

PERFOSTIM S/F

MICROBIAL FEED ADDITIVE FOR SHRIMP

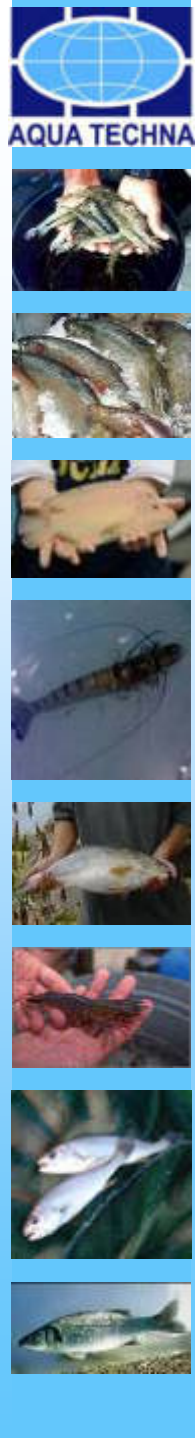
PEDIOCOCCUS ACIDILACTICI MA 18/5M

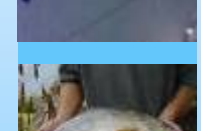
USE OF PERFOSTIM S/F

**AS FEED ADDITIVE FOR SHRIMP JUVENILE PENAEUS
MONODON**

**VUNG TAU CENTER FOR SHRIMP RESEARCH AND
PRODUCTION**

(VIET NAM) DEC 2001- FEB 2002





PERFOSTIM S/F

COMPOSITION

PERFOSTIM S/F IS AN ORIGINAL FEED ADDITIVE COMPOSED OF TESTED BACTERIA AND ESSENTIAL ELEMENTS :

BACTERIA



PEDIOCOCCUS ACIDILACTICI
MA 18/5M

- ✓ COLONIZATION OF DIGESTIVE TRACK
- ✓ DECREASE OF PATHOGENS ACTIVITY
- ✓ IMPROVEMENT OF THE SURVIVAL RATE

SELENIUM



- ✓ LIMITS THE EFFECT OF FREE RADICALS.
- ✓ ENZYMATIC ACTIVITY STIMULATION
- ✓ IMPROVEMENTS OF GROWTH PERFORMANCES
- ✓ DECREASE OF MORTALITY RATE
- ✓ FASTER RESPONSE OF THE IMMUNE

VITAMIN E

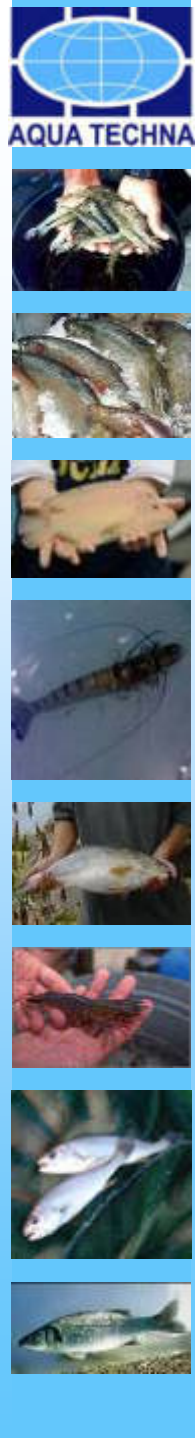


VITAMIN C

- ✓ STIMULATION OF THE IMMUNE RESPONSE.
- ✓ INCREASE OF STRESS RESISTANCE.

PERFOSTIM S/F

PROPERTIES



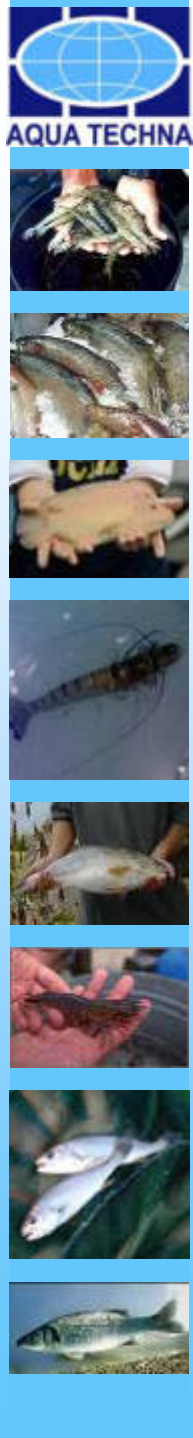
A STRAIN SELECTED TO IMPROVE THE SHRIMP PERFORMANCE:

⇒ IDENTITY:

- ✓ **PEDIOCOCCUS ACIDILACTICI MA 18/5M,**
- ✓ **DEPOSITED AT THE NATIONAL COLLECTION OF MICROORGANISM (PASTEUR INSTITUTE, FRANCE) N° MA 18/5M.**

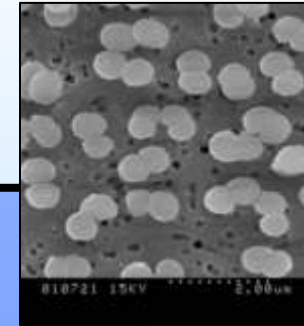
⇒ PROPERTIES:

- ✓ **PRODUCES LACTIC ACID L+ FROM CARBOHYDRATE SUBSTRATES (HOMOFERMENTATIVE BACTERIA),**
- ✓ **ABLE TO GROW IN A WIDE RANGE OF PH, TEMPERATURES, OSMOTIC PRESSURES,**
- ✓ **SURVIVES ALL ALONG THE DIGESTIVE TRACT.**

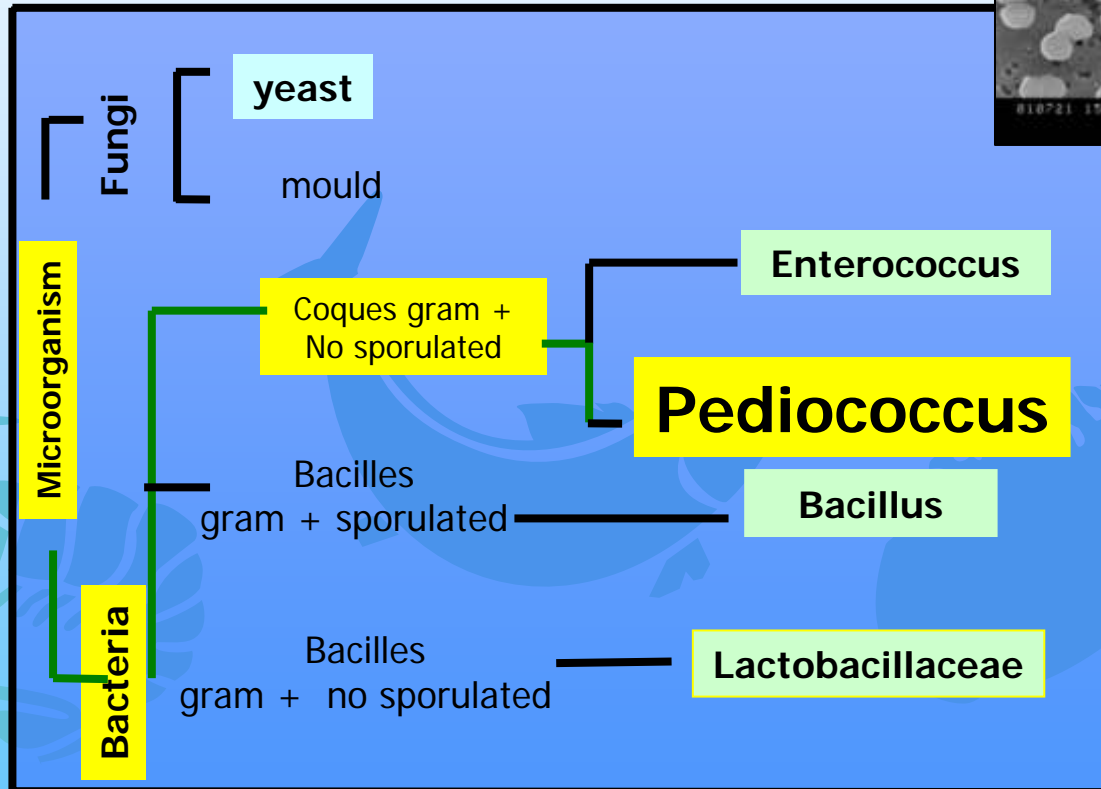


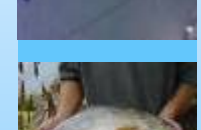
Pediococcus acidilactici, strain n°MA 18/5M

Registered at Collection Nationale de Cultures de Microorganismes (CNCM Institut Pasteur, France).



Pediococcus classification
and other probiotics
microorganisms

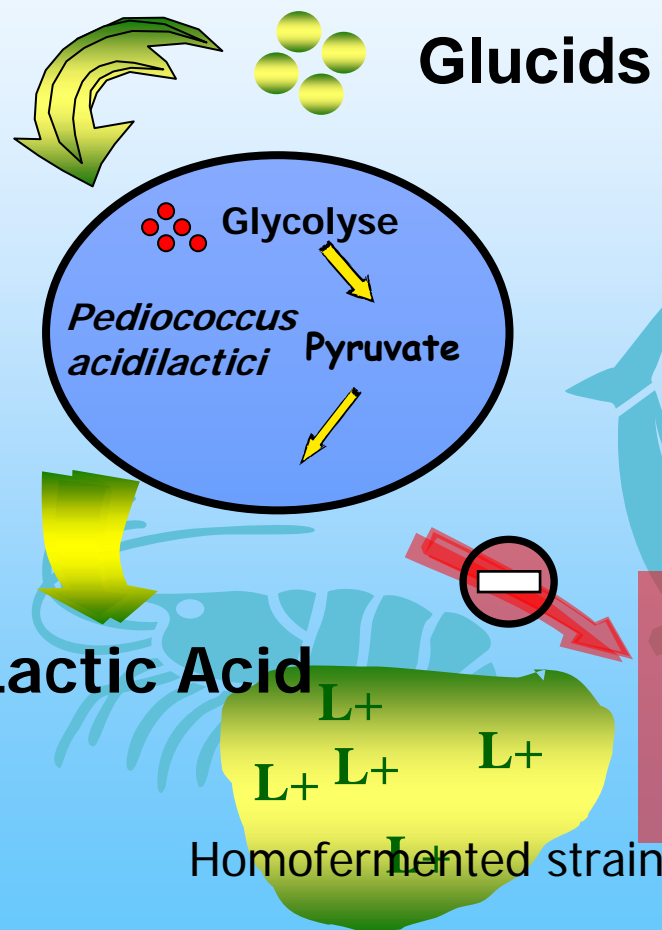




PERFOSTIM S/F

PRODUCTION OF LACTIC ACID

Specific sugars transfer to lactic acid by *Pediococcus acidilactici*.



Fermentative profile of <i>Pediococcus acidilactici</i>	
• L-arabinose*	• Rhamnose*
• Ribose*	• N-acetyl glucosamine
• D-xylose*	• Esculine*
• Galactose	• Cellobiose*
• D-glucose	• Trehalose*
• D-fructose	• D-tagatose*
• D-mannose*	

* not digested by the animal

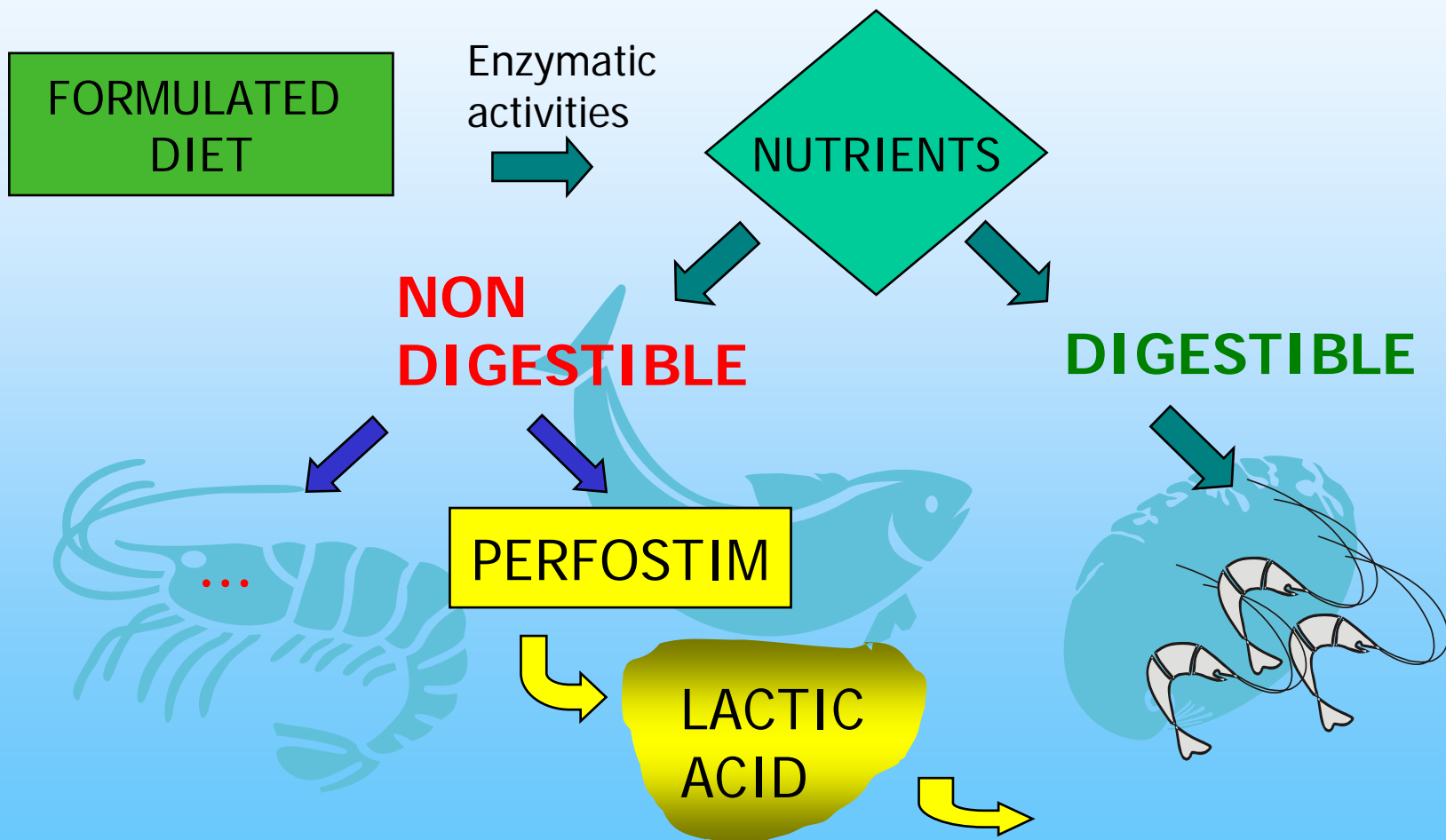
CO₂ (nutrients lost)*
 Ac. Acetic (less palatability)*

*: heterofermented bacteria



PERFOSTIM S/F BENEFIT ON THE FEED

PERFOSTIM improves the **nutritional value** of the diet



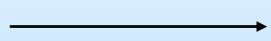
PERFOSTIM S/F TRIAL SET-UP

2nd EXPERIMENT
Feb 2002

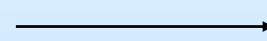
1st EXPERIMENT
Dec 01- Jan 02

LIFE STAGES:

Nauplii



Post-Larvae 15

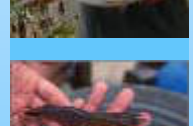


2 month age
shrimp juvenile



3 MONTHS

- Culture volume: tanks 1000l
- Water : filtered 1 μ m, treated 25 ppm Chlorine prior to use



EXPERIMENT 1

PL15 – 2 months

PERFOSTIM® is mixed with formulated feed:

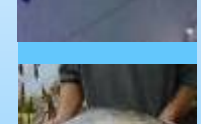
Random block design

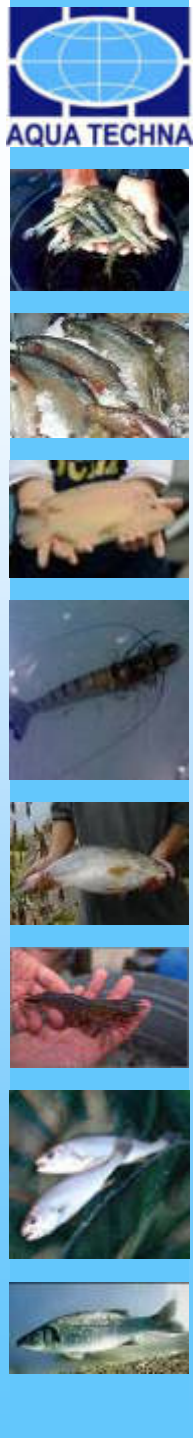
- 3 control tanks
- 3 replicates **PERFOSTIM 10⁶ CFU / g Recommended DOSE**

Rearing density: 450 PL15 / m³ / replicate

Water Quality Parameters monitored daily:

- Temperature = 27°C – 32°C
- Salinity = 10 – 12 ppt
- pH = 7 – 7,5
- DO = 4 – 5 ppm
- NH₃ – N = < 0,1 ppm





EXPERIMENT 1

PERFOSTIM in Shrimp Gut

a) **PERFOSTIM** improve feeding activity
(visual observation)

b) **PERFOSTIM** is found in digestive tract of SHRIMP:

→ *Pediococcus acidilactici* population in
the Shrimp Gut (after 8 weeks of continuous feeding):

$10^4 - 10^5$ CFU/ g (gut)

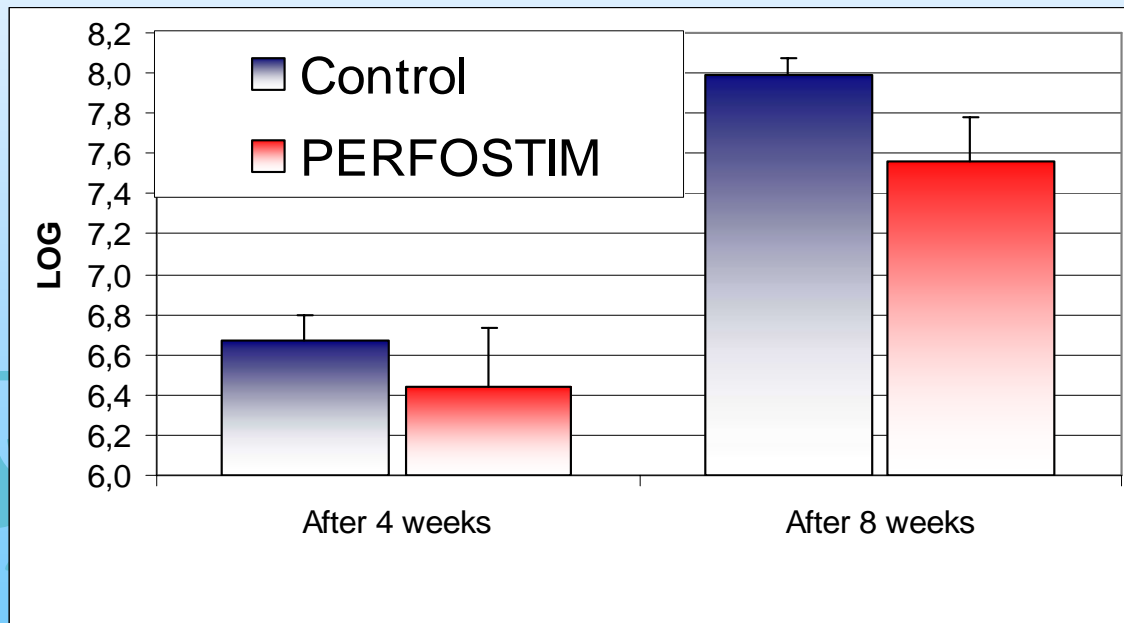
→ The mode of administration of
PERFOSTIM via the feed is efficient

EXPERIMENT 1

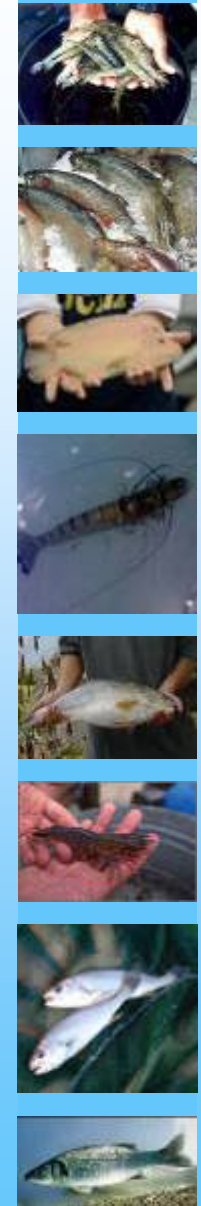
Total VIBRIO in Shrimp Gut

With **PERFOSTIM**, VIBRIO in Shrimp is **lower** after 4 weeks & 8 weeks treatment:

Total Vibrio Population
(Log CFU/ g gut)



Not significantly
Different ($p > 0,05$)



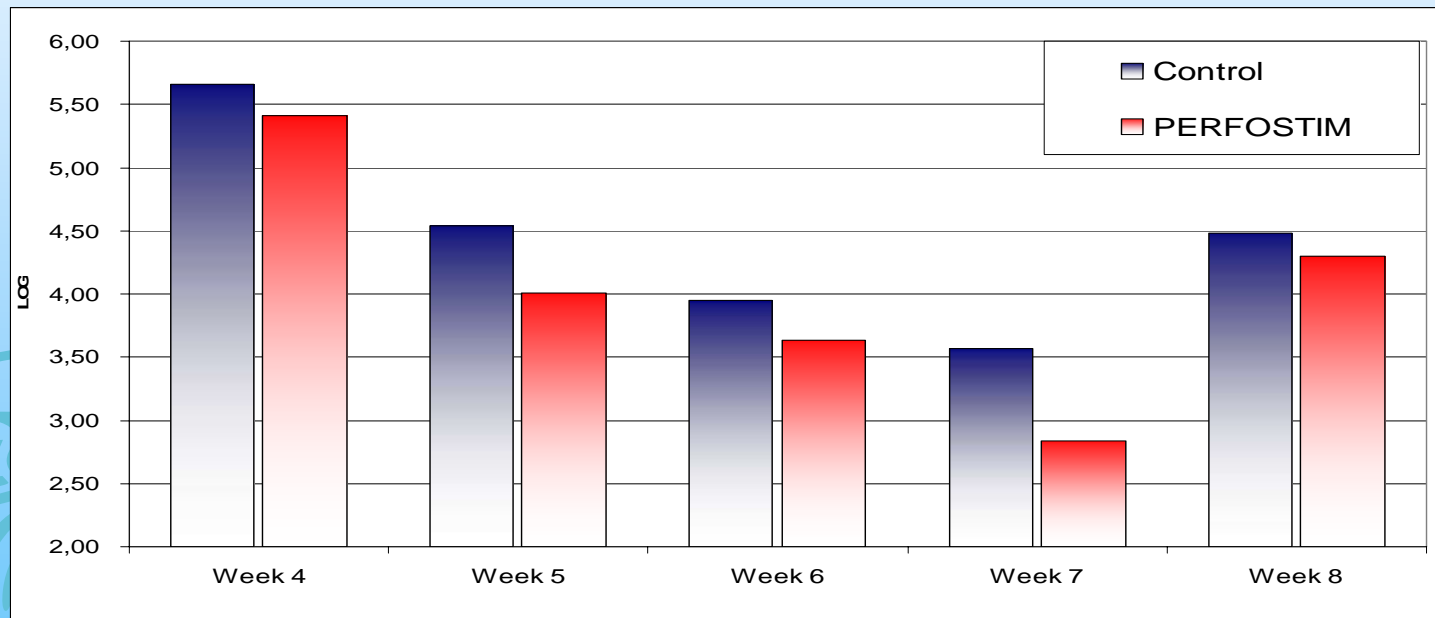
EXPERIMENT 1

a) TOTAL BACTERIA count in water: $10^6 - 10^8$ CFU/ml

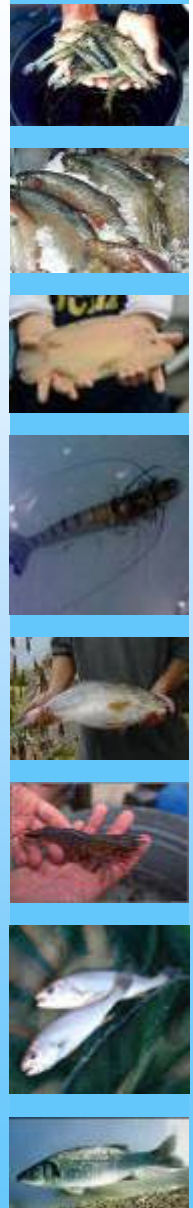
b) TOTAL VIBRIO count in water:

With **PERFOSTIM** Vibrio Count is lower than in Control:

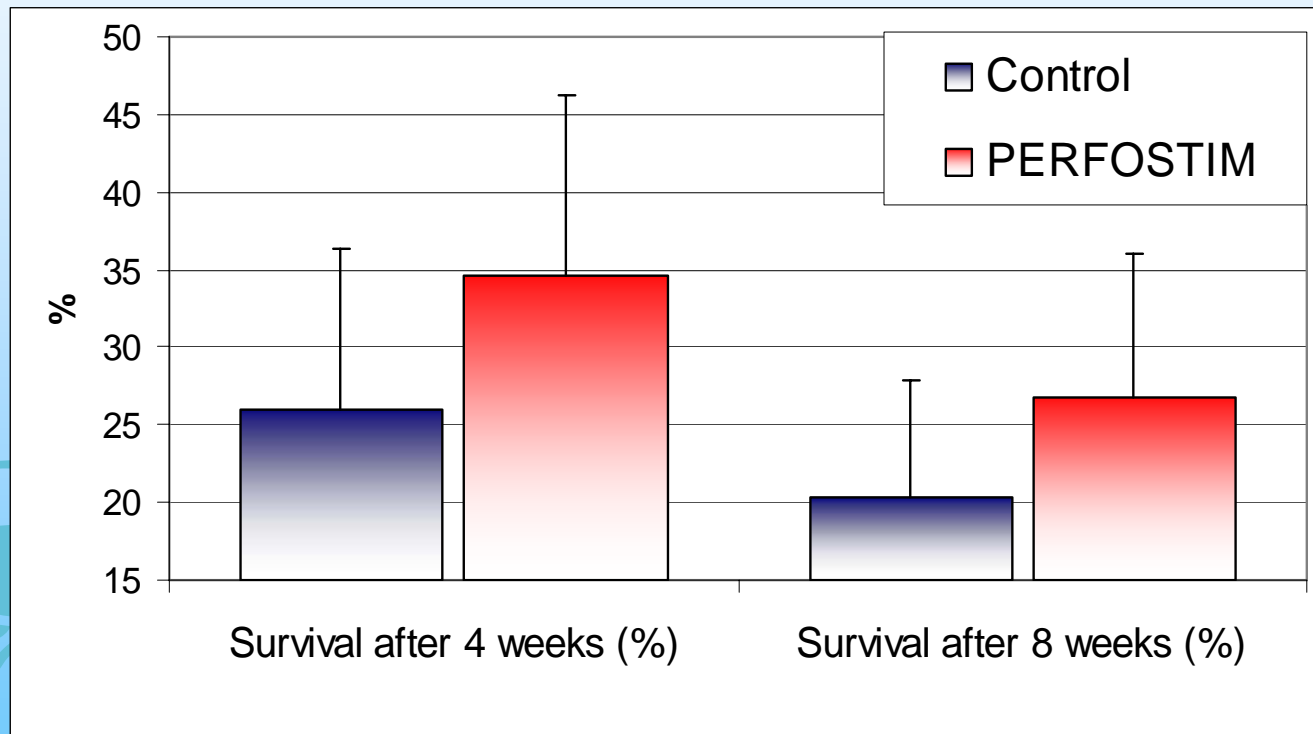
Total Vibrio Population
(Log CFU/ml water)



(Significantly different
($p < 0,05$) for weeks 4 & 7)

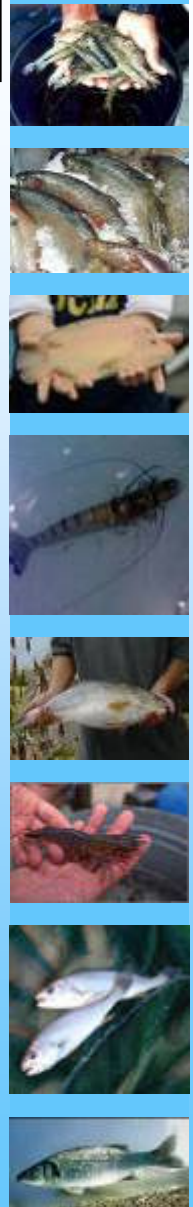


With **PERFOSTIM**, Survival Rate is **higher** after 4 weeks & 8 weeks treatment:



% SURVIVAL

Not significantly Different ($p > 0,05$)



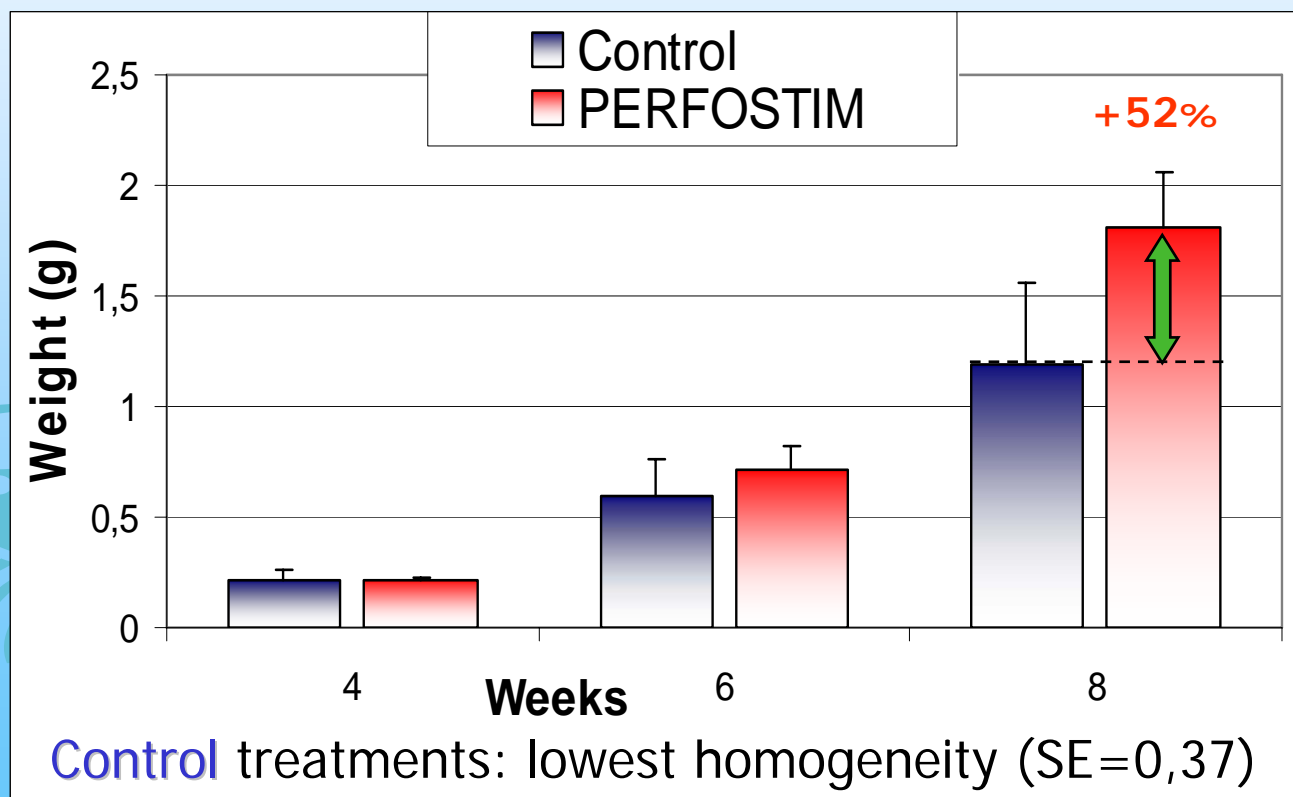


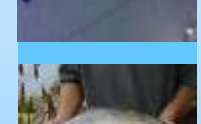
PERFOSTIM S/F RESULT: EFFECTS ON GROWTH

EXPERIMENT 1

WEIGHT (g)

With **PERFOSTIM** weight is significantly higher ($p < 0,05$) after 6 weeks:

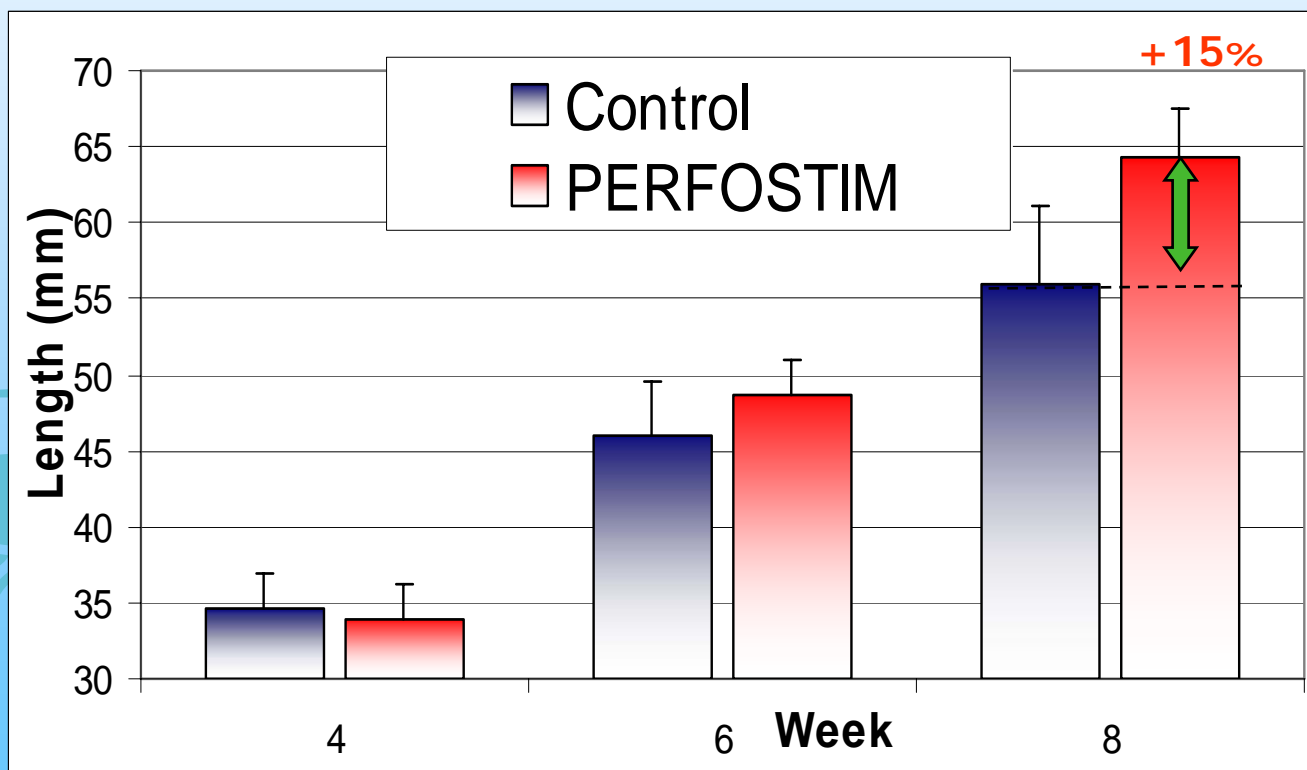


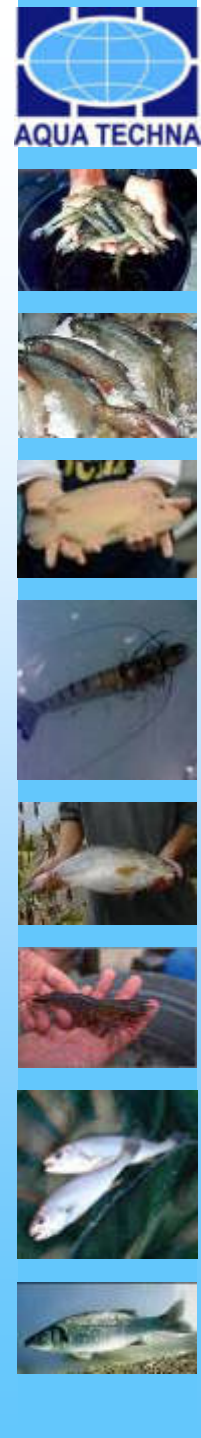


PERFOSTIM S/F RESULT: EFFECTS ON GROWTH

EXPERIMENT 1 LENGTH (mm)

With **PERFOSTIM** length is significantly higher ($p < 0,001$) after 6 weeks:





EXPERIMENT 2

Nauplii - PL15

Mode of Administration of PERFOSTIM :

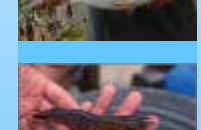
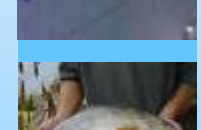
- Nauplii & Zoea stages: directly into culture water
(10^6 CFU/ml)
- Mysis Stage: introduced via Artemia
(10^7 CFU/ ml Artemia suspension)

Set up:



Rearing density: 150 Nau / l / replicate

Water Quality: Same Parameters monitored

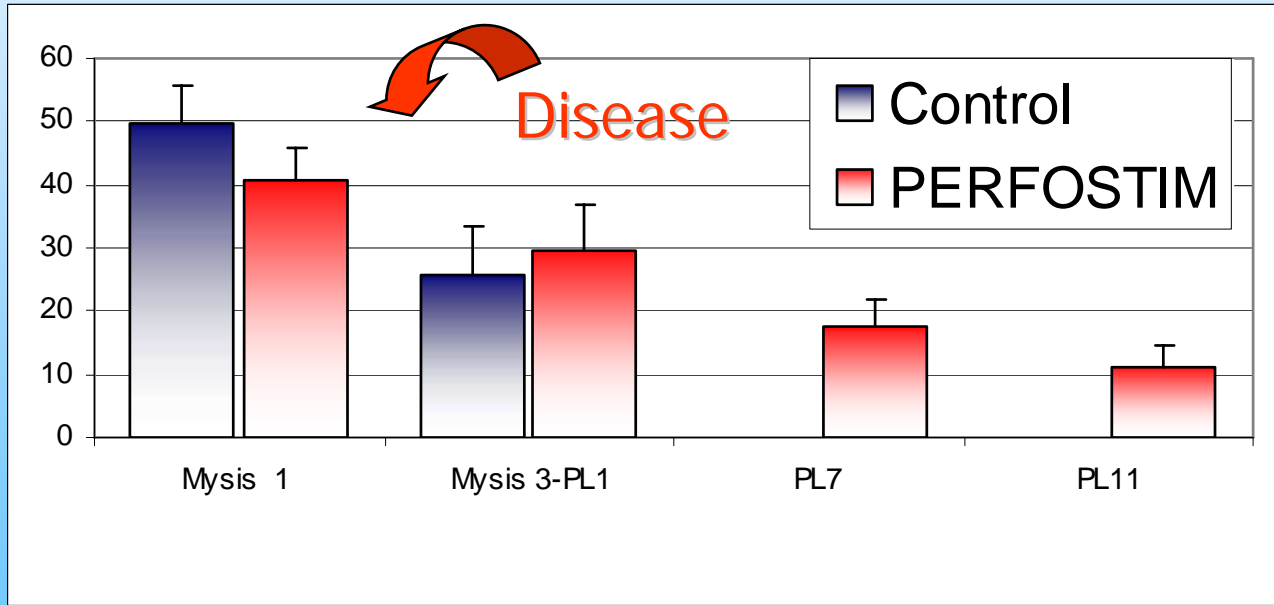


PERFOSTIM S/F RESULTS: EFFECTS ON SURVIVAL

EXPERIMENT 2

a) **Microbiology:** Same trends / Experiment 1

b) **PERFOSTIM** treatment shows an effect vs. this disease



Not Significantly Different
Up to Mysis – PL1 stages ($p > 0,05$)

PERFOSTIM S/F CONCLUSIONS

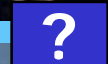
EXPERIMENT 1

&

EXPERIMENT 2

Use of **PERFOSTIM** for Shrimp Aquaculture:

- The Recommended Dose of PERFOSTIM is 10^6 CFU/g → ?
- Effect on Microbiological count, especially *Vibrio spp.*
- Effect on Survival Rate
- Better resistance against bacterial disease
- Significant effect on promoting Growth in Weight & Length





PERFOSTIM S/F WHICH DOSE TO USE?

EXPERIMENT 3

PL15 – 2 months

PERFOSTIM is mixed with formulated feed:

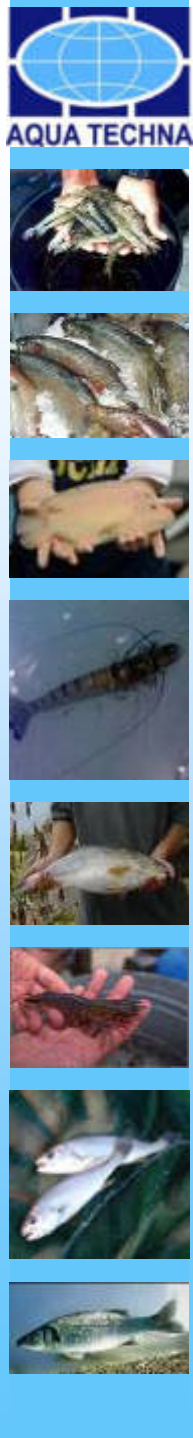
Random
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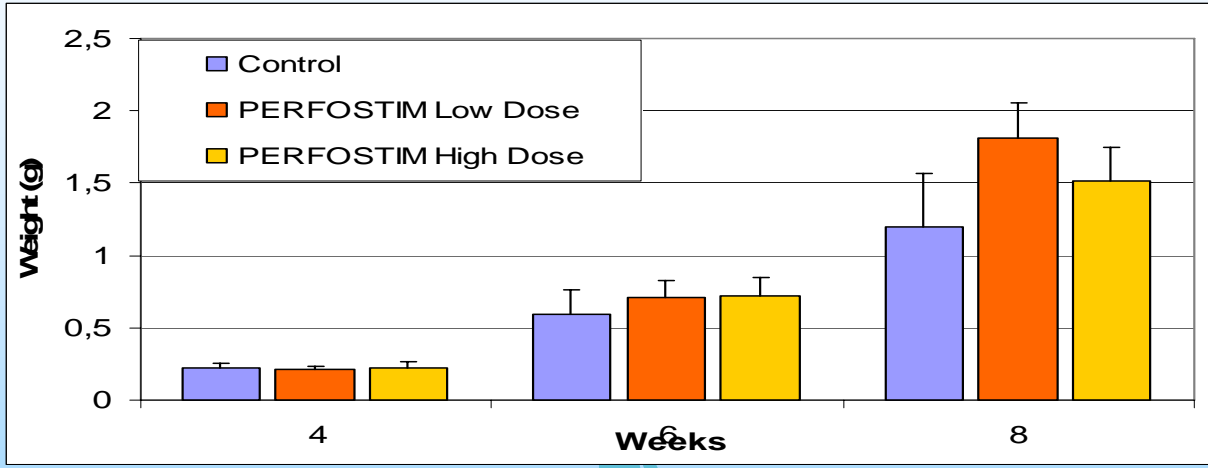


PERFOSTIM S/F

10⁶ CFU/G OF FEED IS THE RECOMMENDED DOSE

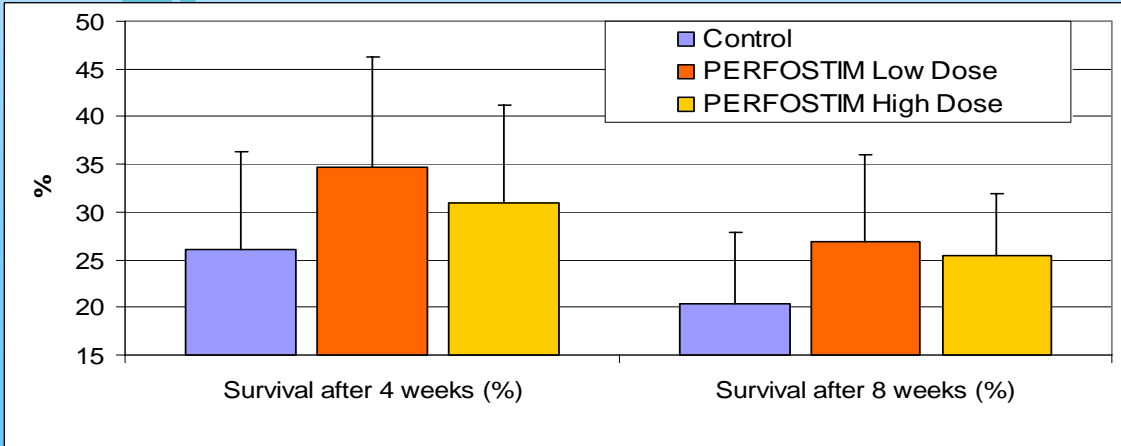
EXPERIMENT 3

Results: Growth & Survival



Growth:
low dose of PERFOSTIM give better results

Survival:
low dose of PERFOSTIM give better results



PERFOSTIM S/F CONCLUSIONS



PERFOSTIM S/F

**IS A SAFE & EFFICIENT PROBIOTIC FOR
APPLICATION IN SHRIMP AQUACULTURE**

