



Partners in production



TechNote

Benefits of Extruded Feeds for Horses

How extrusion of grains works



Testing



Grinding



Blending



Mixing



Add Steam & Pressure



Die Cutting



Cooling



Bagging

Improved Starch Digestibility

The heat and pressure involved in the extrusion process causes the starch granules in the feed to be gelatinised (a process by which the starch granule is expanded and exploded). Gelatinisation of the starch has great benefits for your horse as it makes it easier for your horses to digest the starch in the small intestine reducing the potential for digestive upsets such as laminitis and acidosis occurring from undigested starch fermenting in the large intestine.

Improved Protein Digestibility

The extrusion process helps improve the ability of the protease enzymes in the horse to more efficiently digest the protein thus improving protein digestibility. This means that your horse is efficiently using the protein contained in the extruded feed.

Extruded feeds are softer and result in reduced teeth wear

Feeds produced by the Steam Extrusion process tend to be a bit softer than other forms of feed. This means that by feeding you horse extruded feeds you are helping maintain their teeth in good condition for longer and they tend to wear at a slower rate. Extruded feeds such as the NutriRice range are great for older horses that may have dental problems (particularly when mixed with some water prior to feeding).

Extruded feeds tend to take longer to eat

Extruded feeds tend to have a lower bulk density than conventional feeds such as pellets and sweet feeds. This lower bulk density means that your horse produces lots of saliva when eating. This saliva contains bicarbonate that buffers the digestive system and helps reduce the potential for digestive upsets such as colic and ulcers. The slower eating time also reduces the potential for choking (often a problem with ponies who eat their feed quickly)

Extruded feeds are dust free

The Steam Extrusion process is great for producing dust free feed. Each and every mouthful is the same resulting in consistent and balanced nutrition

Extruded feeds are cooked at temperatures that reduce the potential for harmful bacteria in feed

The extrusion process helps eliminate any potentially harmful bacteria that could occur in the feed such as salmonella making them extremely safe to use.

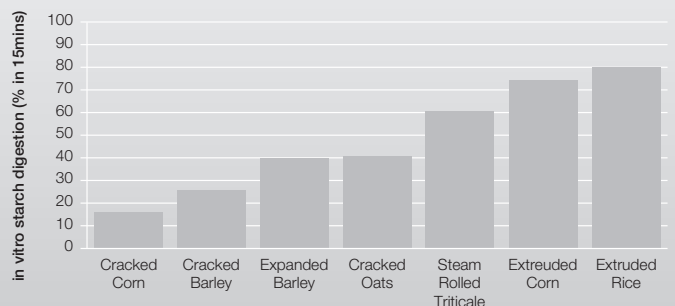
Extruded Feeds are very palatable

The Steam Extrusion process used to produce the NutriRice range of horse feeds gives them a sweet, nutty cooked aroma. Horses love the smell and the feed tastes great as well

Extruded Feeds are great for horses with reduced digestive ability

The improved digestibility of nutrients in Steam extruded feeds makes them ideal for young growing horses and older horses where digestive efficiency may be lower than adult horses

Digestibility of Grains



The *in vitro* digestibility's for a range of grains assayed using the method of Bird et al.(1999). Extruded rice ranks as the most digestible grain *in vitro*, followed closely by extruded corn and steam rolled triticale (McGilchrist unpublished).



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The Equine Digestive System

The Gastrointestinal Tract

The horse is classified as a monogastric herbivore and has four major sections of the gastrointestinal tract. These are the mouth, gastric stomach, small intestine and a highly developed large intestine, consisting of the caecum, large colon, small colon and rectum, which are collectively known as the 'hindgut'.

1. The Mouth

The food is chewed by the horse in the mouth, using a grinding action to reduce the particle size of the feed it is eating to make it more easily digested further down the gastrointestinal tract. This is an important process as food left unchewed will remain undigested through the small intestine and may cause digestive upsets.

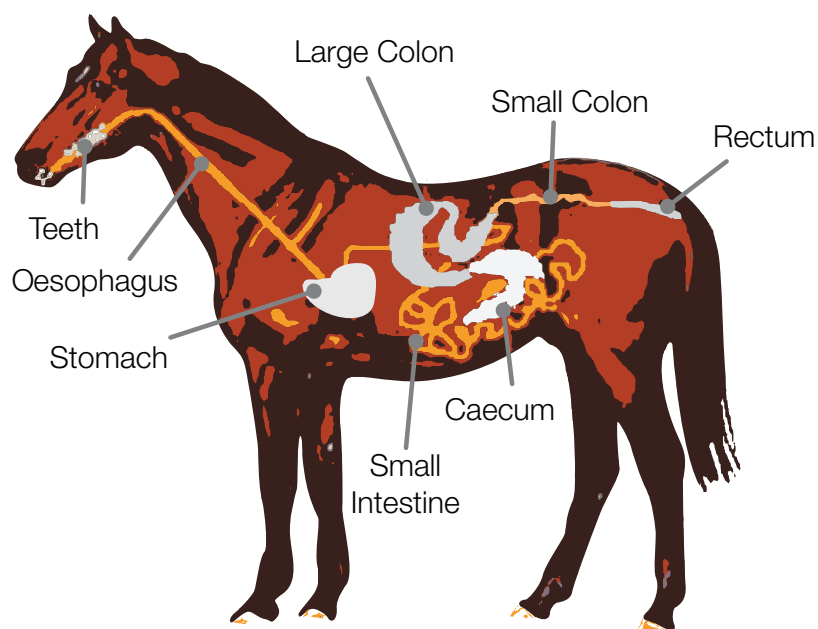
2. The Gastric Stomach

The horse's gastric stomach is a 'J' shaped organ that has a capacity of approximately 5 to 15 litres, comprising around just 10% of the total volume of the digestive tract. The stomach has two major functions during the digestion process in the horse. These are to begin the digestion of protein and to mix, store and regulate the rate of passage of feedstuffs from the stomach into the small intestine. Diets containing a high percentage of oil, such as those based on rice bran, are released slowly from the stomach into the small intestine to ensure that the small intestine has adequate time to digest the oil present in the diet. This also means that the time allowed for the digestion of starch and protein in the small intestine is extended.

3. The Small Intestine

The equine small intestine is approximately 15-22 metres long with a capacity of 40-50 litres. The small intestine is the site where starch, oils and proteins are digested and absorbed. Starch is digested by glycanase enzymes, oil is digested by lipase enzymes and protein is digested by protease enzymes. These enzymes are produced either in the pancreas or the small intestine and effectively act as scissors, cutting starch, oil and protein into small enough pieces so that they may be absorbed across the wall of the small intestine and into the bloodstream of the horse.

While the digestion of oil and protein by the horse is generally extensive, starch digestion in the small intestine can often remain incomplete. It is important when starch enters the small intestine that it is easily accessed by the glycanase enzymes.



If inaccessible to these enzymes, starch will remain undigested as it passes through the small intestine and will consequently be delivered to the hindgut, where bacteria will rapidly ferment it, causing an accumulation of lactic acid and a lowering of the hindgut pH. This acid accumulation in the hindgut may result in reduced fibre fermentation, excitable or irritable behaviour and disease, including laminitis.

4. The Hindgut

The hindgut is comprised of the caecum, colon, small colon and rectum and has a total capacity of approximately 90-110 litres. Because animals are incapable of producing the enzymes necessary to digest and release the energy held in fibre, the horse developed an enlarged hindgut where it is able to house many millions of bacteria who do possess the necessary enzymes for fibre digestion. The horse relies on these bacteria to digest dietary fibre in a process known as fermentation. During this fermentation, fibrous material is broken down and converted into substances called volatile fatty acids (VFAs). The horse absorbs these VFAs from the hindgut into the body, where they are used as a source of energy. Thus, using the hindgut and its resident bacteria, the horse is able to extract the energy from the valuable fibre component of rice bran in a 'safe' and efficient manner.

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