Sugar Beet – The Soaking Process

Dr. Tom Shurlock

FOR many years feeding sugar beet has been a staple part of many horse and ponies diets. Here we find out more from consultant nutritionist Dr Tom Shurlock about the soaking process that sugar beet goes through before it forms part of the feed and how differently flakes and pellets soak.

Sugar Beet – The Soaking Process

In order to extract sugar from the root, the beet plant undergoes a process involving slicing, crushing, water extraction, drying and, finally, pelleting.

This pellet or cube is therefore a compacted, desiccated form of crushed root and in this form it makes a poor base for water absorption.

The surface of the pellet (picture 1, electron microscope scan) shows a series of overlapping plates of fibrous sheets and as the surface is smooth, compacted and virtually free of cracks this makes water penetration very difficult.

Pic 1: Scanning Electron Microscope of Surface of Sugar Beet Pellet.

In the case of soaking fibrous materials water is taken up through capillary action, where extremely narrow gaps between fibres siphon water deep into the material where it is absorbed across the fibres, softening and expanding them.

Where larger gaps appear between the fibrous sheets these often tend to simply hold water as it soaks across the surface fibres, rather than penetrating them.

Therefore pellets with a high proportion of capillaries will distribute the water through the whole of the cube softening and expanding all the fibre, whilst little or no capillaries will limit the action to the surface making soaking difficult.

When looking at the soaking properties of a flake such as Speedi-Beet the action is very different.

Most horse and pony owners would assume that a beet shred would absorb water faster than a pellet, however this is not always the case.

Speedi-Beet for example has been shown to have faster and greater absorption rates than beet shreds and pellets.

When looking at a Speedi-Beet flake research shows (picture 2 and 3) that the sheets of fibrous material are thinner and show a greater roughness, the surface of the flake is permeated by a series of small cracks which act as entry points for the water, and the gaps between the sheets are less so that water doesn't simply become lodged in the crack.

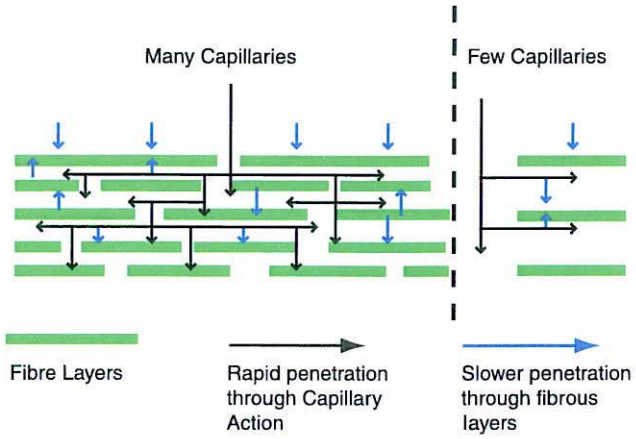


Figure 1. Soaking of Fibre Strands.

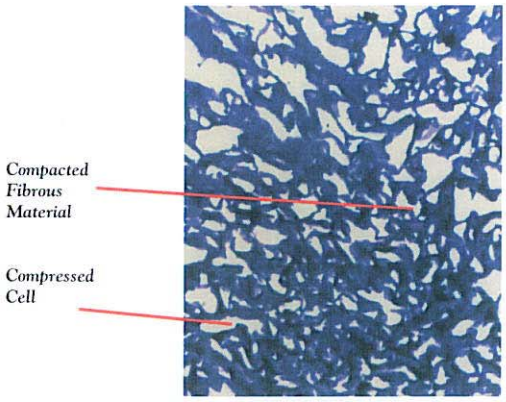
Therefore, Speedi-Beet absorbs water rapidly through the cracks and has quicker access to the fibre through which it is absorbed.

However this does not fully explain the benefits of Speedi-Beet, why it is such a quick process and why it has been converted into a nutritionally superior product.

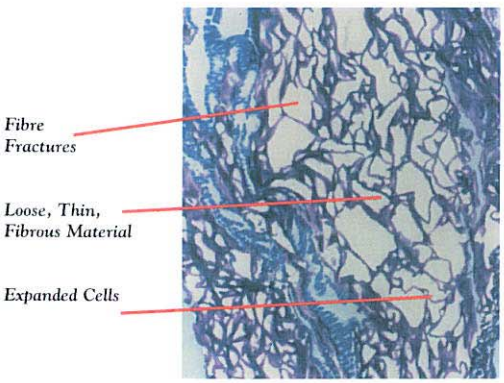
Speedi-Beet is 100% unmolassed sugar beet. It contains no additives or chemical agents and it is manufactured through a unique patented process that includes micronization.

Micronization is a heat treatment that uses infrared rays to "cook". The infrared rays penetrate the product causing inherent water molecules to vibrate rapidly and vaporise almost instantaneously.

The rapid expansion of the vapour, which is effectively super heated steam, not only "cooks" neighbouring nutrients but also fractures the membranes and walls of the cells from which it escapes.



Pic 2: Microscopic Section through Sugar Beet Pellet



Pic 3: Microscopic Section through Speedi-Beet

In the case of Speedi-Beet the important factor is this expansion and fracturing rather than the cooking, which is minimised.

As mentioned before sugar beet pellets (and shreds) are extremely compacted chips of the beet root from which sugar has been extracted.

The now-empty sugar containing cells have been collapsed and the fibrous cell wall material has been compacted into thick, slow absorbing, fibrous barriers to water penetration.

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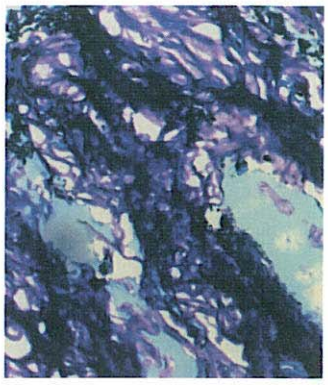
Speedi-Beet (200 Micron)



Rival Product (not micronized)

Sugar Beet Pellet

Micronization expands the compressed cells as the water present evaporates. The vapour is forced between the fibres, pushing them apart and disrupting them giving a product that has spaces between the individual fibres. This allows easy passage of water, increased capillary action and a faster soaking product. This, in essence, is Speedi-Beet.

Thus water soaking into Speedi-Beet has more capillaries to soak down, thinner layers of fibre to soak across and more spaces to hold the water than conventional sugar beet pellets and other competing products.

On the nutritional side this has tremendous benefits. As water can flow rapidly into the cells and between the fibres, so can digestive enzymes. Proteins, lipids, carbohydrates and vitamins & trace elements can also flow out during the passage of Speedi-Beet through the small intestine.

Nutrients that were locked up in the compressed cells and in the compacted fibre can be digested and absorbed before reaching the hindgut where much of their benefit would be lost as microbial fermentation products. Fermenting proteins can give rise to ammonia products that are not beneficial to the horse.

However, the third benefit of Speedi-Beet occurs in the hindgut. Fibre fermentation is the major source of energy provision for the horse. Microbes colonise the surface area of fibre and utilise it through fermentation. The end products are absorbed by the horse in the hindgut and are used for energy metabolism. There is a time limit. The contents of the gut are obviously lost as faeces and much fibrous material is unfermented in time.

The fact that the fibre in Speedi-Beet is not compacted and is fragmented means that the surface area of the fibre bundles is far greater than conventional beet. More fermentation can take place during its passage through the hindgut and so energy utilisation is greater.

And that is Speedi-Beet.

The fibrous material has been "loosened" and spaces made more available.

Nutrients are released and are more available for enzymatic digestion and there is a greater surface area of fibre for microbial activity.

Speedi-Beet is faster soaking, retains more water and has greater nutrient availability than not only sugar beet pellets but also its closest rivals.

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