



Aditivos funcionais : ferramentas para a prevenção de resistências antimicrobianas em produção de camarões

Maria Mercè Isern-Subich, DVM

GPM Aqua HEALTH & FARM CARE



20 
anos
FENACAM'24



ANTIMICROBIAL RESISTANCE : THE CONCERN

<https://doi.org/10.1038/s41467-021-25655-8>

OPEN

Twenty-year trends in antimicrobial resistance from aquaculture and fisheries in Asia

Reviews in Aquaculture (2020) 12, 966–986



doi: 10.1111/raq.12367

Daniel S
Thomas

Evaluating antimicrobial resistance in the global shrimp industry

[Mar Drugs](#). 2017 Jun; 15(6): 158.

PMCID: PMC5484108

Kelly Thornber^{1,2} , David Bass^{1,3} and Charles  Published online 2017 Jun 1. doi: [10.3390/md15060158](https://doi.org/10.3390/md15060158)

PMID: [28587172](https://pubmed.ncbi.nlm.nih.gov/28587172/)

<https://doi.org/10.1038/s41467-024-45111-7>

Article

Antimicrobial resistance in a of literature and national ac

Andrea Caputo¹  | Melba G. Bondad-
Bin Hao²  | Patricia Gaunt⁴  | Da
Alejandro Dorado-Garcia⁶ 

Global surveillance of antimicrobial resistance in food animals using priority drugs maps

Received: 21 June 2023

Accepted: 15 January 2024

Cheng Zhao ¹, Yu Wang¹, Ranya Mulchandani ¹ &
Thomas P. Van Boeckel ^{1,2,3} 

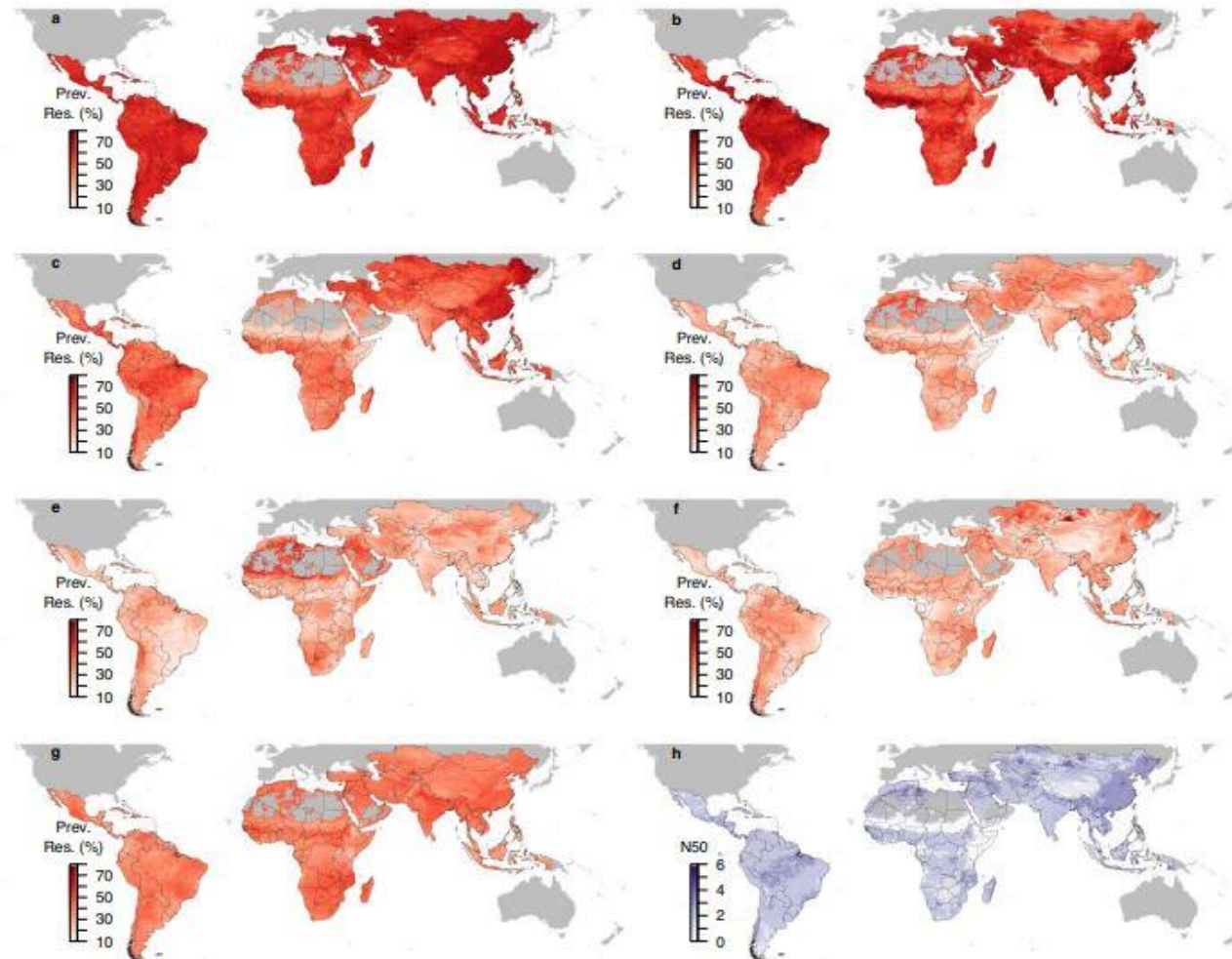
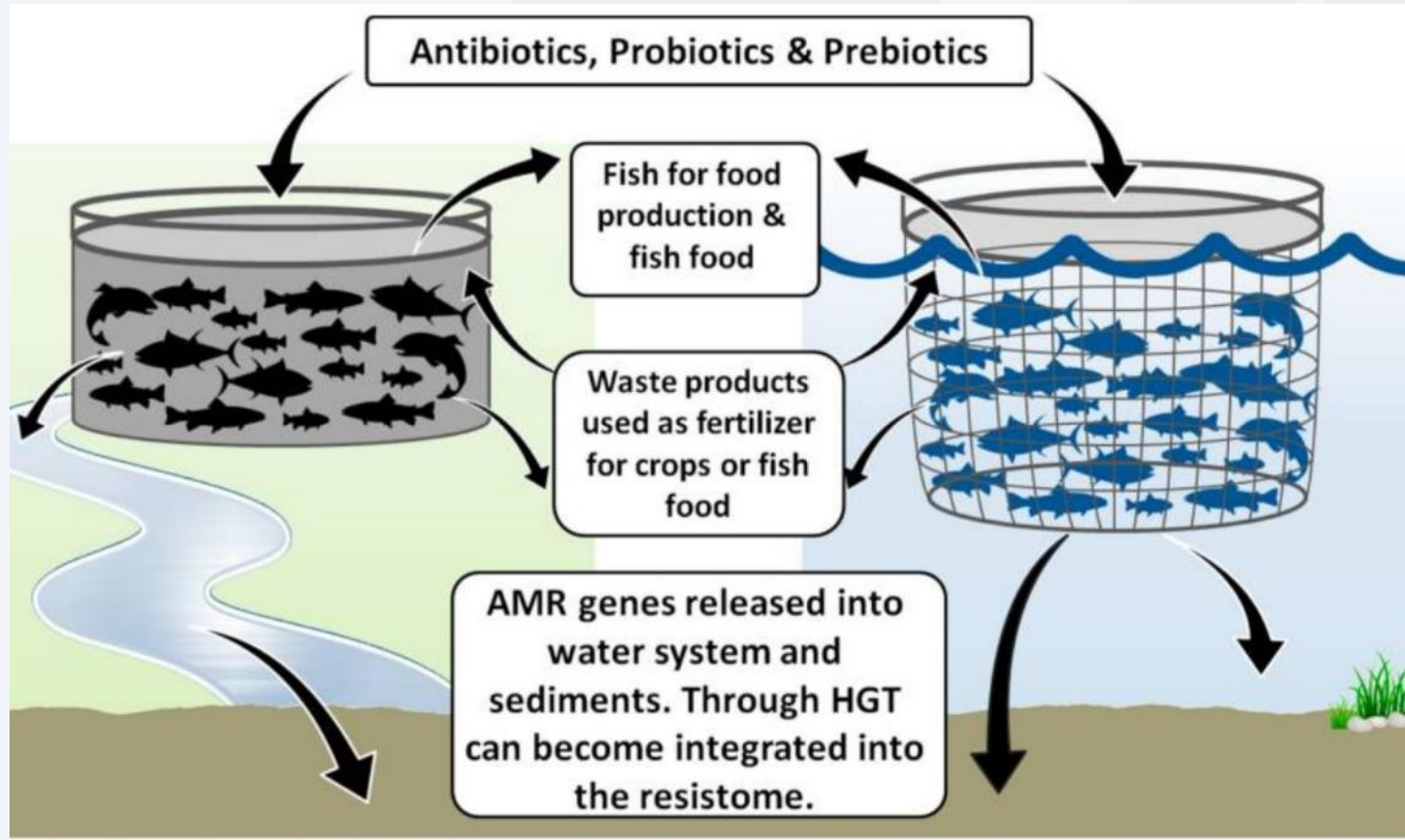


Fig. 2 | Geographic distribution of antimicrobial resistance in *E. coli* in low- and middle-income countries between 2000 and 2019 (median year 2015). Prevalence of resistance (Prev. Res.) for tetracycline **a**, ampicillin **b**, sulfamethoxazole-trimethoprim **c**, chloramphenicol **d**, ciprofloxacin **e**, gentamicin **f**, cefotaxime **g**.

Overall resistance level across antimicrobials measured using the number of antimicrobials (out of 7) with resistance higher than 50% (N50; **h**) (See Supplementary Fig. 7 for maps generated using cutoff values other than 50%). Maps of resistance prevalence for the 7 antimicrobials are available on resistancebank.org.

AQUACULTURE ON THE SPOT



Watts et al, 2017

- ✓ Resistome
- ✓ Anti-Microbial Resistance (AMR) not that much by mutation, but Horizontal Gene Transfer (HGT)
- ✓ 70-80% antibiotics delivered to F&S into the water
- ✓ Global rise of semi and intensive systems
- ✓ Aquaculture farms as GENETIC REACTORS – shaping the future
- ✓ 90% of bacteria originating in seawater are resistant to at least one antibiotic. 20% to five or more (Martinez et al, 2003)
- ✓ Once AMR is obtained, stays in the environment.

antimicrobial resistance aquaculture br

Aproximadament 17.400 resultats (0,08 s)

Antimicrob
national a
A Caputo, M
... Our literati
place ... anti
☆ Desa 9%

Antimicrob
Brazil: a s
ED Nascimer
... Studies or
reflect the foc
☆ Desa 9%

Multidrug-resistant *Vibrio* associated with an estuary affected by shrimp

Antimicrobial Resistance in Water in Latin America and the Caribbean: Available Research and Gaps

Andrea I. Moreno-Switt^{1,2}, Dacil Rivera^{1,3}, Marisa L. Caipo⁴, David C. Nowell⁴ and Aiko D. Adell^{2,5*}

na Silva dos Fernandes Vie

za, Ceará, Brazil

ter Hull, s/n, Campus do Pici, Bloco 827, 60021-5

Aquaculture in Brazil: past, present and future

Wagner C. Valenti^{a,*}, Helenice P. Barros^b, Patricia Moraes-Valenti^a, Guilherme W. Bueno^a, Ronaldo O. Cavalli^c

^a São Paulo State University - UNESP, Aquaculture Center – CAUNESP, Via Paulo Donato Castellane s/n, 14884-900, Jaboticabal, SP, Brazil

^b Fisheries Institute/APTA/SAA, Av. Abelardo Menezes, s/n – P.O. Box 1025, 15.025-970, São José do Rio Preto, SP, Brazil

^c Federal University of Rio Grande – FURG, Institute of Oceanography, Marine Aquaculture Station, Rua do Hotel, 2, 96210-030, Rio Grande, RS, Brazil

Check for updates

PILARS FOR HEALTH PROMOTION



HEALTH

Shrimp Health

- ✓ Immune response
- ✓ Oxidative stress control
- ✓ Tissues functionality



FARM CARE

Environmental quality

- ✓ Physical conditions
- ✓ Chemical conditions
- ✓ Ecosystem

Pathogens

- ✓ Quantity
- ✓ Virulence
- ✓ Pathogenicity

WHY HEALTH-PROMOTING FEED ADDITIVES?

**WIDE
SPECTRUM**

- Pathogen inhibitory activities
- Key Tissue Support
- Immunocompetence
- Easy to deliver
- Environmentally friendly



GROWTH + SURVIVAL = EFFICIENCY + PROFITABILITY + SUSTAINABILITY



DIRECT ANTIMICROBIAL EFFECTS

REDUCING BACTERIA & QUORUM SENSING INHIBITION

% of extract Sanacore® GM

1.00000
0.50000
0.25000
0.12500
0.06250
0.03125
0.01563
0.00781
0.00391
0.00195
0.00098
0.00049
0.00024
0.00012
0.00006

MIC

50%
QS-act

Anti-bacterial
effect

QS Inhibition

Vibrio harveyi BB170

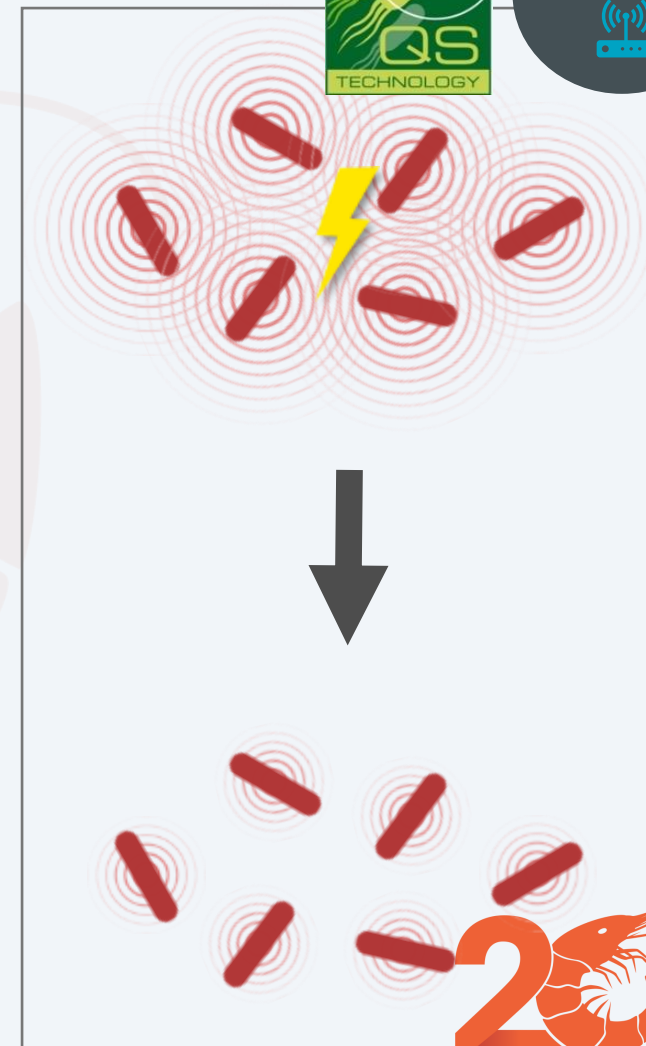
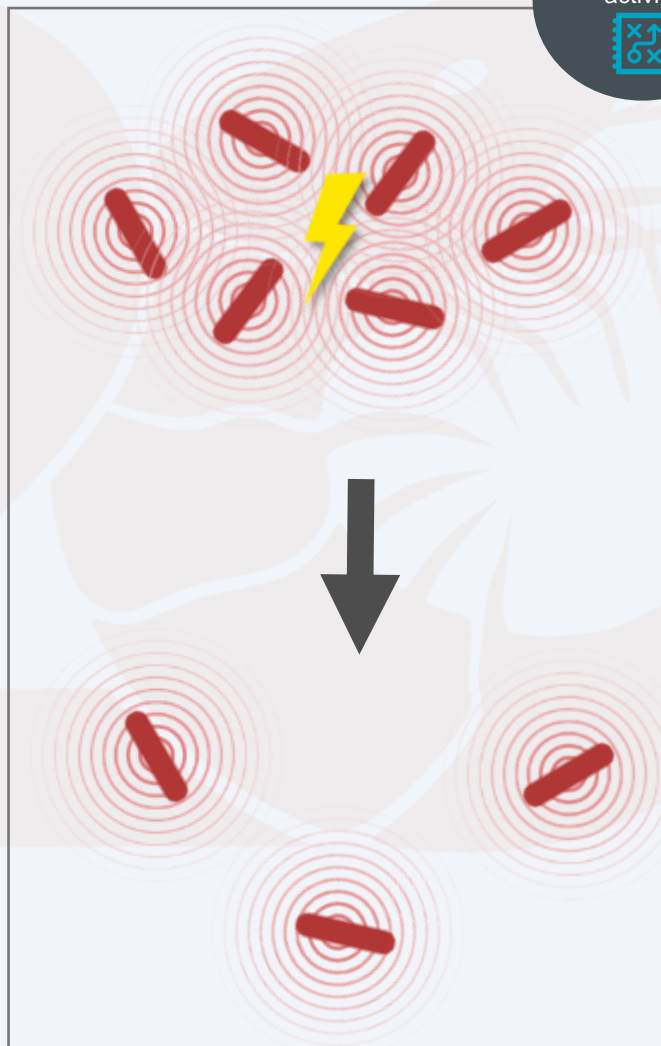
(QS system, AI-2)

ADISSEO
A Bluestar Company

Antibacterial
activity

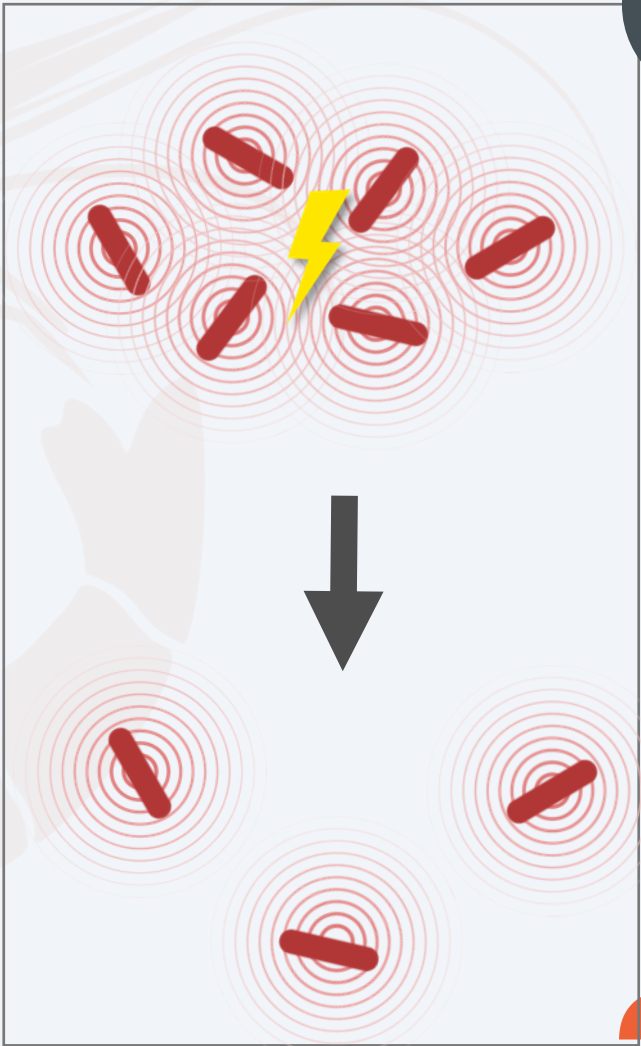
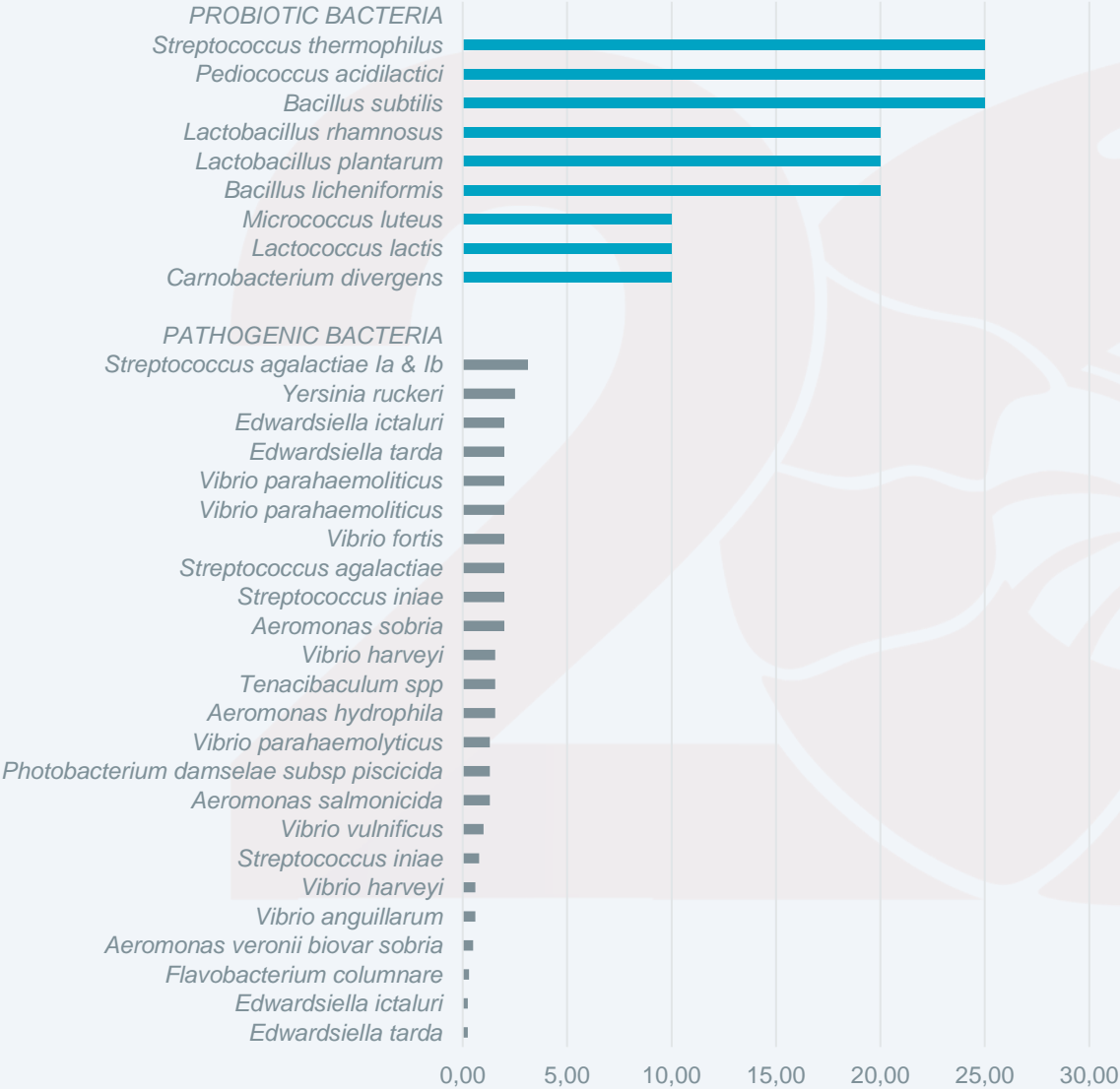


Quorum
Quenching

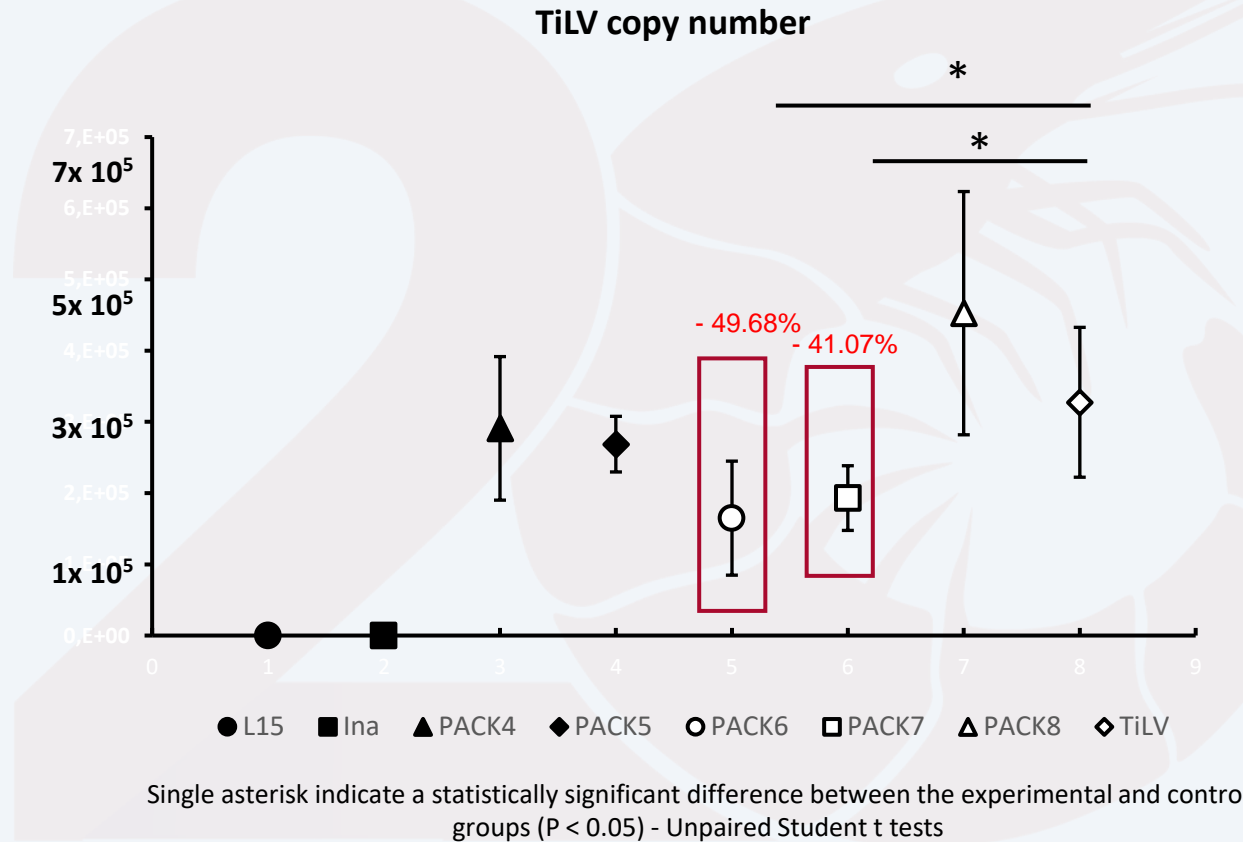


25
anos
FENACAM'24

SELECTIVE ANTIBACTERIAL ACTIVITY



DIRECT VIRUCIDAL EFFECT

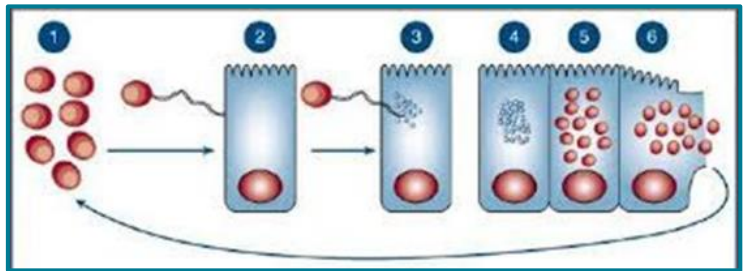
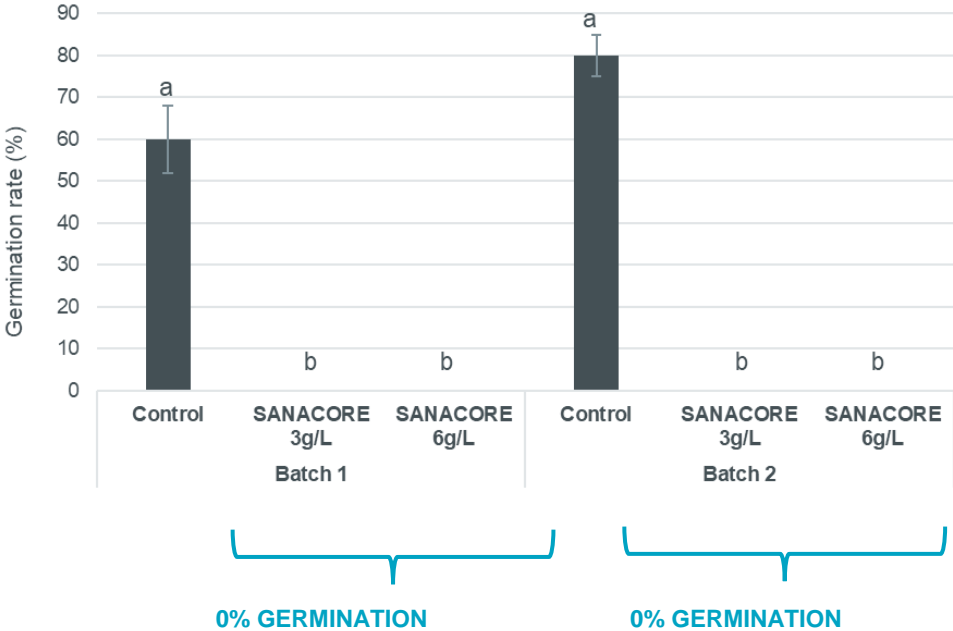


Direct virucidal effect against TiLV

ANTIPARASITIC ACTIVITY: ANTI EHP



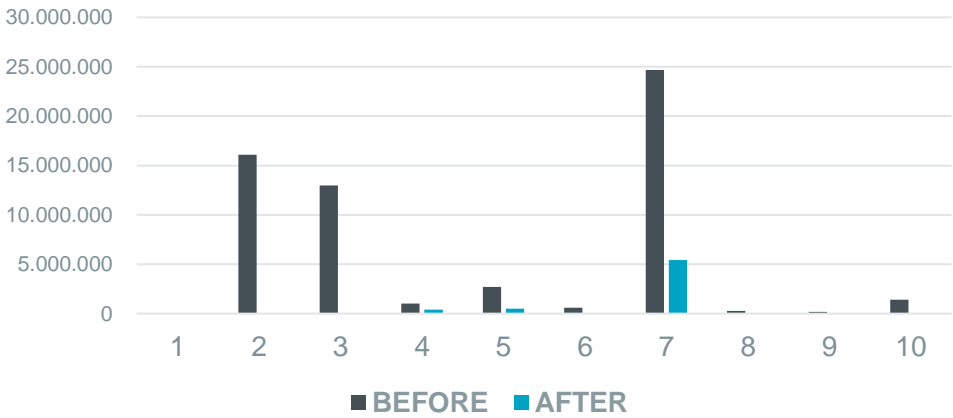
TESTS IN VITRO



FARM APPLICATION

Farm	Days of application	Initial EHP copies	Copies after SNGM	EHP inhibition(%)
1	11 days	2.14×10^1	2.05×10^1	- 4.2 %
2	11 days	1.61×10^7	2.11×10^4	- 99.8 %
3	11 days	1.30×10^7	5.41×10^4	- 99.5 %
4	12 days	1.03×10^6	4.11×10^5	- 60.1 %
5	10 days	2.69×10^6	5.17×10^5	- 80.7 %
6	6 days	5.92×10^5	0	- 100 %
7	6 days	2.47×10^7	5.43×10^6	- 78 %
8	6 days	2.66×10^5	4.50×10^3	- 98.3 %
9	5 days	1.68×10^5	1.54×10^4	- 90.8 %
10	9 days	1.40×10^6	7.56×10^3	- 99.4 %

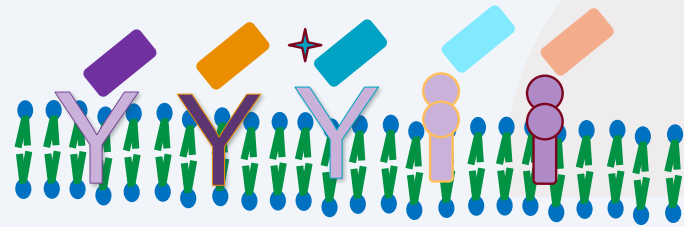
PCR analyses





SHRIMP HEALTH SUPPORT

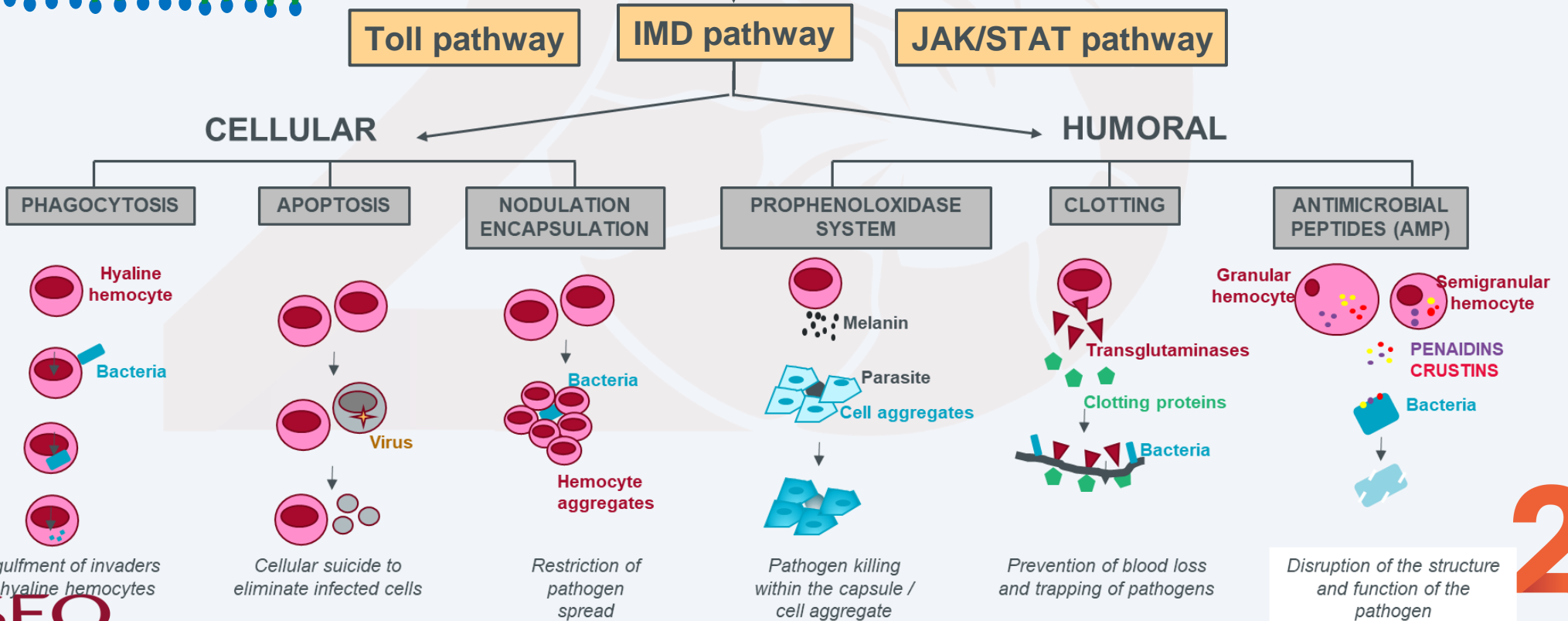
REINFORCING SHRIMP IMMUNE SYSTEM



PAMPs (Pathogen-associated molecular patterns): Virus, Gram+/- bacteria, Fungi

PRRs (Pattern-recognition receptors): Lectins, Scavenger receptors, LPS, PGN binding proteins..etc

Innate immune organs: Hemocyte, hepatopancreas, intestine, stomach, gill



Engulfment of invaders by hyaline hemocytes

Cellular suicide to eliminate infected cells

Restriction of pathogen spread

Pathogen killing within the capsule / cell aggregate

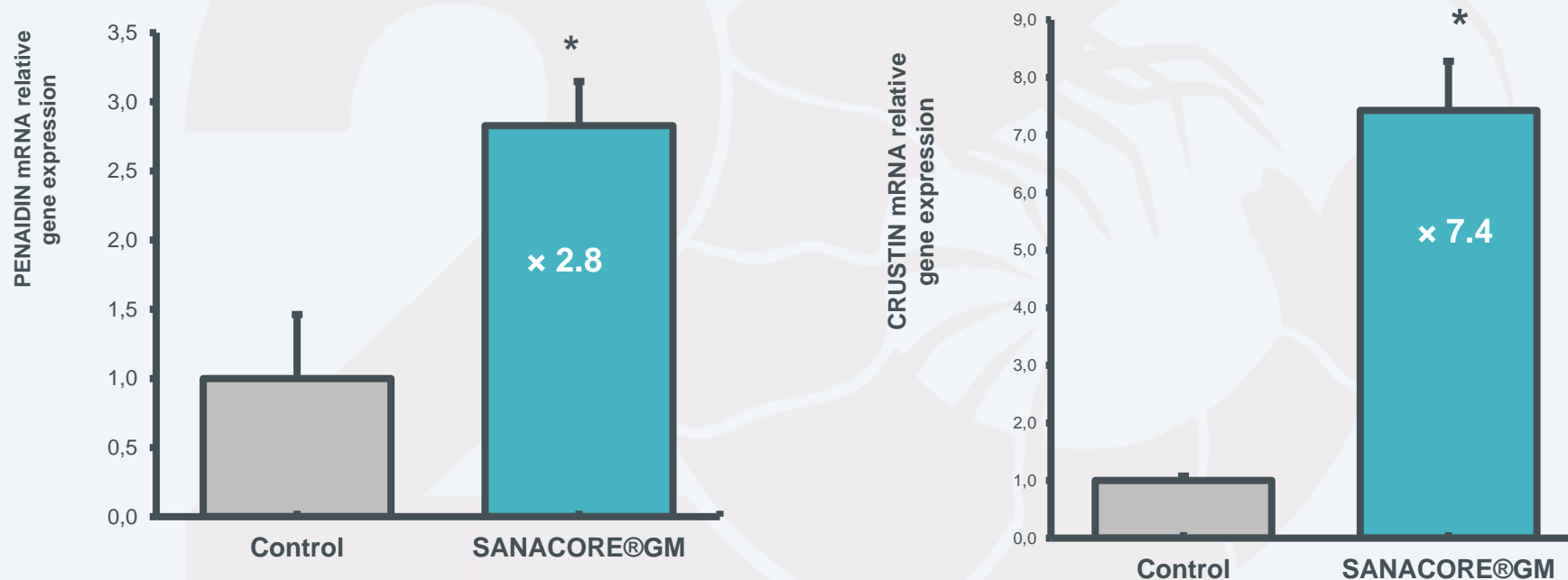
Prevention of blood loss and trapping of pathogens

Disruption of the structure and function of the pathogen

Muñoz et al. 2002; Jiravanichpaisal et al. 2006; Ji et al. 2009; Liu et al. 2020

BOOSTING HUMORAL DEFENSES : AMP

Gene expression measured at hepatopancreas showed increased expression of antimicrobial peptides directly involved in pathogen clearance

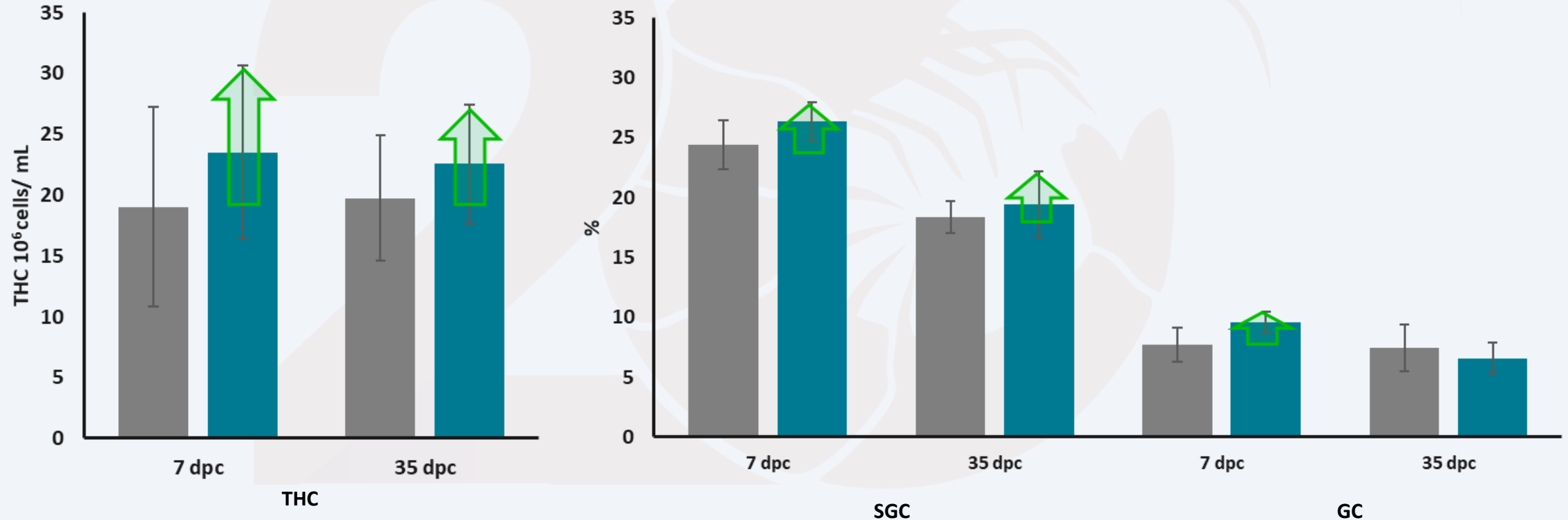


Boost of humoral immune system increases shrimp resistance to disease and helps fighting any infection

(*) Denotes statistical significance

BOOSTING CELLULAR DEFENSES : THC

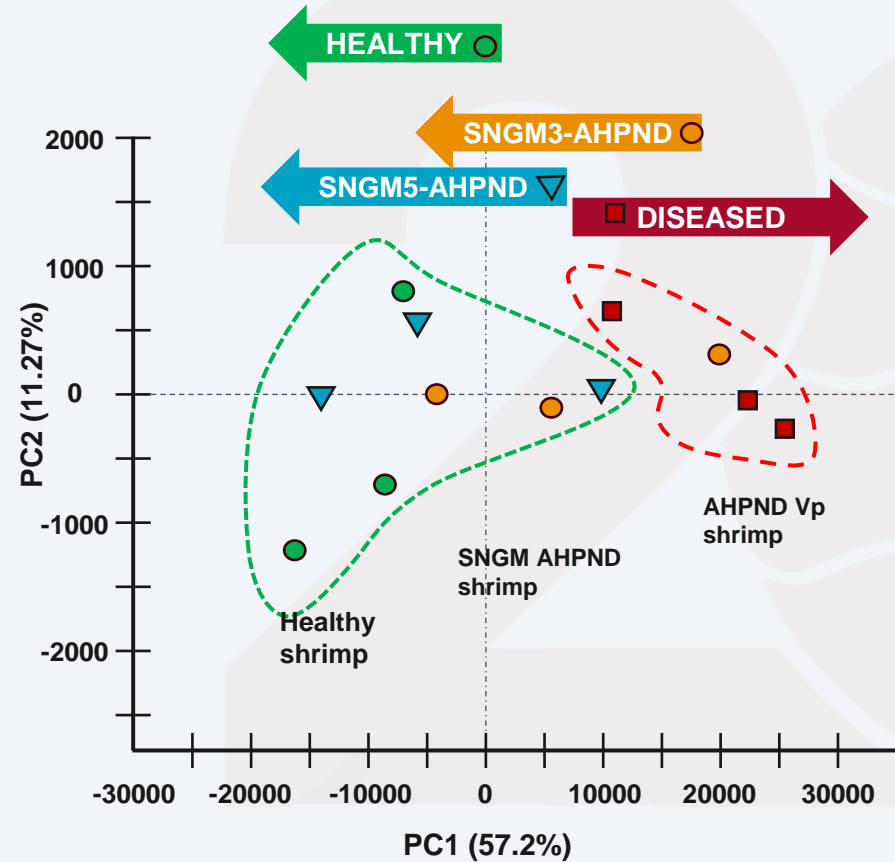
Cell counts from hemolymph show increased number of available cells after superinfection EHP + vibrio spp



Boost of cellular immune system increases shrimp response to the infections and reduces disease outcome

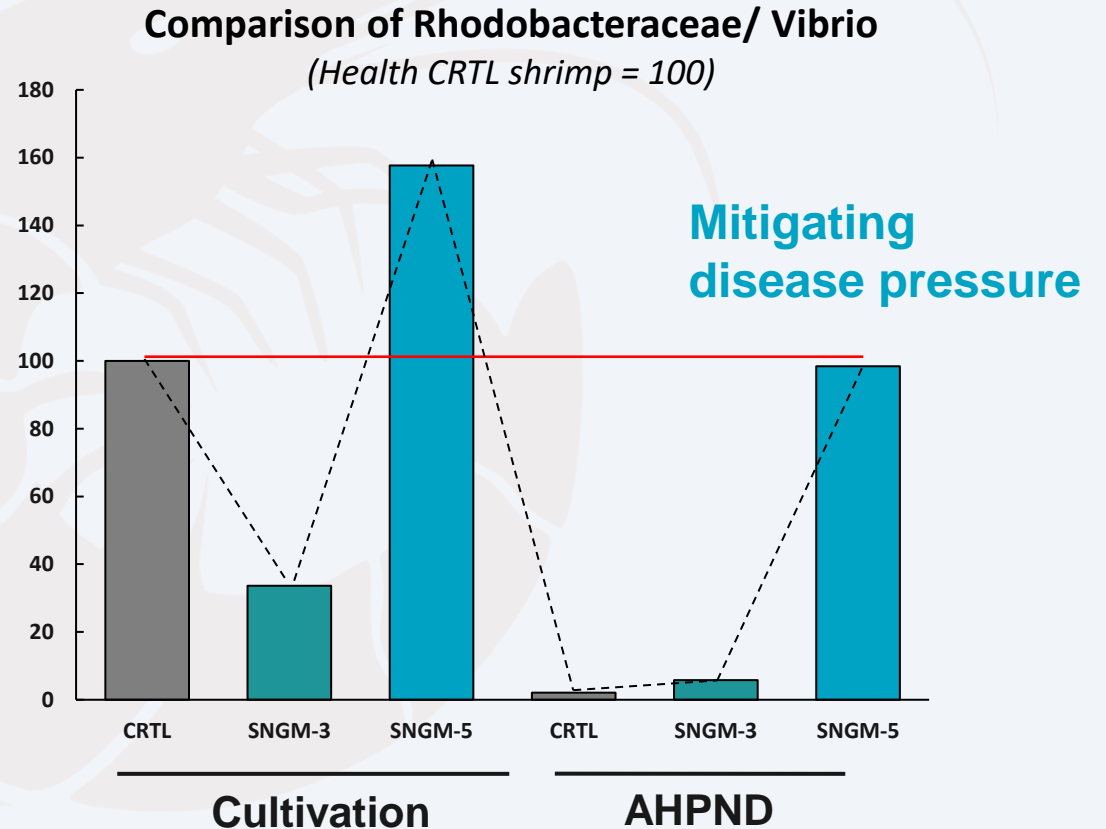
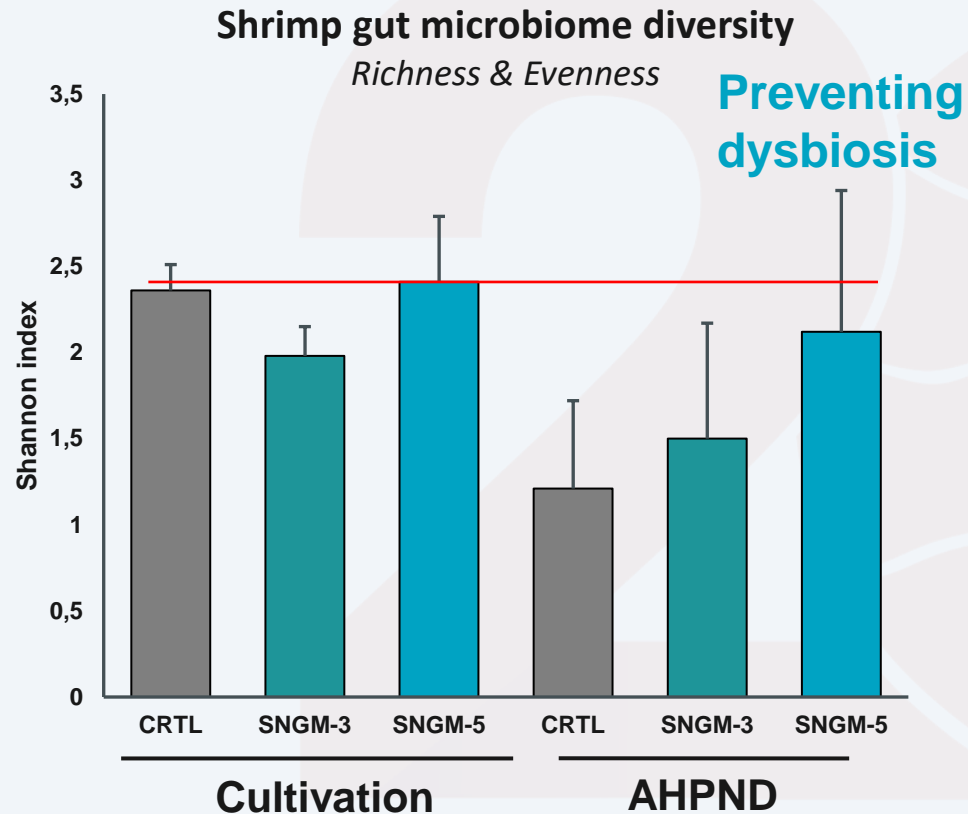
(*) Denotes statistical significance

BOOSTING GUT MICROBIOME RESILIENCE



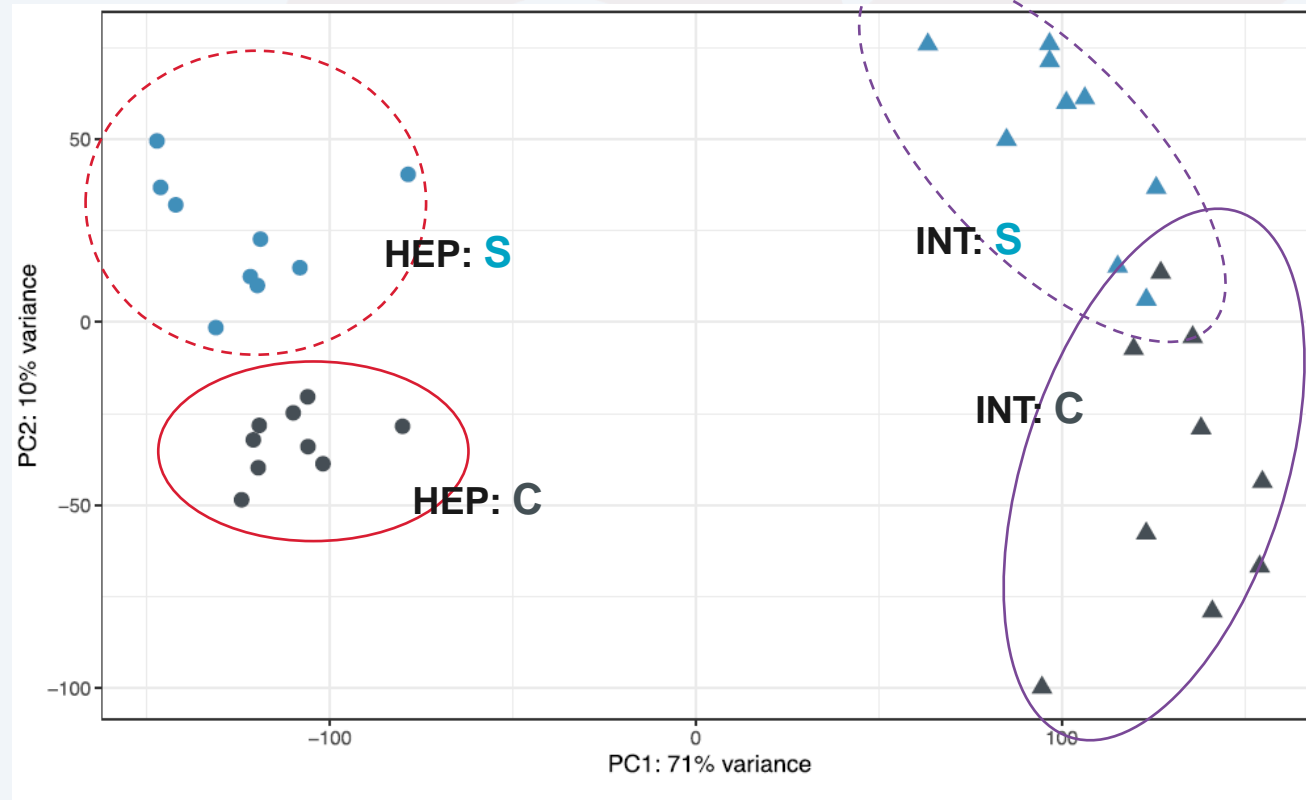
- Minimizing gut bacterial dysbiosis under infection
- Importance of dose under disease outbreak conditions

INDUCING A HIGHER MICROBIAL DIVERSITY AND A HEALTHY MICROBIOME COMMUNITY



High microbial diversity and abundance make an ecosystem that benefits from disease resistance, supporting beneficial over opportunistic bacteria

STATISTICS REVEALS THE TISSUE SPECIFIC RESPONSES

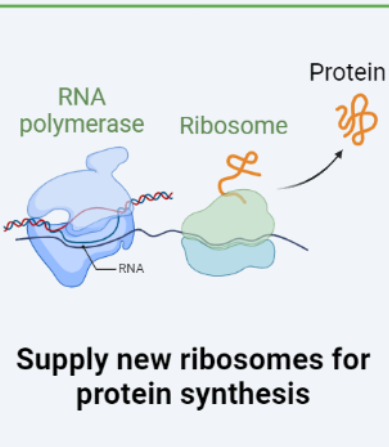


Sanacore® GM regulates gene expression with clear effects in Hepatopancreas (HEP and intestine – mid gut (INT) as observed in by PCA.

PCA: PRINCIPAL COMPONENT ANALYSIS

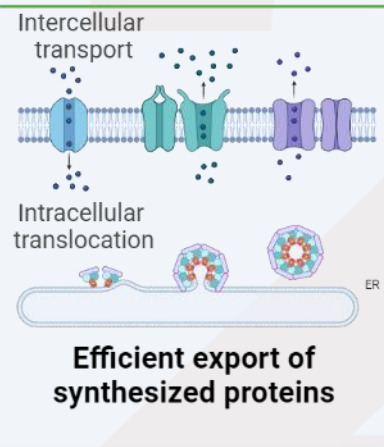
SANACORE® GM ESTABLISHED THE FOUNDATION FOR CELLULAR PROCESS IN THE HEPATOPANCREAS

RNA polymerase &
Ribosome biogenesis



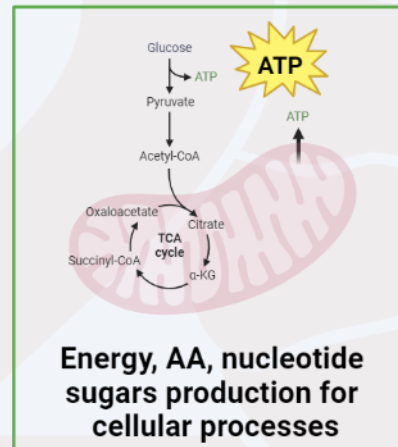
**ESTABLISHED
CELLULAR FOUNDATION**

Membrane protein complex
synthesis



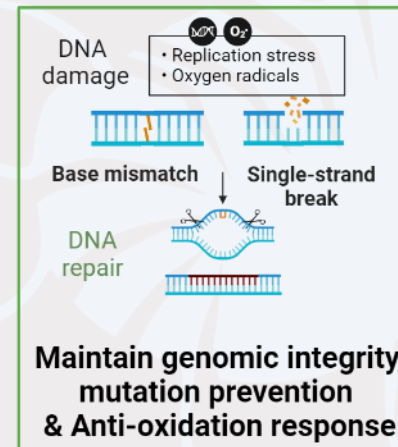
**FACILITATED PROTEIN
TRANSPORTATION**

Glycolysis &
Nucleotide metabolism



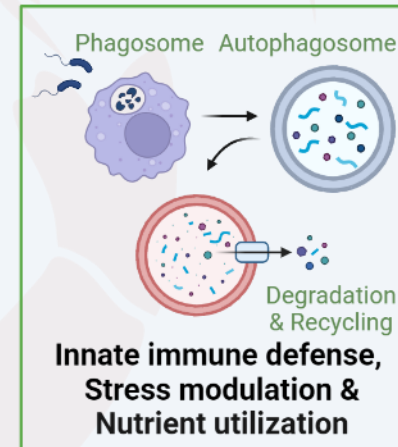
**STIMULATED CELL
METABOLISM**

DNA mismatch repair and
mutation avoidance pathway



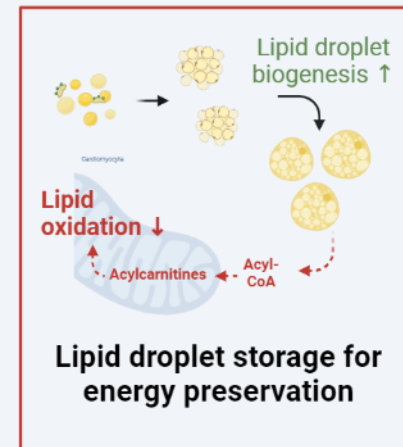
**DNA REPLICATE
STABILIZATION**

Phagocytosis & Autophagy
maturation



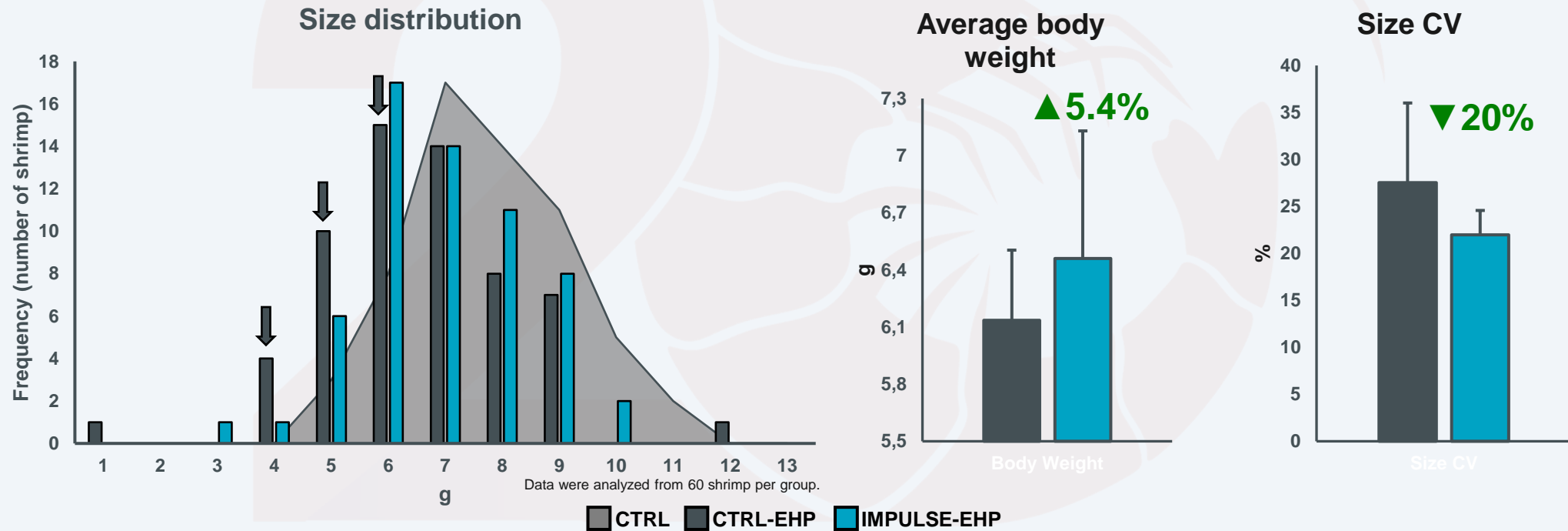
IMMUNOCOMPETENCE

Attenuation of
fatty acid degradation



**LIPID METABOLISM
ADJUSTMENT**

IMPROVED GROWTH & SIZE DISTRIBUTION UNDER DISEASE PRESSURE

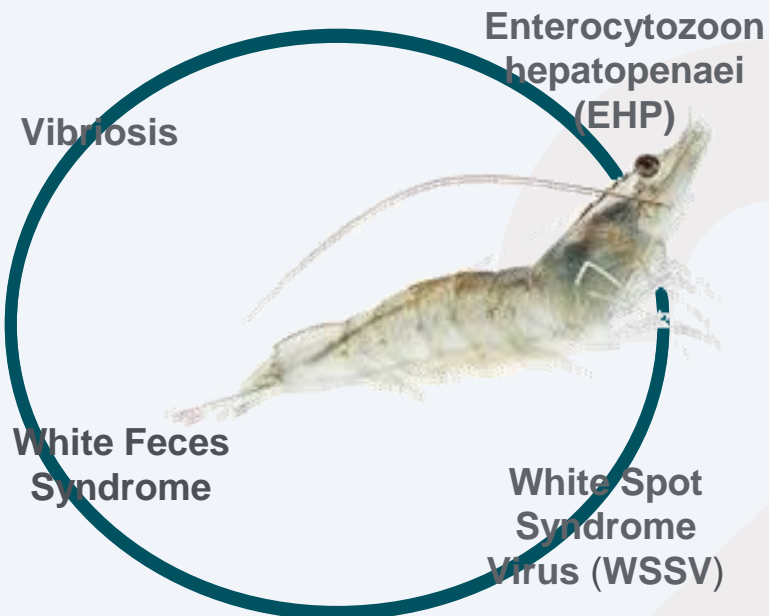


- *IMPULSE* shows more normal distribution curves centered around 6-7g
- The control-EHP group shows a broader size distribution, with peaks between 4-6g



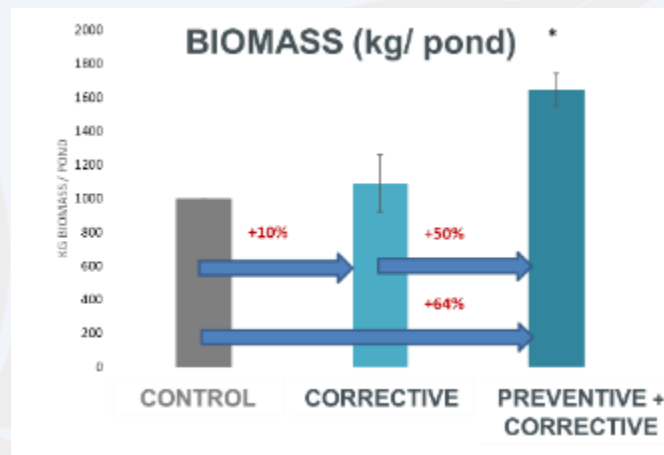
PROFITS & SUSTAINABILITY

Feed efficiency
Farm productivity

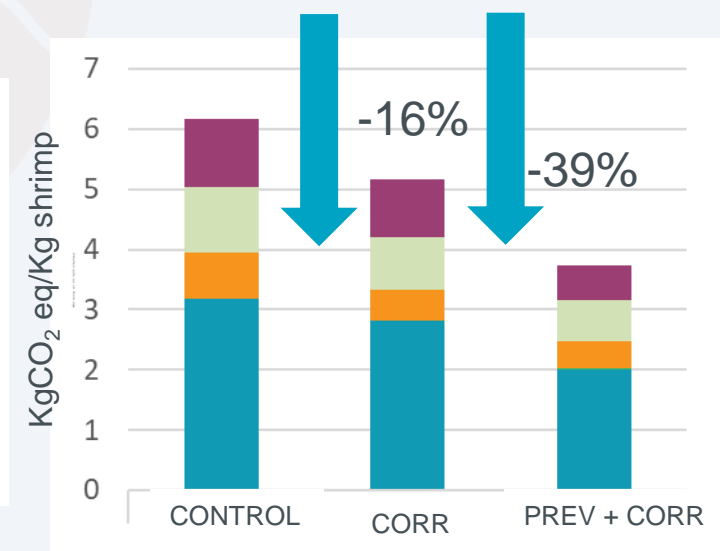
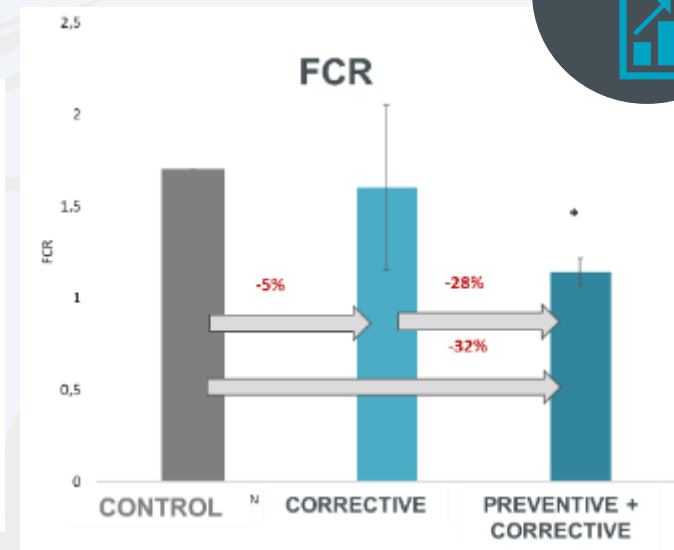
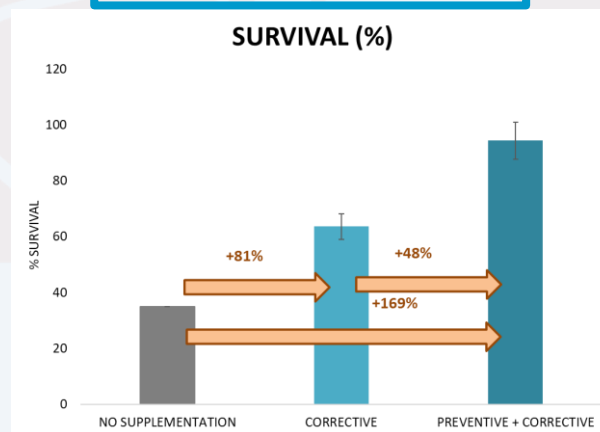


Lampung, Indonesia
100 shrimp/m²
High replication, high disease pressure
Corrective vs Prev + corrective application

SANACORE® GM was able to minimize the impact of disease increasing final biomass as well as feed efficiency. LCA analyses show how SNGM helps increasing farming sustainability.



ROI corrective: 18
ROI prev + corr: 40



SANACORE® GM EN “BLACK ZONE”



Banyuwangi, East Java
Density : 150 shrimp/m2

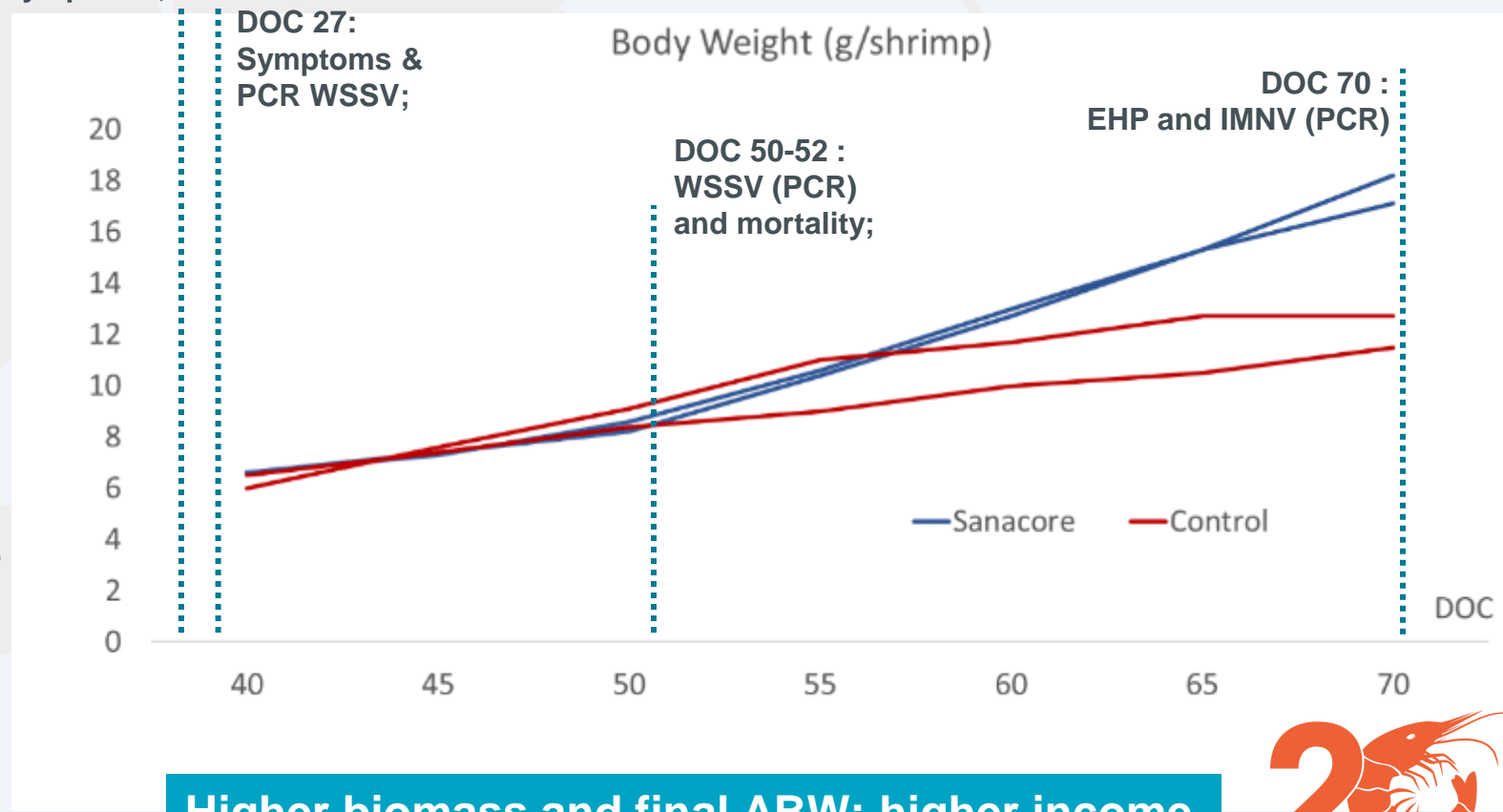
Enterocytozoon
hepatopenaei
(EHP)

Early DOC :
Detected AHPND by symptoms;

AHPND

Infectious Myo
Necrosis Virus (IMNV)

**White Spot Syndrome
Virus (WSSV)



Higher biomass and final ABW: higher income

HEALTH MONITORING AND ANTICIPATED REACTION

Feed efficiency
Farm productivity

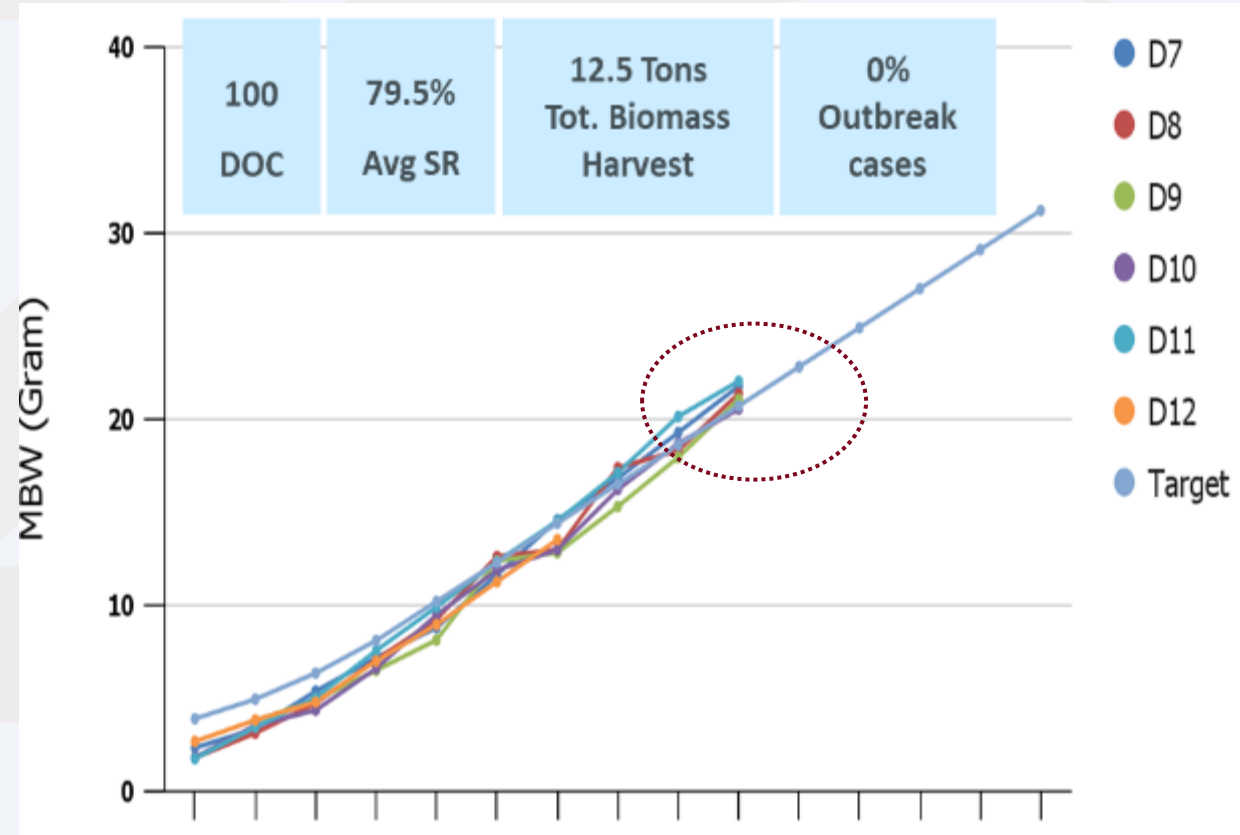


Subang, West Java, Indonesia
Density : 100 shrimp/m²

Enterocytozoon
hepatopenaei (EHP)



**White Spot Syndrome
Virus (WSSV)



- ✓ Good Growth ---
- ✓ Higher than target
- ✓ Zero Disease Outbreak
- ✓ High SR

INCREASED PRODUCTIVITY

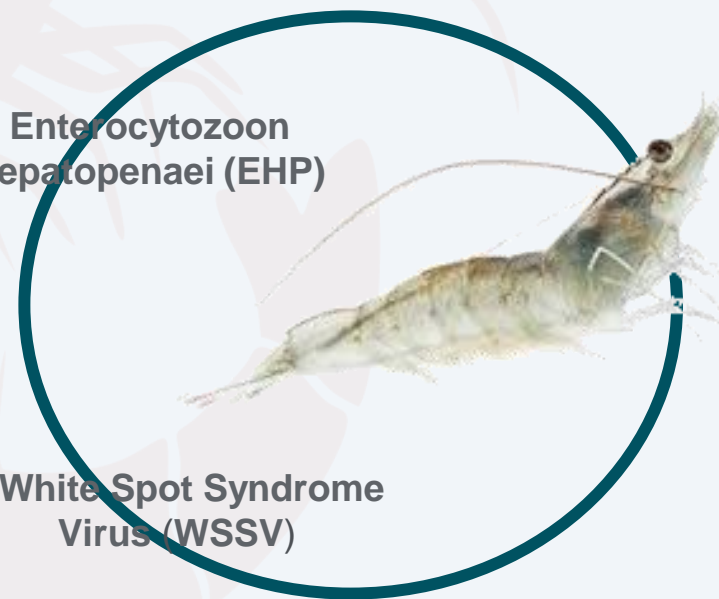


BIOMASS HARVEST RESULT			
No. Pond	Previous crop (kg)	After using Functional Feed Additive (kg)	Improv. (%)
Pond 1	5810	6438	10
Pond 2	2405	5054	110
Pond 3	1698	5954	250
Pond 4	2039	3923	92
Pond 5	780	1449	85
Pond 6	340	4342	1176
Pond 7	298	4246	1322
Min			11
Max			1323

Indokom, Lampung, Indonesia
Density : 100 shrimp/m2

Enterocytozoon
hepatopenaei (EHP)

**White Spot Syndrome
Virus (WSSV)



ENHANCING SHRIMP DISEASE RESISTANCE & RECOVERY

- Enhancing Shrimp immune system
- Supporting gut microbiome resilience
- Boosting Hepatopancreas & intestine functioning
- **Growth, profits, sustainability**



SAÚDE É O CORAÇÃO DO NOSSO NEGÓCIO



CONHEÇA A LINHA AQUA DA ADISSEO



RESTRINJA o uso inadequado de antibióticos e produtos químicos



REDUZA perdas por doenças subclínicas e mortalidades



IMPULSIONE eficiência alimentar e a produtividade da fazenda



AUMENTE a sustentabilidade econômica e ambiental

ADISSEO
A Bluestar Company

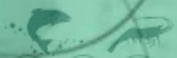




ADISSEO

A Bluestar Company

Copyright © 2020 by Adisseo. All rights reserved. This presentation or any portion thereof may not be reproduced or used in any manner whatsoever without the express written permission of Adisseo





Copyright © 2020 by Adisseo. All rights reserved. This presentation or any portion thereof may not be reproduced or used in any manner whatsoever without the express written permission of Adisseo

