

# Pros and Cons of Roasted Grains

Effect	Pros	Cons
Starch gelatinization: The release of fat from storage organs, breakage of bonds between starch molecules, eventual destruction of complex structures within starch.	This process makes plant starch much more digestible, giving a higher calorie yield from a smaller amount of grain.	Rapid and higher glucose and insulin response to the meal, compared to untreated grains. Young horses showing this pattern of high glucose and insulin post feeding have been found to be at higher risk for developing OCD.
Altered protein structure (denaturation and the Maillard reaction).	Denatured protein is protein that has had the bonds between amino acid chains broken. The same process occurs in the stomach when protein is exposed to stomach acid. It is a step in digestion. Denatured protein is basically partially digested.	In the Maillard reaction, an amino acid becomes bound to a sugar and is no longer available for digestion. Maillard reaction products are present if the grain was toasted enough to change its color. The Maillard products give the distinctive roasted flavor, but you lose some of the protein. Available lysine can be reduced, too.
Antimicrobial.	The high temperatures as grain passes through the flame will kill bacteria and fungi on the surface.	Recontamination can occur in processing steps after the heating. However, the world is not a sterile place, and your horse's meals are never sterile. This isn't a problem unless the grain is contaminated with high levels of a disease-causing (pathogenic) strain.
Toxin reduction.	Mycotoxins can be reduced with heating.	Mycotoxins aren't completely eliminated with heating. Effects depend on both temperature and duration of exposure to heat. Aflatoxin is typically reduced about 50%.
Lowered moisture content.	Low moisture inhibits/prevents the growth of molds. More actual nutrients per pound because percentage water is reduced.	Hard texture.
Vitamin effects.	Whole grains with their kernels intact help prevent vitamin loss due to oxidation (exposure to oxygen).	Thiamin is sensitive to heat. Vitamins E and C are also heat-sensitive in the presence of oxygen, as is vitamin A. This can be overcome by proper supplementation of the grain mix after it has cooled.
Fat effects.	Using whole grains rather than processed slows oxidation of fats (rancidity). Heat treatment inactivates the lipase enzyme, protecting storage forms of fat.	According to a 2003 study published in Vol 37 of the <i>Journal of Cereal Science</i> , heat treatment of oats increases the rate of loss of polar lipids during storage. The reasons aren't clear, but these authors suspect heat treatment may disrupt cell membranes (polar lipids are an important part of cell membranes) and also inactivates naturally present antioxidants such as vitamin E (see above). The polyunsaturated essential omega-3 and omega-6 fatty acids are particularly susceptible.