

BACKGROUND INFORMATION

Supplement Facts

Serving size: 100 mg

Amount per serving	% DV
BioCore® Optimum	100 mg
Amylase (from <i>Aspergillus oryzae</i>)	3,500 DU *
Protease (from <i>A. oryzae</i>)	21,000 HUT *
Protease (from <i>A. oryzae</i>)	4,000 PC *
Protease (from <i>A. oryzae</i>)	2 AP *
Glucoamylase (from <i>Aspergillus niger</i>)	5 AGU *
Protease (from <i>A. niger</i>)	50 SAPU *
Invertase (from <i>Saccharomyces cerevisiae</i>)	400 SU *
Malt diastase (from <i>Hordeum vulgare</i>)	1,500 DP ^o *
Lipase (from <i>Candida rugosa</i> , <i>A. niger</i> , and <i>Rhizopus oryzae</i>)	500 FIP *

* Daily value not established
Other ingredients: maltodextrin

Table 1

In the summer of 2003 NEC's Product Development Team was tasked to create a comprehensive digestive formula to be used in a study that was designed to test the efficacy of microbial digestive enzyme supplements. This study was to be conducted at TNO, a research organization in the Netherlands. TNO had just developed a patented computer controlled dynamic model of the human gastrointestinal system (TIM). TIM is a unique system that can accurately simulate the conditions of the human stomach and small intestine. The proposed experiment involved administering to TIM a "meal" designed to represent the proportion of fat, carbohydrate and protein recommended by the Institute of Medicine's Food and Nutrition Board. The extent of digestion over time was measured with and without the inclusion of the digestive enzyme formula.

NEC formulators created this supplemental digestive enzyme formula by carefully choosing various fungal proteases, lipases and carbohydrases. The enzymes that were chosen for this formula were not only stable in the acidic conditions of the stomach but most were also active in that harsh environment. The study was a success and became the first quantitative evidence proving the efficacy of supplemental digestive enzymes.

The formula used in the TNO study is the basis for the formulation of BioCore® Optimum. BioCore® Optimum is a comprehensive digestive enzyme formula that serves as a foundation for every digestive enzyme solution. BioCore® Optimum contains all the basic digestive enzymes to ensure the proper digestion of food. It is formulated with various fungal proteases that are active at different pH ranges to guarantee protein digestion takes place not just in the small intestine but also in the stomach. BioCore® Optimum also contains various carbohydrases such as amylase, glucoamylase and malt diastase, which act as a disassembly line for the breakdown of starch. Lipases from various sources are also used in BioCore® Optimum for digestion of fats. Table 1 lists the various enzyme activities that are in BioCore® Optimum.

Over the past several months NEC scientists have conducted various tests on BioCore® Optimum to ensure its efficacy. BioCore® Optimum has been subjected to pH, temperature and gastric survivability studies. The results of those studies are shown below. Figure 1 describes the pH profile for amylase activity found in BioCore® Optimum. The amylase activity spans over a broad pH range of 3 to 8 with peak activity at pH 5. Thus this formula will immediately start breaking down starch in the stomach after a meal, since postprandial pH ranges between 4 and 6.

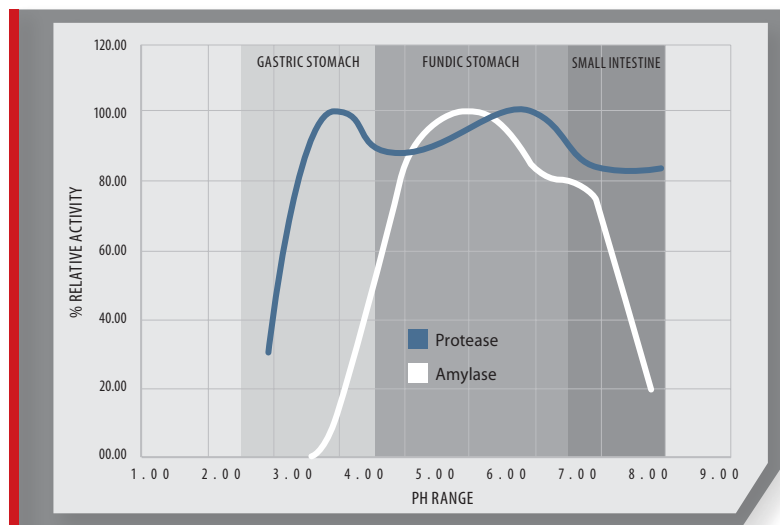


Figure 1

Figure 2 describes the pH profile for the protease activity of Biocore® Optimum. The two peak activities are found at pH 3 and between pH 6 and 7. These activities are ideal for digestion since the stomach is acidic and the small intestine is close to a neutral pH. Therefore this unique combination of proteases in Biocore® Optimum makes certain that protein digestion starts in the stomach and continues in the small intestine.

There is a general misconception among many scientists and consumers that supplemental enzymes do not survive the acidic conditions of the stomach, and must therefore be enterically coated. This may be true for animal enzymes but fungal microbial enzymes are especially resistant to stomach acid. To prove that Biocore® Optimum survives the acidity of the stomach gastric survivability experiments were conducted on the various enzyme activities that comprise Biocore® Optimum. The experiment involved the incubation

of Biocore® Optimum in a gastric solution for 1 hour followed by transfer to intestinal juices and then testing for activity. Figures 3, 4 and 5 show the activities of protease, lipase and amylase in Biocore® Optimum after exposure to gastric acid and reconstitution in intestinal juices. This data demonstrates that the enzymes in Biocore® Optimum are very resilient towards the acidity of the stomach.

Biocore® Optimum is a comprehensive digestive formula that is based on the first study that proved the efficacy of supplemental digestive enzymes. This product is the foundation for the ultimate line of digestive enzyme supplements.

The information contained in this paper is intended for educational purposes only. It is neither to be used to market or advertise a product nor to make labeling claims. The FDA and FTC have strict regulations concerning how information can be used in promoting a dietary supplement, and it is recommended that adherence to these regulations be followed.

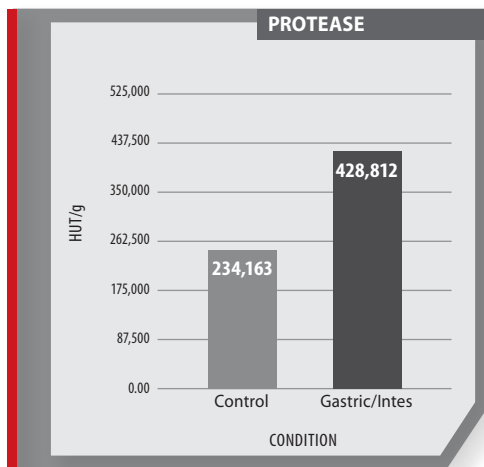


Figure 2

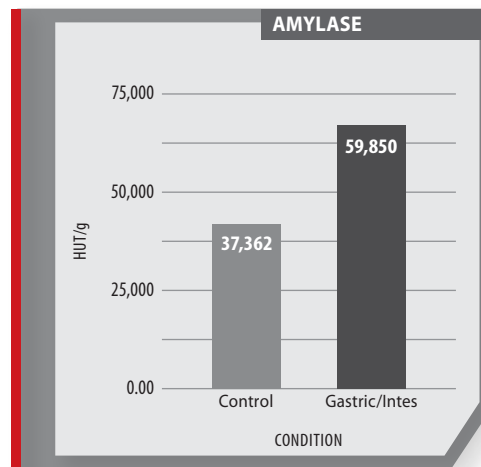


Figure 3

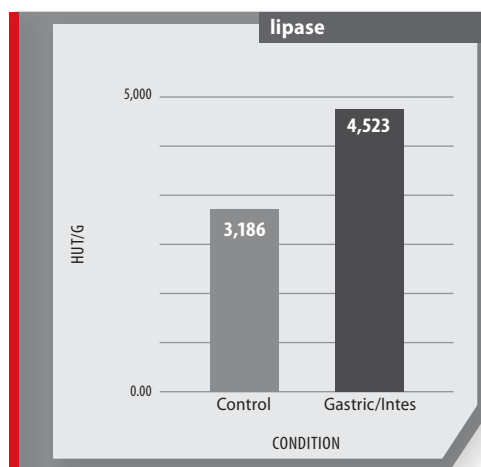


Figure 4