Phytases for Improved Iron Absorption

Microbial phytases (EC 3.1.3.8) catalyse dephosphorylation of phytic acid, which is the primary storage compound for phosphorous in cereal kernels. The negatively charged phosphates in phytic acid chelate iron (Fe$^{3+}$) and thus retard iron bioavailability in humans. Supplementation of microbial phytase can improve iron absorption from cereal-based diets.

In order for phytase to catalyse iron release in vivo the phytase must be robust to low pH and proteolysis in the gastric ventricle. Our work has compared the robustness of five different microbial phytases, evaluating thermal stability, activity retention, and extent of dephosphorylation of phytic acid in a simulated low pH/pepsin gastric environment. The five phytases responded differently to the robustness parameters: The Peniophora lycii phytase (Ronozyme NP) was the most thermostable, but the least robust enzyme at low pH, whereas the two tested Aspergillus niger phytases (SukaPhy phytase and a cloned A. niger enzyme), and an Escherichia coli phytase proved to be most resistant to low pH and pepsin hydrolysis. The phytase from Citrobacter braakii (Ronozyme HiPhos) showed intermediate robustness.