CereCalase®

A Formulation From National Enzyme Company

Background Information

Description

CereCalase® is an exclusive blend of hemicellulase, beta-glucanase and phytase that is designed to synergistically disrupt the fibrous nature of plant cell walls and release trapped nutrients from plant materials.

Suggested Use

CereCalase® is designed for use in herbal e·d·s® blends and digestive products that are designed to support the nutritional needs of vegetarians or persons whose diets are high in vegetable matter. **CereCalase®** is not well suited for products which contain only herbal extracts or isolated active herbal constituents. Because **CereCalase®** breaks down fiber, beta-glucans and phytic acid, the use of **CereCalase®** in fiber supplements, colon health/cleanse supplements, certain anti-oxidant supplements, certain cardiovascular supplements, and certain blood sugar support supplements may not be appropriate.

Suggested Storage

Store all enzyme products in a cool, dry location, away from light.

Function

Whole plant foods and supplements can create a unique problem for the mammalian digestive system. The cell walls of plants are organized in complex matrices that can trap macronutrients, micronutrients, and bioactive compounds. These matrices account for the fibrous nature of plant foods and are composed of cellulose, hemicellulose, xylans, pectins, phytates, and beta-glucans (Salisbury and Ross, 1985). The digestion of the structural matrices of plant cell walls requires digestive enzymes that humans do not produce. So, botanical nutrients and essential constituents can be trapped in this structural matrix of plant cell walls, preventing them from being adequately absorbed into the human system where they can be utilized to improve the health and wellbeing of the consumer (Schwimmer, 1981). Due to this, the supplementation of select enzymes may be needed to digest these structures and release the trapped nutrients and bioactive constituents found in whole botanical ingredients and foods. Recognizing the need for this type of supplementation, National Enzyme Company specifically developed **CereCalase®** for the purpose increasing the availability of key constituents found in herbal ingredients and plant foods. **CereCalase®** is composed of phytase, hemicellulase, and beta-glucanase.

Phytic acid, inositol phosphate, is a plant compound that may have up to 6 phosphate groups attached to a ring structure. Phytic acid acts as a key phosphate reserve for plants and is found in high amounts in grains and seeds. Phytic acid is not readily degraded by human digestive enzymes and has been shown to reduce the absorption of essential nutrients, including but not limited to calcium, zinc, iron, and phosphorus (Hallberg et al, 1987)(Hallberg et al, 1989)(Sandstrom and Sandberg, 1991) (Nasi et al, 1999) (Kennefick and Cashman, 2000)(Glahn and Wortley, 2001). Both animal and human trials indicate that the supplementation of phytase can release these nutrients and improve the nutrition of the consumer (Sandberg et al, 1995)(Ravindran et al, 1999) (Nasi et al, 1999).

A large portion of the fibrous components of botanicals are composed of non-starch polysaccharides (NSPs). The primary NSPs found in the fibrous structure of plant cells include hemicelluloses and beta-glucans. Hemicellulose and beta-glucans can alter the transit times of foods, bind digestive enzymes, and trap essential plant constituents. Enzymes capable of degrading these have been shown to improve the digestibility and nutrient profiles of plant foods and products (Graham et al, 1989)(Almirall et al, 1995)(Cowan, 1996)(Delgado-Vargas and Paredez-Lopez, 1997).

References:

Almirall, M.; Francesch, M.; Perez,-Vendrell, A.M.; Brufau, J.; Esteve-Garcia, E. "The Differences In Intestinal Viscosity Produced By Barley And Beta-Glucanase Alter Digesta Enzyme Activities And Ileal Nutrient Digestibilities More In Broiler Chicks Than In Cocks." *J Nutr.*1995. 125(4): 947-55.

Cowan, W.D. "Animal Feed" in **Industrial Enzymology**, 2nd edition (New York: Stockton Press, 1996).

Delgado-Vargas, F and Paredez-Lopez, O. "Enzymatic Treatment To Enhance Carotinoid Content In Dehydrated Marigold Flower." *Plant Foods Hum Nutr.* 1997. 50(2): 163-9.

Hallberg, L et al. "Iron Absorption In Man: Ascorbic Acid And Dose-Dependent Inhibition By Phytate." *Am J Clin Nutr.* 1989. 49:140-4.

Hallberg, L et al. "Phytates And The Inhibitory Effect Of Bran On Iron Absorption In Man." *Am J Clin Nutr.* 1987. 45: 988-96.

Glahn, R and Wortley, G "Inhibition Of Iron Uptake By Phytic Acid, Tannic Acid, And $ZnCl_2$: Studies Using And In Vitro Digestion/ Caco-2 Cell Model." *J Agri Food Chem.*2002.50:390-395.

Graham, H et al. "Effect Of Pelleting And Beta-Glucanase Supplementation On The Ileal And Fecal Digestibility Of A Barley-Based Diet In The Pig." *J Anim. Sci.* 1989.67:1293-1298.

Kennefick, S and Cashman, KD. "Inhibitory Effect Of Wheat Fiber Extract On Calcium Absorption In Caco-2 Cells: Evidence For A Role Of Associated Phytate Rather Than Fiber Per Se." *Eur J Nutr.* 2000. 39(1):12-7.

Nasi, M et al. "Comparison Of Aspergillus Niger Phytase And Trichoderma Reesei Phytase And Acid Phosphatase On Phytate Phosphorus Availability In Pigs Fed On Maize-Soybean Meal Or Barley-Soybean Meal Diets." *Arch Tierernahr.* 1999. 52(1):15-27.

Ravindran, V et al. "Effects Of Phytase Supplementation, Individually And In Combination, With Glycanase On The Nutritive Value Of Wheat And Barley." *Poult Sci.* 1999. 78:1588-95.

Salisbury, F.B.; Ross, C.W. **Plant Physiology,** 3rd ed. (Belmont CA: Wadsworth Publishing Company, 1985).

Sandberg, AS et al. "Dietary *Aspergillus niger* Phytase Increases Iron Absorption In Humans." *J Nutr.* 1996. 126: 476.

Sandstrom, B and Sandberg, AS. "Inhibitory Effects Of Isolated Inositol Phosphates On Zinc Absorption In Humans." *J. Trace Elem. Electrolytes Health Dis.*1992. 6:99-103.

Schwimmer, S. **Source Book of Food Enzymology**. (Westport, CT: AVI Publishing Company, Inc., 1981)