

The Advantages of Microbial Enzymes versus Animal Enzymes

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There are many advantages of using supplemental microbial enzymes as opposed to animal derived enzymes. Fermented enzymes have been used in foods for centuries. Microbial enzymes have been specially selected on the basis of each enzyme's unique characteristics. Fermented enzymes exhibit broad ranges of pH, temperature and substrate specificities. Supplemental microbial enzymes are chosen on their ability to work within the gastrointestinal system of mammals.

Specially selected for compatibility with the body's temperature, microbial enzymes also exhibit activity across a broad pH range. Unlike supplemental enzymes of animal origin, microbial enzymes work at the pH found in the upper stomach. Food sits in the upper portion of the stomach for as long as an hour before gastric secretions begin action. Several studies conducted at major universities have shown that the enzymes in saliva continue their digestive activity in the upper stomach and can digest up to 30% of the ingested protein, 60% of ingested starch and 10% of ingested fat during the first 30 to 60 minutes after consumption. Although salivary enzymes accomplish a significant amount of digestion, their activity is limited to a pH level above 5.0. Supplemental microbial enzymes are active in the pH range of 3.0 to 9.0 and can facilitate the utilization of a much larger amount of protein, carbohydrates and fat before hydrochloride is secreted in sufficient amounts to neutralize their activity. In contrast, supplemental enzymes of animal origin are destroyed by the low pH within the stomach unless they are enterically coated. Yet, this coating can prevent the dissolution of the enzymes and prevent any digestive benefit. Studies have shown that non-enteric coated products can be more effective than coated products. Furthermore, animal-based enzymes function only at the narrow pH ranges found at specific anatomical sites. Pepsin is only active in the highly acidic environment of the active stomach. Pancreatin, trypsin and chymotrypsin are only active in the alkalinity of the duodenum. Supplemental microbial enzymes exhibit activity throughout the entire digestive process. Therefore, microbial enzymes can play a significant role in improving food nutrient utilization.

Another advantage of microbial enzymes is the variety of enzymes available for supplementation. While pancreatin offers only protease, lipase and amylase activities, microbial enzymes offer protease, peptidase, lipase, amylase, glucoamylase, invertase, malt diastase, lactase, alpha-galactosidase, cellulase, hemicellulase, pectinase and phytase activities. Pancreatin is a pre-defined blend and the only alternatives are proportional increases in total activity that may not be necessary. Customization and flexibility to match the appropriate enzymes to the diet is another strength of supplemental microbial enzymes.

Yet, another advantage of microbial enzymes is that they are animal-friendly. These enzymes are vegetarian and cruelty-free.

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References:

- Beazell JM. "A Reexamination of the role of the stomach in the digestion of carbohydrate and protein." *Am J Physiol* 132: 42-50 (1941).
- Graham DY. "Enzyme replacement therapy of exocrine pancreatic insufficiency in man." *NEJM* 296: 1314-7 (1977).
- Griffin SM et al. "Acid resistant lipase as replacement therapy in chronic pancreatic exocrine insufficiency: a study in dogs." *Gut* 30: 1012-5 (1989).
- Guyton AC. *Textbook of Medical Physiology*, 8th edition. (Philadelphia: W.B. Saunders Company, 1991).
- Hesseltine CW & Wang HL. "Traditional Fermented Foods." *Biotech Bioeng* 9: 275-88 (1967).
- Howell E. *Enzyme Nutrition*. (Wayne, NY: 1985).
- Lennard-Jones JE. "Functional gastrointestinal disorders." *NEJM* 308: 431 (1983).
- Prochaska LJ & Piekutowski WV. "On the synergistic effects of enzymes in food with enzymes in the human body: A literature survey and analytical report." *Med Hypoth* 42: 355- 62 (1994).
- Schneider MU et al. "Pancreatic enzyme replacement therapy: comparative effects of conventional and enteric-coated microspheric pancreatin and acid-stable fungal enzyme preparations on steatorrhea in chronic pancreatitis." *Hepato-gastroenterol* 32: 97-102 (1985).
- Schwimmer S. *Source Book of Food Enzymology*. (Westport, CT: The AVI Publishing Company, Inc., 1981).
- Thacker PA, Campbell GL, & GrootWassink J. "The effect of enzyme supplementation on the nutritive value of rye-based diets for swine." *Can J Anim Sci* 71: 489-96 (1991).