Biotronic®

The breakthrough in pathogen control

dsm-firmenich

With many opportunistic pathogens in aquaculture, the risk of disease is never far away. Further, modern aquaculture practices (e.g. disinfection, high organic inputs, high stocking density etc.) favors the rapid proliferation of pathogens. Therefore, continuous, and proactive pathogen management is required throughout the production cycle.

What is Biotronic®?

Biotronic® is an enhanced organic acid solution to manage bacterial pathogens and improve the survival of fish and shrimp.

The unique combination of multiple active components acts synergistically to target Gram-negative pathogens minimizing their impact, whilst reducing the need for traditional interventions, such as antibiotics.

Traditionally, organic acids have been used at high inclusions in the attempt to reduce the pH of the feed and gastrointestinal tract. With questionable efficacy in this regard, high inclusions can also be expensive, take up formulation space and damage equipment. Biotronic® overcomes these issues by having direct and targeted antimicrobial effects, maximizing benefits in fish and shrimp.

Benefits of Biotronic®

Biotronic® has well documented benefits in a range of species, including salmonids, shrimp, tilapia, bass, bream and other aquatic species

- Reduces pathogenic load.
- Improves survival.
- Reduces reliance on antibiotics and risk of antimicrobial resistance.
- Mitigates the negative impacts of gastrointestinal diseases.
- Has a low inclusion, saving space in diets for other components.
- Contributes to sustainability, in part by improving health and welfare.

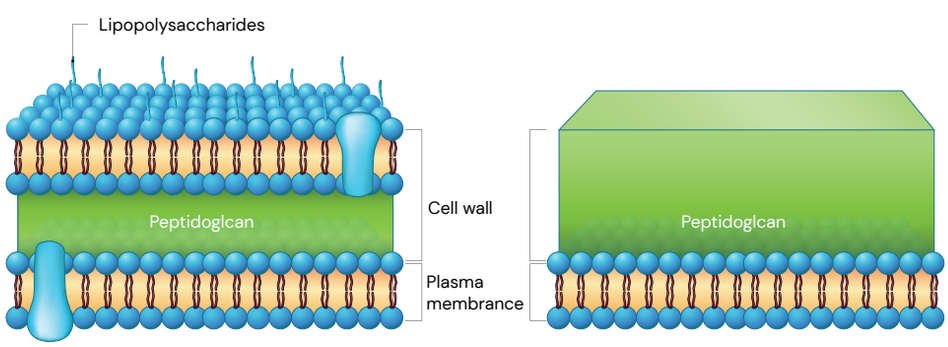
Mode of action

- Damages the cell membranes of Gram-negative bacteria, impairing their functionality.
- Reduces efflux pump activity, reducing antimicrobial resistance.
- Interferes with membrane potential, stressing pathogenic cells.
- Has antimicrobial properties.
- Disrupts quorum sensing (quorum quenching), reducing pathogen virulence.
- Acts as a natural growth promoter.

Bacterial pathogens – a combined approach

Most bacterial pathogens in aquaculture are Gram-negative in nature (as opposed to Gram-positive). This makes them more challenging to overcome, due to several features:

- Outer membrane comprised of lipopolysaccharide (LPS) provides additional layer of protection.
- Multiple efflux pumps, within the membrane, allowing them to develop resistance against antibiotics and other traditional antimicrobials.



Gram-negative bacteria **Gram-positive bacteria**

Therefore, a different, and more targeted approach is needed to overcome Gram-negative challenges. At dsm-firmenich, top scientists developed a unique solution to do just that, and Biotronic® was introduced.

This winning formula has documented benefits against ...

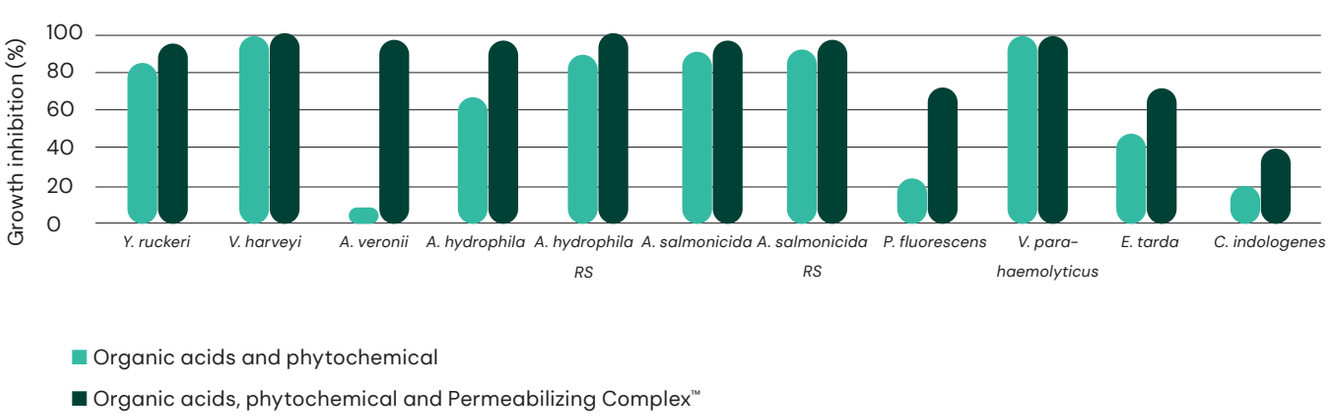
Vibrio ✓	*Moritella* ✓	*Pseudomonas* ✓
Aeromonas ✓	*Tenacibaculum* ✓	*Edwardsiella* ✓
Yersinia ✓	*Piscirickettsia* ✓	... and more ✓
Flavobacterium ✓	*Francisella* ✓	

Permeabilizing Complex™ targets Gram-negative bacteria, breaking down their outer LPS membrane and boosts the antimicrobial activity of the other components.

Phytogenic inhibits cell division of pathogenic bacteria leading to a reduced bacterial load, without affecting beneficial microorganisms. In addition, their quorum quenching properties impair the cell-to-cell communication of bacteria (quorum sensing) resulting in reduced pathogen virulence.

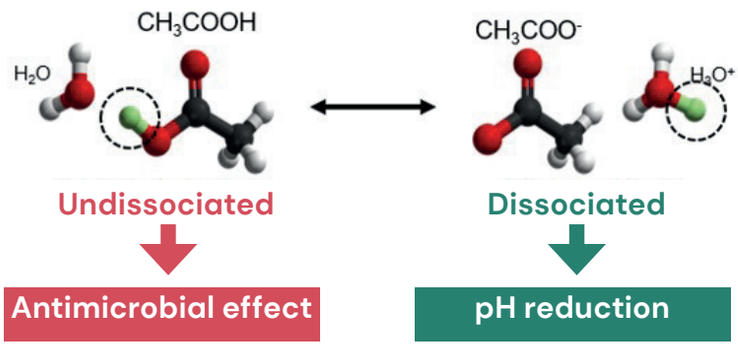
Organic acids enter the bacterial cells where they alter the normal cellular functions and impair their functionality. The combination of organic acids acts synergistically to improve their antimicrobial efficacy against pathogens and extend their spectrum of activity.

Improved efficacy with the Permeabilizing Complex™

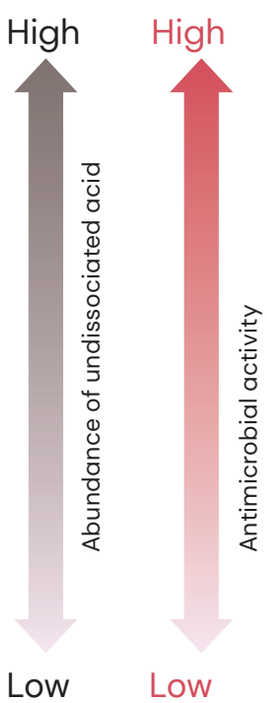


Did you know:

Organic acids can be either 'dissociated', or 'undissociated'. This depends on their pKa value, the pH at which the acid is in equal form. Organic acids with a high pKa value, such as propionic acid, have greater antimicrobial activity.



Organic acid	pKa value
Propionic acid	4.88
Butyric acid	4.82
Acetic acid	4.76
Sorbic acid	4.76
Benzoic acid	4.19
Lactic acid	3.86
Formic acid	3.75
Malic acid	3.40
Citric acid	3.13
Fumaric acid	3.03
Tartaric acid	2.98



Using Biotronic®

	Biotronic® Top3	Biotronic® PX Top3*
Species	Fish and shrimp	Fish and shrimp
Application	Straight	Via premix or straight
Dosage	1 – 2 kg/ t feed	0.5 – 1 kg/ t feed

* Formulation based on organic acid salt

Note: Formulation and product name may differ, due to registration guidelines

We bring progress to life

Scan to know more
or visit **dsm-firmenich.com/anh**

October 2023

FO6_Biotronic_A_EN_0224_BSA

dsm-firmenich