

## LATEST ADVANCES IN RACE FEED FORMULATION

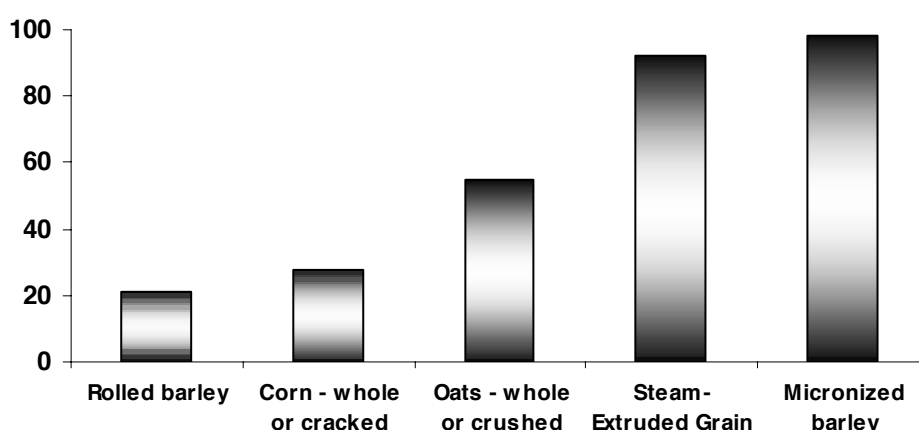
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For centuries, horsemen and women have ground, crushed, boiled, cooked, pelleted and steamed raw grains and they have done this for 2 reasons – firstly to increase digestibility and second to decrease the risk of colic, diarrhoea and laminitis. If undigested grains enter the large intestine, they are rapidly fermented to yield lactic and propionic acids – the latter depresses appetite and stimulates wood chewing. Horses are more likely to chew wood, stable fittings and bedding if body acid levels rise. This may be in part due to the fact that chewing initiates saliva production. Saliva is high in bicarbonate and it therefore has a neutralising effect on rising acid levels. Perhaps wood and bedding represent a type of ‘antacid’ or equine ‘quickeze’ – reducing the discomfort of an acid stomach - because in chewing comes relief. Both lactic and propionic are strong acids and produce a change in the eco-system of the caecum and large intestine – a bit like a swimming pool turning green if the pH is not kept within a narrow range. For these reasons, improving digestion in the small intestine offers great advantages for health and performance.

Oats, sunflowers and other plants growing in horse manure is evidence that raw grains are quite resistant to digestion. There is wide variation in the extent to which grains are digested - oats are more digestible than corn, which is more digestible than barley. The extent to which grains are digested varies with the type of grain, method of processing, meal size, and transit time through the small intestine and efficiency of the digestive enzymes.

The degree to which processing improves digestibility depends on the method used. Older physical treatments such as grinding, boiling and pelleting, are relatively crude and have only a marginal effect on digestibility.

### Digestibility in Small Intestine for Different Feeds



Recent advances in food technology have resulted in more sophisticated methods of grain processing – micronization and steam-extrusion. Micronization is an infra-red cooking process. The rapid internal heating of the grain causes starch granules to swell, fracture and gelatinize.

Micronization is the treatment of choice for barley – improving digestion from around 20% for rolled and 48% for steamed or boiled barley - to over 90% for micronized barley.

Grains should only be cooked in the presence of water to minimize the risk of heat damage to proteins and oil. Steam-extrusion achieves this objective and is especially beneficial for high energy feeds, improving corn digestion from around 30% to over 90%. It is hard to quantify some of the indirect advantages of steam-extrusion and micronization, such as reduced storage space, increased stability of feed, destruction of toxins, insect pests and bacterial pathogens and avoidance of high starch levels in the caecum and large intestine. The last is of prime importance.

Other international research into digestive function in horses has focused on digestive enzymes. The uses of selected, species-specific enzymes, which are natural to the horses system, provide additional opportunities to improve energy availability and safety of high energy racing diets for standardbreds. Horses have only low levels of digestive enzymes when compared to other species and there are differences between horses in terms of enzyme production. The horse has low levels of the enzymes necessary for starch digestion and absorption – having only around 6% as much as pigs. In addition, transit time through the small intestine is rapid – 1-3 hours, allowing little time for starch digestion. This is not something which should be surprising, considering that the horse evolved for over 50 million years grazing and browsing leaves and grass up to 16 hours a day. The equine gut is not adapted for large meals of raw grains.

By increasing the amount of digestive enzymes and slowing the rate of passage through the small intestine, starch digestion increases dramatically. This has the dual effect of making more energy available for work and preventing acid buildup in the large intestine. The addition of appropriate enzymes to the feed improves starch digestion by up to 25% and by feeding small meals several times a day, there is less risk of overloading the digestive capacity of the small intestine. Oats are around 65% digested in the small intestine, corn 29% and barley 21%. However, if more than 2kg of grain is fed at any one time, even these figures are not achieved. To reduce the rate of passage through the small intestine and allow more time for starch digestion, the concentrate can be fed without roughage. Chaff and hay can be fed either 2 hours before or 2 hours after the concentrate and this will slow transit time through the small intestine and allow digestive enzymes more time to act and prevent absorption sites from being overloaded.

Because of the damaging effects of semi- and undigested grains entering the large intestine and because trotters require high grain diets, advances in feed technology and grain processing are of great benefit. Research into equine nutrition and performance has gained momentum and it is up to individual trainers to apply the results. The combination of advanced grain processing techniques and boosting natural digestive enzymes can reduce feed intake. This is because horses are able to extract and absorb more of the nutrients in the feed. Of equal importance, these advances protect the caecum and large intestine from grain overload.

MITAVITE is continually applying the results of the most recent international research to provide trotting trainers with the latest developments. Mitavite feeds are formulated and prepared using micronized barley, extruded corn and selected species-specific enzymes. These latest advances are combined with time-honoured methods, enriched oil levels, chelated mineral proteinates, heat-stable, protected vitamins and added mineral, essential amino acids and biotin to assist trainers in allowing their horses to achieve their genetic potential.