

# Inulin

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Inulins are a group of complex carbohydrates or polysaccharides that are used to store energy by a number of vegetables and plants. They are commonly referred to as fructans or soluble fibre and consist of chains of fructose, often with an end of chain or terminal glucose molecule. They are regarded as functional foods and are described as having prebiotic properties. A prebiotic is defined as “a selectively fermented ingredient that allows specific changes, both in the composition and/or activity in the gastrointestinal microflora that confers benefits upon host well-being and health” (Roberfroid 2007). Prebiotics, such as inulin cannot be enzymatically digested in the horses’ small intestine, but travel to the hindgut where they provides a fermentable substrate or ‘food source’ for certain beneficial digestive tract microflora. Much of the inulin used in horse feed is extracted from chicory using a specialized manufacturing process. Inulin has been shown to be well tolerated in the equine diet at inclusion rates of 2% into a concentrate feed and at this level of intake is associated with improved fermentation in the hindgut (Van Loo 2007). The prebiotic properties of both inulin and oligofructose, in terms of their ability to increase the relative number or activity of beneficial bifidobacteria, is well proven in other species (Niness 1999).

## **Prebiotics in horses**

Evaluation of the prebiotic properties of inulins in horses has concentrated primarily on a sub-category known as fructooligosaccharides or oligofructose. Oligofructose is produced by further hydrolysis of inulin to produce an ingredient with a shorter chain length. Both oligofructose and inulin travel through to the equine hindgut within about 3 hours and are fermented

predominantly in the caecum, although it is suggested that a proportion of both oligofructose (Van Loo et al. 2006) and inulin (Coenen et al. 2006) may be fermented in the upper digestive tract. This has been confirmed by, (Respondek et al. 2005) who suggests that oligofructoses are also effective in the stomach, where a degree of fermentation occurs. This can result in a higher gastric pH being maintained with oligofructose supplementation, which may be beneficial for the maintenance of gastric health in horses such as race horses or other performance horses at risk from gastric ulceration.

Inulin and oligofructose have been previously used experimentally to induce laminitis in ponies, although in this scenario the inulin or oligofructose was fed to a severe excess. The intake of inulin or oligofructose used in these instances was far higher than would be typically used for improved fermentative performance (Milinovich et al. 2006; Kalck et al. 2009).

### **Clinical benefits**

The clinical benefit of prebiotic ingredients, such as oligofructose and inulin, for horses at a heightened risk of digestive disorders such as colic has also been investigated (Volter 1999). A reduced incidence of colic was observed in a group of 126 horses supplemented daily with short chain oligofructose. This finding was confirmed in a subsequent trial and the effect was reported to relate to the quantity of prebiotic fed (Julliand 2006).

The mechanism of the proposed effect on the incidence of colic remains unresolved, although recent studies suggest that oligofructose may help to protect the hindgut against the detrimental effects of a high starch diet. For performance horses, high starch diets are often essential, however, this type of ration can significantly increase their relative risk of colic (Tinker et al. 1997). Management practices, such as feeding plenty of forage and ensuring that meal size is kept small can help to reduce the associated risk of colic. When a large high starch containing meal is fed, the amount of starch that escapes digestion in the small intestine increases, as does the amount that

reaches the hindgut. In the hindgut, starch can be rapidly fermented leading to an accumulation of lactic acid, which may contribute to the increased risk of colic. Prebiotics such as oligofructose and inulin are thought to limit the detrimental effects of a sudden change to a high starch diet by reducing the accumulation of lactate in the colon (Respondek et al. 2006). This is likely to be achieved by boosting the numbers of those bacteria that utilize lactic acid as a 'food source'.

There are therefore many advantages to feeding a prebiotic such as inulin on a daily basis to maintain the balance of beneficial microflora in the digestive tract and to reduce the likelihood of digestive disturbance such as colic

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