



EnzoMeal™ is the first advanced protein soybean meal with zero oligosaccharides that delivers improved nutritional value for fish feed

PARTNERSHIP & LICENSING: Ohio Soybean Council is seeking commercial partners with an interest in bringing this technology to the marketplace. Contact **Barry McGraw** at Ohio Soybean Council: bmcgraw@soyohio.org | (614) 310-1804

Enzymatically improved Soybean meal for Fish Feed

ENZOMEAL ADVANTAGE

Patented process efficiently removes anti-nutritional oligosaccharides from soybean meal without affecting nutritional value.

EnzoMeal composition shows an improved soybean meal that does not contain hard to digest oligosaccharides, while boosting valuable protein levels.

EnzoMeal's patented (non-fermentation) process removes Anti-Nutritional Factors (ANF) from conventional soybean meal. In a major boost to aquatic fish farmers, EnzoMeal delivers a powerful alternative to fish meal.

While conventional soybean meal is the best vegetable based alternative to fish meal due its high protein content, some aquatic diets are restricted to 20-30% loading of soybean meal due to substances that interfere with digestion of the aquatic species referred to as Anti-Nutritional Factors (ANF).

EnzoMeal removes the ANF substances such as trypsin inhibitors, antigens (glycinin and b-conglycinin), phytic acid, and oligosaccharides.

EnzoMeal preparation process removes oligosaccharides, by far the most challenging ANFs to remove from conventional soybean meal. Moreover, the EnzoMeal process does not compromise amino acid composition, thus starting a revolution in soy-based meal.

Trout, shrimp, and yellow perch evaluation results:

- comparable to fish meal and better than conventional soybean meal
- can replace 50-75% fish meal protein in fish — 100% in shrimp
- promising new ingredient for the growing aqua feed industry

BENEFITS

Low-cost — Soy economy at increased inclusion (greater than 30%)

Robust — Zero oligosaccharides, high protein

Safe — No indications of any significant detrimental impacts

Yields — Tested with trout, shrimp, perch

Sustainable — Soy means a long-term, trusted solution for aquaculture farmers

ENZOMEAL™ SPECIFICATIONS

Comparative nutritive value of conventional soybean meal vs. EnzoMeal

	Commercial soybean meal (CSM)	EnzoMeal	EnzoMeal Nutritional benefits over CSM
Protein (%)	45.9	56	22% increased
Carbohydrates (%)	39.85	27.5	45% decreased
Oligosaccharides (%)	15	<0.05	~ 100% removal
Phosphorous (g/kg)	6.37 (includes 1.52% phytic acid)	6.4% (includes 0.98% phytic acid)	55% phytic acid decreased

- EnzoMeal was analyzed using chromatography to confirm the complete removal of anti-nutritional oligosaccharides and nutritional analysis showed similar amino acid composition compared to conventional soybean meal.

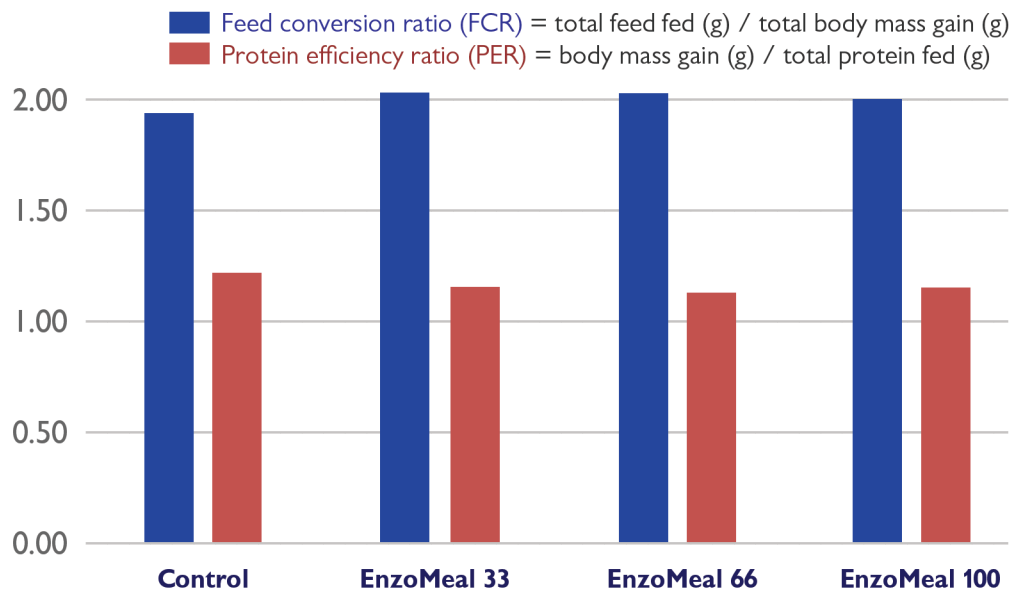
STORY Traditionally, commodity soybean meal has been effectively utilized in aqua feed formulations under rather strict incorporation levels due to the presence of anti-nutritional factors (ANF) such as trypsin inhibitors, raffinose, stachyose and others that can detrimentally impact production in many high value species. Inclusion rates of commodity soybean meal higher than 15% of the diet in commercially formulated feeds have resulted in reductions in performance in terms of growth and overall health status in rainbow trout. Many feed companies simply limit inclusion of commodity soybean meal to 10-12% of the diet, as no viable, long-term solutions have been available in the aquaculture marketplace, until now.

EnzoMeal, an improved soybean meal, reduces oligosaccharides and increases in crude protein. EnzoMeal represents a breakthrough product for use in commercially derived feed in a high value, well-recognized aquaculture species such as rainbow trout. Efforts to find suitable, more sustainable replacement proteins for fish meal have intensified, and the need to increase the inclusion levels of soybean meal in aquafeed formulations has escalated as well. EnzoMeal provides aquaculture farmers a sustainable, long-term, healthy solution.

PACIFIC WHITE SHRIMP & TROUT HIGHLIGHTS

Pacific white shrimp nutrient utilization

- 100% of fishmeal can be successfully replaced with EnzoMeal



- Results demonstrate the health benefits for trout as the high loading of EnzoMeal is comparable to fish meal control diet — showing excellent gastrointestinal tract results and better than conventional soybean meal