



By Appointment to Her Majesty the Queen,  
Home Feed Manufacturers,  
Dengie Crops Ltd, Essex.

# Dengie

## Silver Product Advisor Course



# Product Advisor Awards



Welcome to the second level of the Dengie Product Advisor Course and thank you for taking the time to learn more about nutrition and feeding. Our research shows that many horse owners ask their feed supplier for advice on feeding and so it is clear that the health and welfare of many horses and ponies is dependent on your knowledge. At Dengie we recognise that you need accurate information to enable you to advise customers correctly and the aim of this course is to supply just that. We will take you through the horse's digestive system and the nutrients he needs as well as giving you a step-by-step guide to calculating a ration. Hopefully this will help you to develop a greater understanding of the thinking behind our feeds and supplements including the particular benefits of alfalfa which are integral to our success.

This is also a great opportunity to remind you of all the services we can offer you and your customers including ration planning, talks, training, yard visits, forage analysis and there is always the Dengie Feedline 01621 841188 for help if you need it.

If you've enjoy completing the Silver Product Advisor Course why not have a go at the Gold level?

Best wishes

A handwritten signature in black ink, appearing to read "Katie Williams".

Katie Williams M.Sc. (Dist)  
Technical & Product Development Manager

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# The Digestive System

The basic rules of feeding originate from the need to consider the impact domestication has on the horse's digestive system and his overall health. Understanding how the horse's digestive system works is the first step to keeping it healthy.



Sections progressing through the digestive system	Description	What happens here?
<b>The Mouth</b>	<p>Horses have 36-42 teeth and have 3 pairs of salivary glands.</p> <p>The size of the oral cavity varies between individuals.</p> <p>Lips Tongue Teeth Salivary glands</p>	<p>Lips - the horses lips are very dextrous and manipulate feed into the mouth to be bitten off by the teeth.</p> <p>Tongue - allows the horse to taste different flavours and exercise a preference over feed due to the presence of taste buds on the tongue. The tongue also has a mechanical function and moves food around the mouth forming a 'bolus' of feed ready to be swallowed.</p> <p>Teeth - masticate or chew feed into much smaller particles making it easier to swallow and digest. Salivary glands - release saliva, but only when the horse is physically chewing, unlike humans where the sight and smell of food can induce salivation. Saliva mixes with feed and acts as a natural lubricant and buffer to acid produced in the stomach.</p> <p>Time spent chewing and saliva production is dependent on what the horse is consuming. 1kg of coarse mix takes around 10 minutes to eat whereas the same weight of hay would take at least 30 minutes.</p>
<b>The Oesophagus</b>	1-2 metres	<p>The oesophagus is basically a tube for passage of feed from the mouth to the stomach.</p> <p>The feed bolus moves through the digestive system by a series of muscular contractions called peristalsis.</p>
<b>The Stomach</b>	<p>The lining of the horse's stomach is divided into two regions; the non-glandular or squamous mucosa and the glandular mucosa.</p> <p>The stomach holds around 10 litres and visually is about the size of a rugby ball!</p>	<p>At the entrance to the stomach is a strong valve called the cardiac sphincter that prevents horses from vomiting. When the horse starts eating the pyloric sphincter at the bottom of the stomach opens to release feed into the small intestine and closes when the horse finishes eating.</p> <p>Gastric secretions including gastric acid are released into the stomach from the glandular mucosa to help start the chemical breakdown of feed. The glandular mucosa has its own in-built protection mechanism against acid whereas the squamous mucosa has to rely on the presence of saliva to buffer the acid and the physical presence of fibre to act as a barrier and prevent acid from coming into contact with the stomach lining.</p> <p>Under natural circumstances the stomach is never fully empty as the horse is a trickle feeder i.e. eats little and often, which helps to provide continual protection against the acid produced.</p>
<b>The Small Intestine</b>	<p>Collectively 21-22 metres or two double decker buses!</p> <ul style="list-style-type: none"> <li>- Duodenum</li> <li>- Jejunum</li> <li>- Ileum</li> </ul>	<p>Despite its length the small intestine is called small because it has a small diameter. This is vital to ensure maximum absorption of the nutrients from the feed.</p> <p>Digestion and absorption of starch, sugar, protein, fat and some vitamins and minerals occurs here.</p> <p>The horse produces limited amounts of enzymes for the digestion of starch hence meal sizes must be kept small. Too large a meal will mean that more starch reaches the hindgut increasing the likelihood of digestive disturbance. The maximum size of a cereal based feed for a pony should be 1.25kg and for a horse no more than 1.75kg.</p>
<b>The Large Intestine or "hindgut"</b>	<p>Collectively 7-8 metres</p> <ul style="list-style-type: none"> <li>- Caecum</li> <li>- Large colon</li> <li>- Small colon</li> <li>- Rectum</li> </ul>	<p>Although shorter than the small intestine the name derives from the large diameter of this part of the intestine.</p> <p>The horse cannot actually digest fibre or more specifically cellulose itself as it does not produce the enzyme cellulase, which breaks down cellulose. Instead it has a host of micro-organisms such as bacteria or 'bugs' which do the job for the horse by the process of fermentation. This process can take a long time - up to 60 hours in the case of very fibrous materials.</p> <p>Fermentation produces gas and heat as by-products and the bacteria that break down fibre also produce B vitamins such as biotin.</p> <p>Water is also absorbed in the large intestine.</p>

# The Digestive System



## Ancillary organs

There are a number of ancillary organs that also aid digestion by producing secretions that enter the digestive system or filter waste. Important ancillary organs in the horse include the liver, pancreas and the kidney.

The liver produces bile which, in contrast to humans, drains continuously into the small intestine rather than into the gall bladder (the horse doesn't have one). Bile contains salts which help to break down fats by emulsifying them so that they can pass across the intestinal membrane. The liver is also a major site for storage of glycogen; the storage product of glucose that can be broken down to use as energy. The liver is also involved with the metabolism of fats and protein and the storage of fat-soluble vitamins. If the horse's liver becomes damaged or diseased, which can occur as a result of ragwort poisoning or illness, the horse requires a specialised diet to alleviate the stress on the liver.

The pancreas produces digestive enzymes that are secreted into the small intestine such as amylase that helps to break down starch to glucose levels. The pancreas also produces hormones such as glucagon which is produced in response to a drop in blood glucose and stimulates the breakdown of glycogen to glucose to provide the horse with energy when blood sugar levels drop. A rise in blood sugar after a meal results in the release of another hormone from the pancreas called insulin which stimulates the storage of glucose as glycogen.

The kidney controls the water or osmotic potential of the blood and so high concentrations of certain substances will be excreted through the urine; the nitrogenous waste from the breakdown of amino acids from protein is one example. The osmotic state of the blood will dictate whether the horse needs to drink or urinate.

### What can go wrong and what can be done to help?

#### Poor dentition

As horses age their teeth can become worn and loose meaning that they have a compromised ability to chew their feed and often struggle to manage long stem forage like hay/haylage. At this stage short chop hay replacer products like Hi-Fi Senior or Hi-Fi Lite are often a suitable alternative alongside products that can be soaked like Alfa-Beet or Pure Grass Pellets that are even easier to chew.

#### Behavioural Problems

Chewing is not just a digestive function but a psychological one as well. Horses have evolved to spend 16-18 hours per day eating. A low fibre diet and meal feeding have been linked to the performance of stereotypic behaviour like crib biting and box walking.

#### Choke

Choke occurs when feed becomes lodged in the horse's oesophagus. This can happen if the horse hasn't chewed feed sufficiently. This may be because he has bolted his feed or his teeth are worn, loose or missing.

Feeding a fibre based ration or adding a Dengie fibre feed to mixes/cubes can help slow the rate of eating and increase saliva production.

#### Gastric Ulcers

Horses that spend little time chewing due to a restricted fibre diet such as good doers are at an increased risk of developing gastric ulcers (EGUS). If high levels of cereals are fed such as for racehorses, the risk is further increased. EGUS is a painful condition resulting from gastric acid eroding the stomach lining most commonly in the squamous mucosa.

Feeding plenty of fibre to encourage chewing and saliva production as well as feeding little and often are just some ways to help reduce the likelihood of ulcers forming.

Feeding a double handful (150gms) of fibre 20 mins before exercise can help to stop acid splash

Alfalfa is a better buffer to acidity in the digestive tract compared to other fibre sources.

#### Worm damage

Worm damage can result in the formation of scar tissue which is less absorbent than healthy tissue. This can be part of the reason why older horses don't tend to do as well as their younger counterparts; years of low-grade worm damage reduce the absorption capacity of the small intestine so a 'top notch' diet is essential.

#### Impaction, gassy colic and loose droppings

Impaction colic is common in old horses that have poor teeth as they cannot chew feed into small particles. This then gets trapped at the pelvic flexure that is almost a 90° bend in the large intestine.

Gas is produced as a by-product of fermentation in the large intestine. Fibre is needed to literally push gas out of the digestive system to prevent gassy colic. Spring time with young, less fibrous grass is a common time for gassy colic.

Loose droppings can occur for a number of reasons; nerves or excitement can increase rate of passage meaning that there is not enough time for water absorption in the large intestine which makes droppings loose. It also means that the valuable B vitamins produced are also lost, which can compromise health and performance.

Loose droppings can also be a consequence of old age as the health and efficiency of the digestive system start to deteriorate.

High fibre diets and digestive supplements that contain prebiotics and yeast are recommended for horses with loose droppings.

# All About Energy



## Energy

**Definition:** Energy is the product of the breakdown of certain nutrients in the body that release energy for maintenance or work.

### Main source of energy for the horse:

Carbohydrate which comes from fibre, sugar and starch. Fibre is fermented by the microbial population in the hind gut to produce slow release energy. Sugar and starch are broken down by enzymes to simple sugars such as glucose in the small intestine, to produce quick release energy.

### Other sources of energy:

Fat or oil - very energy rich containing 2.25 times more energy than carbohydrates.

Protein - used only as a principal energy source in extreme circumstances such as starvation.

### Energy stores:

The three main sites for energy storage in the horse's body are the muscles, liver and adipose (fat) tissues. Glucose (from carbohydrates) is stored as glycogen in the muscles and liver or is converted to fat and stored as adipose tissue in various sites around the body.

Fatty acids from fat or oil are stored as adipose tissue.

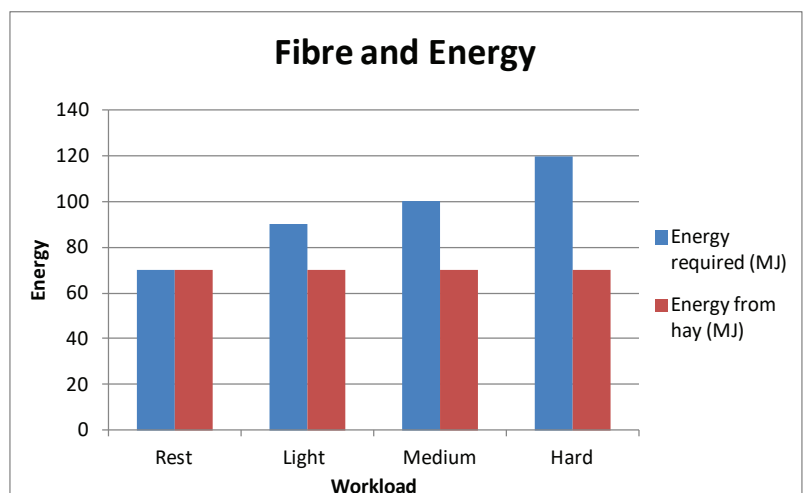
### Energy Utilisation:

The horse can use food directly as it enters the bloodstream or it can break down stored energy. The type and intensity of work the horse is doing will determine which energy sources and stores it can use; low intensity exercise allows the horse to use fatty acids from fibre or fat as an energy source whereas high intensity exercise requires glucose or glycogen.

## Fibre

Grass and conserved forage such as hay or haylage are usually the main source of fibre in the horse's diet. Fibre is vital for the health of the digestive system and research suggests that a horse should consume an absolute minimum of 1% of its bodyweight of fibrous materials per day in order to maintain gut motility and help prevent digestive upsets such as loose droppings or colic.

But fibre isn't just about gut health. The chart on the opposite page shows just how much of the horse's energy requirements can be met by hay alone. It is important to consider that fibre feeds based on alfalfa such as Alfa-A Original could easily supply the rest of the energy a horse needs working up to moderate levels. It should be noted though, that a source of vitamins and minerals would need to be added to ensure the diet is balanced.



# All About Energy



## Starch

Cereal grains have been the traditional way to fill the energy gap but research has shown that they increase the risk of diseases such as laminitis, colic and gastric ulcers. Cereals may need to be used for horses with increased energy requirements such as those in race training or lactating mares and there are steps that can be taken to reduce the risk of problems. The basic rules of feeding should be implemented as extensively as possible and some extra tips are as follows:

- Weigh what your scoop holds - you could be feeding a lot more than you think.
- Use cooked cereals - just as you cook potatoes before you eat them, cereals should be cooked for horses. Micronizing and extruding are two commonly used cooking techniques that make cereals a lot more digestible.

Research has shown that feeding alfalfa with cereals helps to regulate the acidity produced by the cereals thereby reducing the risk of gastric ulcers.

## Oil

Although the horse's natural diet is low in oil it can be a really useful energy source that the horse can utilise efficiently. Some of the particular benefits of oil are:

- Glycogen sparing effect - horses can be conditioned to use oil for low intensity exercise thus sparing stores of glycogen that are needed for high intensity work.
- Slow release energy - oil is broken down slowly and so is a really useful energy source for over-excitables.
- No starch - ideal as an energy source for individuals requiring a low starch diet such as those prone to laminitis and ERS.
- Energy dense - ideal for horses and ponies with limited appetites that need to gain weight.

## Sugar

Sugar gets lots of bad press and is often perceived to be unnatural for horses even though grass at certain times of the year can contain up to 50% sugar. The horse is able to digest sugar relatively efficiently but the crucial factor in relation to the horse's health is the amount that is consumed at one time. When grazing, the horse will consume a trickle of sugar whereas concentrate meals that are eaten quickly provide lots of sugar in a much shorter time period.

Sugar in grass can cause problems, the most common being laminitis. Grass stores sugar in the form of fructan which is a more complex sugar and is not digested as well as simple sugars like glucose. If a horse or pony is prone to laminitis, restricted grazing is essential and a low sugar and starch diet is required.

# All About Nutrients



## Protein

Protein is needed for growth, renewal and repair. Protein is made up of chains of amino acids all linked together in special arrangements. Some amino acids such as lysine are essential and so must be supplied in the diet as they can't be made in the body.

Feed manufacturers have to provide a value for crude protein on the bag. As the name implies this is a very crude value as it makes no distinction between the levels of non-essential and essential amino acids in the feed. The phrase "quality protein" is often used to describe whether the protein in a feed contains good levels of essential amino acids.

Contrary to popular belief, excess protein in the diet has not been shown to cause laminitis, growth defects, muscle problems such as ERS (previously known as azoturia or tying-up), or cause over-excitability. The horse deals with excess protein by converting it to ammonia in the liver and excreting it as urea which is why it is recommended that horses with liver damage receive a low protein diet. It is important to consider both the level of protein and the feeding rate when selecting a feed for a horse requiring a low protein diet as the example below illustrates:

<b>Feed 1: High Fibre Cubes</b>	<b>Feed 2: Alfa-A Original</b>
Protein content: 8%	Protein content: 12%
Feeding rate: 3kg	Feeding rate: 1.5kg
Protein supplied: 240g	Protein supplied: 180g

## Minerals

Minerals are inorganic substances that are required in much smaller quantities than nutrients such as protein but are no less important as they all have vital roles in the body.

Minerals are divided into macro- and micro-minerals according to how much is needed in the diet. Macro-minerals are measured as grams per kilogram (g/kg) on the back of a feed bag or supplement whereas micro-minerals are fed in smaller quantities and measured as parts per million (ppm) or milligrams per kilogram (mg/kg). The table below outlines the general function of the Macro-mineral group and the Micro-mineral group:

<b>Macro-minerals</b>	<b>Micro-minerals</b>
Body structure	Enzyme function
Fluid balance (electrolytes)	Anti-oxidant status

# All About Nutrients



The key functions of minerals are listed below:

Macro-minerals	Key Function
Calcium	Component of bones and teeth
Phosphorus	Component of bones, needed for energy metabolism
Sodium	Electrolyte
Chloride	Electrolyte
Potassium	Neuromuscular function, regulation of acid-base balance
Magnesium	Neuromuscular function, enzyme activation
Sulphur	Involved in connective tissue, energy metabolism and component of some amino acids
Micro-minerals	Key Function
Selenium	Antioxidant
Copper	Component of enzymes
Iron	Component of red blood cells
Iodine	Component of thyroid hormones
Zinc	Component of enzymes, male fertility
Cobalt	Needed for microbial production of vitamin B12

## Vitamins

Vitamins can be divided into two groups; fat-soluble which can be stored in the body and water-soluble which cannot be stored. Vitamins are required in small quantities and are measured in International Units per kilogram (iu/kg).

Fat-soluble Vitamins	Water-soluble Vitamins
Vitamin A	Vitamin C
Vitamin D	B vitamins
Vitamin E	
Vitamin K	

As with minerals, a deficiency of vitamins can result in poor condition, a dull coat and crumbly hooves. Poor performance and weight loss may also occur as a result of a vitamin deficiency. As fat-soluble vitamins A, D and E can be stored in the body, feeding too many over a period of time can be detrimental to the horse's health.

## Water

Water is also an integral part of the horse's diet as it accounts for at least 60% of the horse's bodyweight. An inadequate water supply is detrimental to the horse's health as it can result in decreased appetite, poor performance and in cases of severe dehydration, death. Even mild dehydration can significantly impair performance and so ensuring that the competition horse drinks enough water is vital.

The amount of water a horse requires is generally related to the amount it loses. Basic losses occur through the urine and faeces but exercise and sweating significantly increase the horse's water requirements. Excess salt in the diet can also make a horse drink more. Providing a horse has access to water they will generally drink more than they need, however, if the water is unpalatable, they typically only drink enough to meet their requirements.

The horse's diet will also affect the amount of water consumed. For example, if a horse is grazing fresh spring grass that contains a lot of water, he may drink less than when he is stabled during the winter eating hay which has a much lower moisture content.





# Choosing A Ration



The introduction of new types of feed such as balancers that are more concentrated and so fed in smaller quantities, means that the guidelines for the proportions of forage to concentrates a horse needs have become obsolete. This is probably why some horse owners find feeding so confusing and the aim of this section is to try and make the process of choosing a feed and working out how much to use easier.

## Step 1: Establishing your horse's bodyweight

A horse's nutritional requirements are calculated by its bodyweight. If, like most people, you don't have a weigh bridge on your yard then invest in a weigh tape. Follow the instructions for using it carefully as placing it incorrectly will affect the accuracy of the reading.



The photo to the left shows how to see the weigh tape.

A weigh tape should be used every couple of weeks to monitor your horse's weight effectively and is most accurate when used by the same person at the same time of day.

## Step 2: How much to feed

A horse will eat between 2 and 2.5% of its bodyweight per day. This can be calculated as follows:

Horse weighs 500kg  
 $1\% = 500/100 = 5\text{kg}$   
 $2\% = 5\text{kg} \times 2 = 10\text{kg}$

This value is on a dry matter basis and the reason that this is important is that the moisture content of feeds varies considerably. For example:

Grass = 80% water, 20% dry matter  
Hay = 20%, 80% dry matter

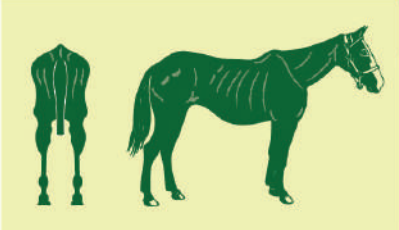
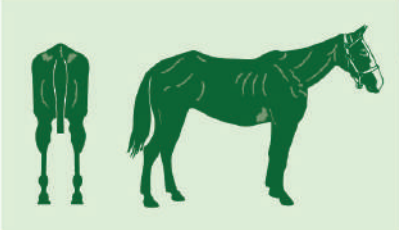
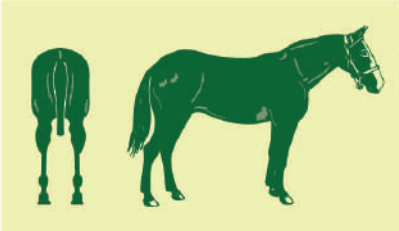
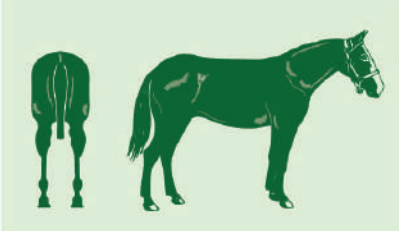
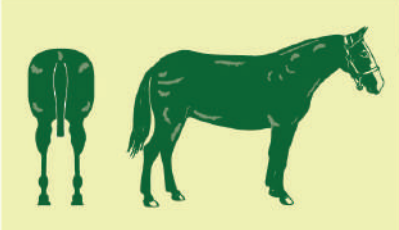
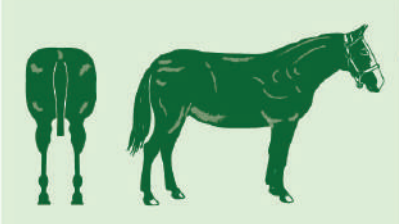
For a horse to consume 10kg of dry matter it would need to eat 50kg of grass OR 12.5kg of hay. There is a big difference between the two amounts and so it is important to consider this when working out how much to feed.

# Condition Scoring



## Step 3: Condition scoring

The aim of condition scoring is to remove the subjectivity of assessing a horse's condition and to highlight when changes to the diet are required. The condition scoring chart used by Dengie is based on a 5 point scale. The score of the horse will determine what type of feed it requires.

	<h3>0 - EMACIATED</h3> <ul style="list-style-type: none"><li>• No fatty tissue can be felt</li><li>• Skin tight over bones</li><li>• Shape of individual bones visible</li><li>• Marked ewe-neck</li><li>• Very prominent backbone and pelvis</li><li>• Very sunken rump</li><li>• Deep cavity under tail</li><li>• Large gap between thighs</li></ul>
	<h3>1 - THIN</h3> <ul style="list-style-type: none"><li>• Barely any fatty tissue</li><li>• Skin more supple</li><li>• Shape of bones visible</li><li>• Narrow ewe-neck</li><li>• Ribs easily visible</li><li>• Prominent backbone, croup and tailhead</li><li>• Sunken rump; cavity under tail</li><li>• Gap between thighs</li></ul>
	<h3>2 - LEAN</h3> <ul style="list-style-type: none"><li>• A thin layer of fat under the skin</li><li>• Narrow neck; muscles sharply defined</li><li>• Backbone covered with a very thin layer of fat but still protruding</li><li>• Withers, shoulders and neck accentuated</li><li>• Ribs just visible</li><li>• Hip bones easily visible but rounded</li><li>• Rump usually sloping flat from backbone to point of hips, may be rounded if very fit</li><li>• May be small gap between thighs</li></ul>
	<h3>3 - MODERATE</h3> <ul style="list-style-type: none"><li>• A thin layer of fat under the skin</li><li>• Top line developing and becoming more rounded</li><li>• Withers rounded over tips of bones</li><li>• Shoulders and neck blend smoothly into body</li><li>• Back is flat or forms only slight ridge</li><li>• Ribs not visible but easily felt</li><li>• Thin layer of fat building around tailhead</li><li>• Rump beginning to appear rounded</li><li>• Hip bones just visible</li></ul>
	<h3>4 - FAT</h3> <ul style="list-style-type: none"><li>• Muscles hard to determine beneath fat layer</li><li>• Spongy fat developing on crest</li><li>• Fat deposits along withers, behind shoulders and along neck</li><li>• Ribs covered by spongy fat</li><li>• Rump well rounded</li><li>• Spongy fat around tailhead</li><li>• Gutter along back</li><li>• From behind rump looks apple shaped</li></ul>
	<h3>5 - OBESE</h3> <ul style="list-style-type: none"><li>• Horse takes on a blocky, bloated look</li><li>• Muscles not visible as covered by layer of fat</li><li>• Pronounced crest with hard fat</li><li>• Pads of fat along withers and behind shoulders</li><li>• Extremely obvious gutter along back and rump</li><li>• Flank filled in flush</li><li>• Lumps of fat around tailhead</li><li>• Very bulging apple shaped rump</li><li>• Inner thighs pressing together</li></ul>

# Workload Levels



## Step 4: Estimating workload

Most horse owners tend to over-estimate how hard they are working their horse. The different levels of work are defined below:

### Maintenance

Type of Activities: At rest, retired.

### Light

Type of Activities: Hacking, schooling, riding club competitions once a week.

### Moderate

Type of Activities: Affiliated competitions at medium level, hunting once a week, endurance up to 50 miles

### Hard

Type of Activities: Affiliated competitions at high level, endurance 50-75 miles, hunting twice a week.

### Intense

Type of Activities: Three-day-eventing, polo, racing, 75-100 mile endurance rides, carriage driving

## Step 5: Choosing a feed?

Unless a horse is overweight then it is generally recommended to feed forage or grass ad lib. This means that whenever you visit your horse he should have access to forage.

If a horse is able to maintain its weight and has enough energy for the work it is required to do, there is no need to add further energy to the ration. However, it is recommended to provide a source of vitamin and minerals to balance the ration which can be supplied in the form of a supplement, a balancer or even a lick. All of these supply nutrients but very little, if any, energy (calories).

Which one of these you use is determined by workload, reproductive status, lifestage or any diseases the horse may be prone to. For example, a leisure horse would benefit from Leisure Vits & Mins whereas a horse in harder work would need Performance Vits & Mins. The same amount of forage might be sufficient to keep the horse at the correct bodyweight and so the supplement can be used to supply nutrients or ingredients that are specific for the needs of the group they are intended for.



# When Forage Isn't Enough



There are often situations where forage and grass can't supply enough energy to maintain a horse's weight. This could be because the horse is in work and so has increased energy requirements, the horse is a poor doer or has a limited appetite, or the nutritional value of the forage is low. At this point it is necessary to make a decision as to whether you are going to use a fibre based diet or include some cereal based feeds straight away. Dengie advocate a fibre first approach as it is the healthiest way to provide your horse with nutrients and energy. If using a fibre based diet, the first step is to pick the fibre feed you need.

Most of Dengie's fibre feeds are straights as we don't add vitamins and minerals to them, the exceptions being Cool, Condition & Shine and the Healthy range of fibre feeds. If using the fibre feeds that are straights it is necessary to continue with the source of vitamins and minerals such as a supplement or balancer. If using a balanced feed at the recommended levels there is no need to add another vitamin and mineral source.

## Is it really not necessary to use a mix?

When you consider that Alfa-A Oil contains as much energy as a conditioning or competition mix then for most horses and ponies there is no need to use a cereal based feed. There are occasions where this may not be practical such as:

- Horses with limited appetites may not be willing to eat the volume of fibre feeds required - for most horses the increased chew time is beneficial.
- Horses with laid back temperaments might need some quick release energy to give them a bit more sparkle - be sure that lazy horses are not overweight or just unfit before adding cereals to their rations.



## Putting this into practice

Spartan is a 16.2hh TB x ID eventer competing at British Eventing Novice level.

Step 1 - A weigh tape gives Spartan's bodyweight as 575kg

Step 2 - Spartan has a good appetite and so is likely to consume 2.5% of his bodyweight each day.  $575/100 \times 2.5 = 14.375\text{kg}$  is what Spartan is likely to consume per day.

Step 3 - Spartan is currently condition score 3.

Step 4 - Spartan's work load is moderate.

Step 5 - Spartan receives ad lib hay during the winter when he has a few weeks off and he just has Dengie Leisure Balancer to balance the ration. The feeding rate for Leisure Balancer is 100g per 100kg bodyweight and so he is fed 575g of Balancer. Assuming that hay is about 88% dry matter, Spartan is likely to consume 17.25kg as fed per day.

In the summer Spartan is working harder and so needs more energy to maintain his weight. He is therefore fed Alfa-A Oil. The recommended feeding rate for a 575kg horse is 2.5kg which he has split between two feeds a day. As he is in work he is fed Performance+ Balancer because it contains more vitamins and minerals to meet his increased requirements. The feeding rate for this is 100g per 100kg bodyweight and so he requires 575g per day. He is fed ad lib haylage during the summer which means that he is likely to consume 19.79kg as fed (assuming haylage has a dry matter of 60%).

# Dengie Product Overview



	Digestible Energy (MJ/kg)	Sugar %	Starch %	Good Doers	Poor Doers	Molasses Free	PRONE TO LAMINITIS		Full or Partial Hay Replacer	Straw Free*	Nutritionally Balanced	Moderat and Hard Work
							Overweight	Underweight				
Alfa-A Oil	12.5	4.5	2									
Performance Fibre	12	12	1.5									
Alfa-A Molasses Free	11.5	4.5	2									
Meadow Grass with Herbs & Oil	11.5	12	2									
Healthy Tummy	11.5	4.5	2									
Cool, Condition & Shine	11	10	2									
Pure Grass	10	12	2									
Alfa-A Original	10	12	2									
Alfa- A Lite	9	8	2									
Healthy Hooves Molasses Free	8.5	2.5	1.5									
Healthy Hooves	8.5	5	1.5									
Hi-Fi Molasses Free	8.5	2.5	1.5									
Hi-Fi Senior	8.5	10	1.6									
Ulser Lite	8	6.5	2									
Hi-Fi Original	8	9	1.5									
Hi-Fi Lite	7.5	7	1.5									
<b>PELLETED FIBRE</b>												
Alfa-Beet	10.5	5	2									
Alfalfa Pellets	10	5	3									
Pure Grass Pellets	10	12	2									

\*Super clean sources of fibre ideal for RAO and performance horses

# A Guide to Raw Materials



Raw Material	What product is it in?	What is it?	Features
<b>Alfalfa Chop</b>	<ul style="list-style-type: none"> <li>• All fibre feeds - except Grass range, Ulser Lite Cool, Condition &amp; Shine</li> </ul>	<ul style="list-style-type: none"> <li>• Precision dried British produced alfalfa</li> </ul>	<ul style="list-style-type: none"> <li>• Similar calorie level to pasture or cool mix or cube before we add anything to it</li> <li>• Valuable source of nutrients including good quality protein and naturally occurring vitamins and minerals</li> <li>• Excellent source of fibre</li> <li>• Increased chewing time compared to mixes and cubes</li> </ul>
<b>Alfalfa Pellets</b>	<ul style="list-style-type: none"> <li>• Alfalfa Pellets</li> <li>• Healthy Hooves</li> <li>• Alfa-Beet</li> <li>• Alfa-A Molasses Free</li> <li>• Healthy Tummy</li> <li>• Hi-Fi Molasses Free</li> <li>• Cool, Condition &amp; Shine</li> <li>• Healthy Hooves Molasses Free</li> <li>• Ulser Lite</li> </ul>	<ul style="list-style-type: none"> <li>• Precision dried British produced alfalfa</li> </ul>	<ul style="list-style-type: none"> <li>• All the benefits of alfalfa but in a concentrated form</li> <li>• Allows reduced volume of feed to be used</li> </ul>
<b>Cereal Straw</b>	<ul style="list-style-type: none"> <li>• Hi-Fi Original</li> <li>• Hi-Fi Lite</li> <li>• Healthy Hooves</li> <li>• Healthy Hooves Molasses Free</li> <li>• Hi-Fi Molasses Free</li> <li>• Cool, Condition &amp; Shine</li> <li>• Ulser Lite</li> </ul>	<ul style="list-style-type: none"> <li>• British produced straw</li> </ul>	<ul style="list-style-type: none"> <li>• Straw has little nutritional value so is added to 'dilute' alfalfa making a lower calorie product</li> <li>• Straw helps to increase chewing time compared to mixes and cubes</li> </ul>
<b>Precision dried grasses</b>	<ul style="list-style-type: none"> <li>• Hi-Fi Senior</li> <li>• Performance Fibre</li> <li>• Meadow Grass with Herbs &amp; Oil</li> <li>• Pure Grass Pellets</li> <li>• Pure Grass</li> <li>• Cool, Condition &amp; Shine</li> <li>• Ulser Lite</li> </ul>	<ul style="list-style-type: none"> <li>• Predominantly Timothy Grass and some Ryegrass grown in the UK</li> </ul>	<ul style="list-style-type: none"> <li>• Used to 'dilute' alfalfa as Timothy is a low protein, low nutritional value grass</li> <li>• More digestible than straw so ideal for older horses</li> <li>• Can be used as a performance forages as exceptionally clean</li> </ul>
<b>Unmolassed sugar beet pulp</b>	<ul style="list-style-type: none"> <li>• Alfa-Beet</li> </ul>	<ul style="list-style-type: none"> <li>• Sugar beet is a by-product of the sugar industry - it's what's left after the sugar is extracted</li> </ul>	<ul style="list-style-type: none"> <li>• Source of highly digestible fibre</li> <li>• Further improves alfalfa digestibility</li> </ul>
<b>NIS pellets</b>	<ul style="list-style-type: none"> <li>• Healthy Hooves</li> <li>• Healthy Hooves Molasses Free</li> <li>• Hi-Fi Molasses Free</li> <li>• Cool, Condition &amp; Shine</li> </ul>	<ul style="list-style-type: none"> <li>• Nutritionally improved straw pellets include straw that has been processed to make the fibre more digestible so that it is easier for the horse to break down</li> </ul>	<ul style="list-style-type: none"> <li>• Source of low calorie fibre</li> <li>• Useful to reduce energy concentration of mixes</li> </ul>

# A Guide to Raw Materials



## Other ingredients

Raw Material	What product is it in?	What is it?	Features
<b>Linseed</b>	<ul style="list-style-type: none"> <li>• Leisure Balancer</li> <li>• Performance+ Balancer</li> </ul>	<ul style="list-style-type: none"> <li>• Is an oilseed and is also known as flaxseed</li> </ul>	<ul style="list-style-type: none"> <li>• Source of protein</li> <li>• Source of omega-3 essential fatty acids that promote good skin and coat condition</li> </ul>

## Coatings

Raw Material	What product is it in?	What is it?	Features
<b>Molasses</b>	<ul style="list-style-type: none"> <li>• Alfa-A Original</li> <li>• Alfa-A Lite</li> <li>• Hi-Fi Original</li> <li>• Hi-Fi Lite</li> <li>• Hi-Fi Senior</li> <li>• Healthy Hooves</li> <li>• Performance Fibre</li> <li>• Cool, Condition &amp; Shine</li> </ul>	<ul style="list-style-type: none"> <li>• Extracted from sugar cane</li> <li>• Molasses contains approximately 40% sugar so when applied at 15% of the finished product contributes 6% sugar which is less than hay contains</li> </ul>	<ul style="list-style-type: none"> <li>• Molasses is sweet so is used to enhance palatability as alfalfa can be a naturally bitter plant</li> <li>• Useful to stick the alfalfa leaf to the stem</li> </ul>
<b>Rapeseed oil</b>	<ul style="list-style-type: none"> <li>• Alfa-A Oil</li> <li>• Alfa-A Molasses Free</li> <li>• Healthy Hooves</li> <li>• Healthy Hooves Molasses Free</li> <li>• Healthy Tummy</li> <li>• Hi-Fi Molasses Free</li> <li>• Hi-Fi Senior</li> <li>• Meadow Grass with Herbs &amp; Oil</li> <li>• Performance Fibre</li> <li>• Cool, Condition &amp; Shine</li> <li>• Ulser Lite</li> </ul>	<ul style="list-style-type: none"> <li>• Good quality oil extracted from rapeseed</li> </ul>	<ul style="list-style-type: none"> <li>• Increases the energy density of a feed without significantly increasing meal size</li> <li>• Oil added to Alfa-A Oil provides a product with a calorie level comparable to a conditioning mix or cube</li> </ul>
<b>Natural Spearmint Oil</b>	<ul style="list-style-type: none"> <li>• Alfa-A Lite</li> <li>• Performance Fibre</li> <li>• Cool, Condition &amp; Shine</li> </ul>	<ul style="list-style-type: none"> <li>• A natural oil</li> </ul>	<ul style="list-style-type: none"> <li>• Improved palatability</li> </ul>





Raw Material	What product is it in?	What is it?	Features
<b>Live Yeast</b>	<ul style="list-style-type: none"> <li>• Healthy Tummy</li> <li>• Ulser Lite</li> <li>• Leisure Vits &amp; Mins</li> <li>• Performance Vits &amp; Mins</li> </ul>	<ul style="list-style-type: none"> <li>• A live yeast culture approved as EU additive also called Probiotic</li> </ul>	<ul style="list-style-type: none"> <li>• Research has shown it improves fibre digestion</li> <li>• Stabilises the pH in the hindgut and helps to maintain normal digestive function</li> <li>• Improves quality and quantity of mares milk</li> </ul>
<b>FOS Prebiotic</b>	<ul style="list-style-type: none"> <li>• Healthy Tummy</li> <li>• Ulser Lite</li> <li>• Performance+ Balancer</li> </ul>	<ul style="list-style-type: none"> <li>• A complex sugar that comes from sources such as sugar beet, chicory and the acacia tree</li> <li>• Acts on bacteria in the digestive tract</li> </ul>	<ul style="list-style-type: none"> <li>• Is a food source for good bacteria in the gut</li> </ul>
<b>Glucosamine</b>	<ul style="list-style-type: none"> <li>• Performance+ Balancer</li> </ul>	<ul style="list-style-type: none"> <li>• Extracted from the exoskeletons of crustaceans</li> </ul>	<ul style="list-style-type: none"> <li>• Component of joint tissues so fed to improve joint health</li> </ul>
<b>Chelated Minerals</b>	<ul style="list-style-type: none"> <li>• Healthy Tummy</li> <li>• Healthy Hooves Molasses Free</li> <li>• Cool, Condition &amp; Shine</li> <li>• Performance Vits &amp; Mins</li> <li>• Performance+ Balancer</li> <li>• Leisure Balancer</li> </ul>	<ul style="list-style-type: none"> <li>• Minerals that are attached to sugar or protein molecules</li> </ul>	<ul style="list-style-type: none"> <li>• More bioavailable than inorganic sources</li> </ul>
<b>Mould Inhibitor</b>	<ul style="list-style-type: none"> <li>• Hi-Fi Original</li> <li>• Hi-Fi Lite</li> <li>• Hi-Fi Senior</li> <li>• Healthy Hooves</li> <li>• Alfa-A Original</li> <li>• Alfa-A Lite</li> <li>• Performance Fibre</li> <li>• Cool, Condition &amp; Shine</li> </ul>	<ul style="list-style-type: none"> <li>• Mould inhibitor is predominantly propionic acid based</li> <li>• Propionic acid is an organic acid also produced in the horse's gut</li> </ul>	<ul style="list-style-type: none"> <li>• Enables a longer shelf life with less likelihood of mould problems</li> </ul>
<b>Mint &amp; Fenugreek</b>	<ul style="list-style-type: none"> <li>• Alfa-A Molasses Free</li> <li>• Hi-Fi Molasses Free</li> </ul>	<ul style="list-style-type: none"> <li>• A blend of herbs</li> </ul>	<ul style="list-style-type: none"> <li>• Feeding trials showed this to be the most palatable combination of herbs</li> </ul>
<b>Garlic</b>	<ul style="list-style-type: none"> <li>• Healthy Hooves</li> <li>• Healthy Hooves Molasses Free</li> </ul>	<ul style="list-style-type: none"> <li>• A herb</li> </ul>	<ul style="list-style-type: none"> <li>• To improve palatability</li> <li>• May also act as a natural fly repellent</li> </ul>

# Dengie

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