also evented herself and ridden at the world famous Mondial du Lion. No matter what time of the year, it's always a busy time the Berry farm, between covering the mares, visiting mares getting scanned, foaling and preparing foals for the sales.

'It never stops at our house during the summer months and autumn. We just collapse at Christmas. I have to say that I have been very lucky having great horses to ride and the training that I receive from HSI during the year is great' says Susie.

'Terry Boon helps with the dressage at major events and training days, but I must also thank Sasha Stewart, who helps me be Mrs Positive. I showjumped a lot of ponies when I was younger and rode a number of them for Micky McCann who I've always gotten help from time to time and at the international events Ian Fearon of HSI keeps us all focused.'



There is great depth in horse power with her 2013 team horse Bolero De Ste Hermelle recently winning the hotly contested CIC** at Ballindensik, the 12 year old looking like a serious advanced horse for next year and also the very and also the very exciting Mullentine High Society mare owned by Micky McCann.

Planning is key when breeding or eventing and the Berry family have one each season. Whether it's selecting stallions or working out goals for the event horses, Pegus Horse Feed is part of that plan.

Using the latest nutritional software, Pegus advisors tailor diets to suit each horse, depending on weight, energy and temperament. They arrange complete diets for the breeding farm and the competition horses. 'It's super service from Pegus, takes all the guessing away and they understand horses and the demands faced with competition' said Cally.

All we can say is watch this space. Will Iveagh Pony Club have another Olympic rider on its roll of honour?



PEGUS HORSE FEED

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The gestation period for a mare is 11 months, for a female donkey it is 12 months.... Chariot racing was the first Olympic sport in 680 B.C... It takes 9-12 months to re-grow an entire horse hoof...