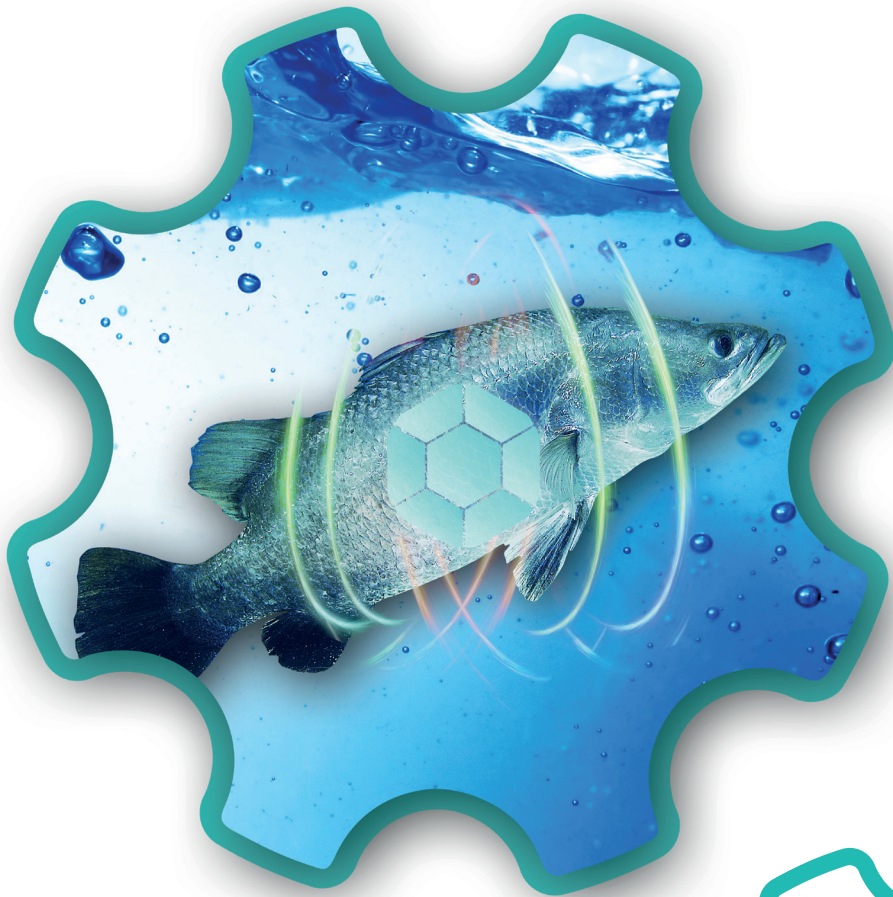


progut[®]

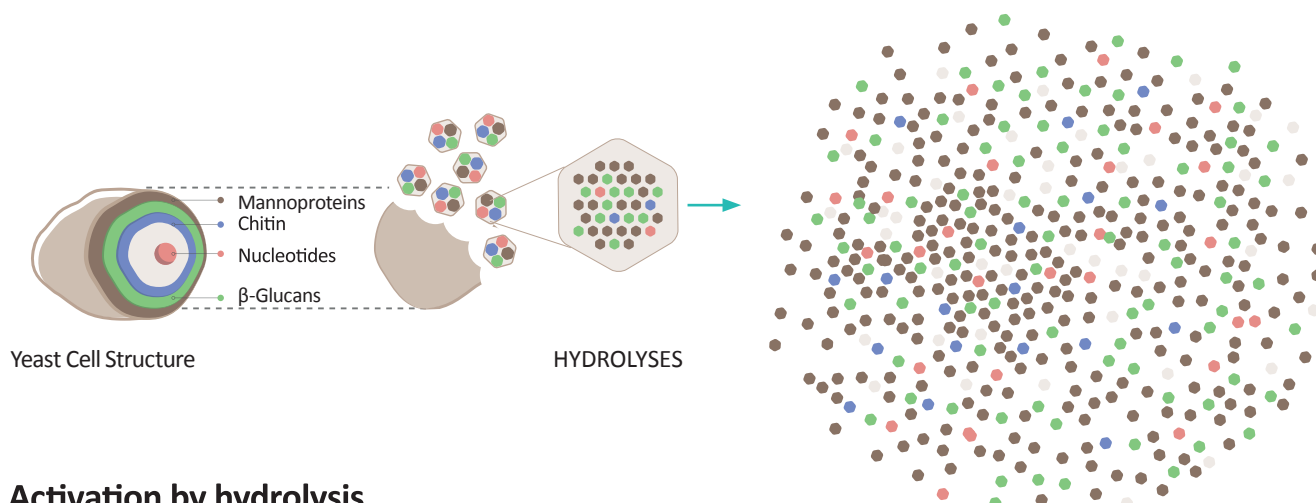


**GROWTH
IMMUNITY
GUT HEALTH**

*Scientifically proven
used in different
species*

Progut® – Internal Protection for Aquaculture

Progut® is a patented yeast hydrolysate, which offers a unique set of immunological and performance benefits for fish and shrimps. Yeast cells are hydrolyzed to maximize the efficacy of their bioactive components. Progut® is rich in soluble mannanoligosaccharides, betaglacans, nucleotides and peptides. It is heat stable.

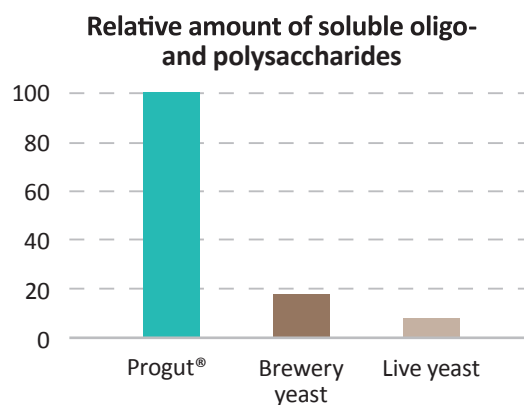


Activation by hydrolysis

The unique hydrolysis process of Progut®:

- Opens the layers of the yeast cell wall
- Retains all bioactive components of the yeast cells
- Breaks down the sugar chains of the yeast cell wall into soluble oligo- and polysaccharides

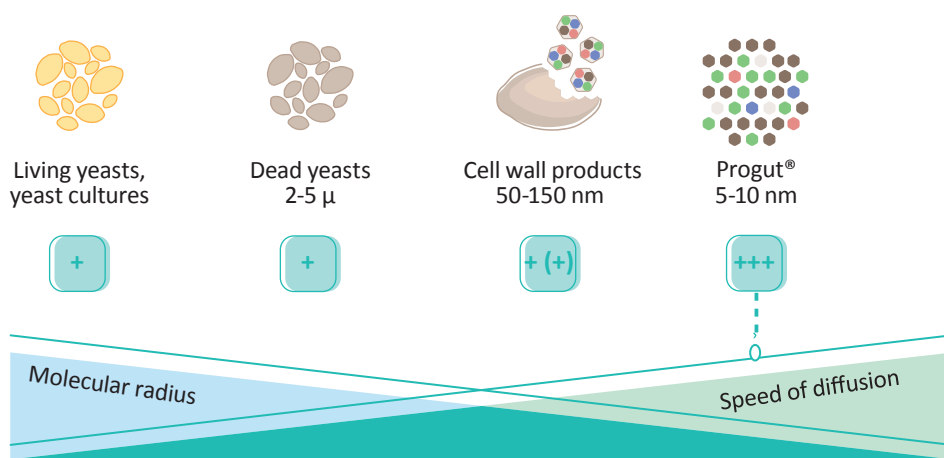
Thanks to our process Progut® contains over 5 times the amount of soluble oligo- and polysaccharides in deactivated brewery yeast and over 10 times the amount in live yeast.
(Glycos Ltd Finland, 2008)



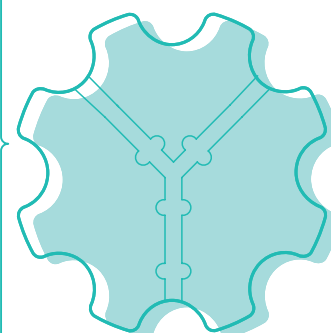
Optimized to enhance activity

- Sugar structures in Progut® are of optimal size to maximize its immune stimulating potential
- As the molecular radius of sugar structures decrease, the speed of diffusion in water increases
- Our hydrolysis process increases the amount of soluble, bioactive structures that can interact with immune cell receptors.

Size and water solubility matter



Immune receptor interactions



Benefits in Aquaculture

Progut® addition improved:

- the condition of intestinal epithelium and growth of Asian seabass University of Kasetsart (Bangkok, Thailand) in normal conditions (low salinity waters)*
- the vitality and growth of shrimps in commercial field trials

**BETTER
GUT
CONDITION**

**IMPROVED
PERFORMANCE**

**ENHANCED
IMMUNITY**

* Asian seabass trial by the University of Kasetsart

The trial was divided into 2 experiments:

Experiment 1 Effects of Progut® on growth performance and immune response in normal condition under the field trial.

Experiment 2 Effects of Progut® in on growth performance, and histology of liver and intestine under normal condition and disease challenge against *Vibrio parahaemolyticus*

Data collection:

Growth performance

- Live weight or average fish weight, weight gain
- Specific growth rate
- Feed conversion ratio
- Survival / mortality rate

Health and immunity

At the end of study, blood samples were tested for immunity parameters.

- Complete Blood Count (white blood cell count, red blood cell count, hemoglobin, hematocrit), immunoglobulin M (IgM) and lysozyme activity and glutathione were determined.

Gut health: Liver and Intestine section

- Liver and intestinal villi length of each treatment were determined by histology technique at the end of study.



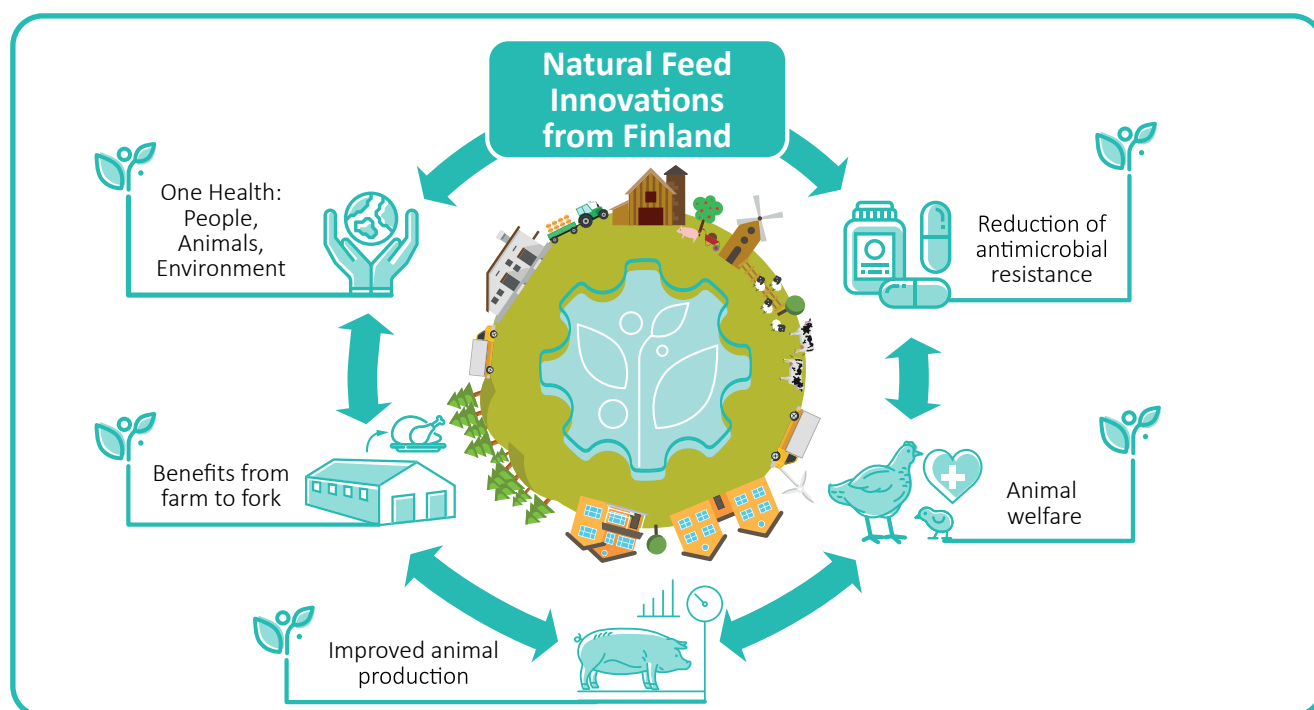
PROGUT® SUPPORTS THE BODY'S NATURAL DEFENSE FORCES WHENEVER THEY NEED BACK-UP

Activate Internal Protection!

Progut® works as a safe sparring companion to the immune system of your fish and shrimps. It speeds up the development of humoral and cell-mediated arms of the adaptive immune system, thus allowing natural defenses to be prepared to take the action when needed.

Recommended dosage rates for fish and shrimps: 0.5 — 1 kg/ton of feed

progut® INTERNAL PROTECTION



Hankkija FINNISH FEED INNOVATIONS

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