



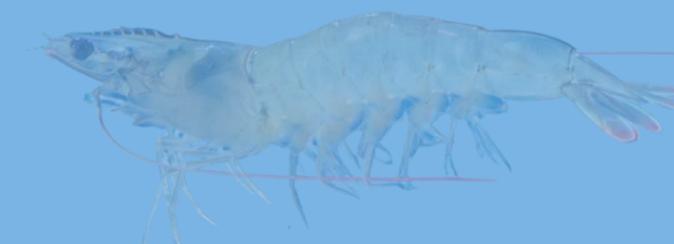
XVIII FEIRA NACIONAL DO CAMARÃO FENACAM'22



Sistema Simbiótico: Benefícios e desafios para implementação na Carcinicultura



Luis Otavio Brito da Silva
Engenheiro de Pesca
Dr. Recursos Pesqueiros e Aquicultura





Conceito de simbiótico

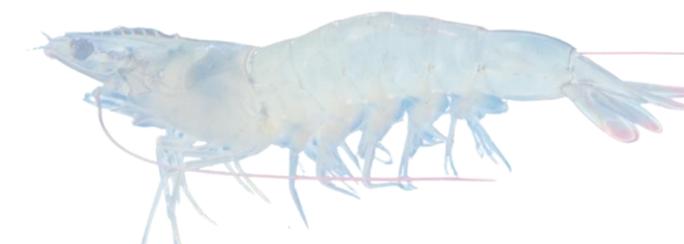
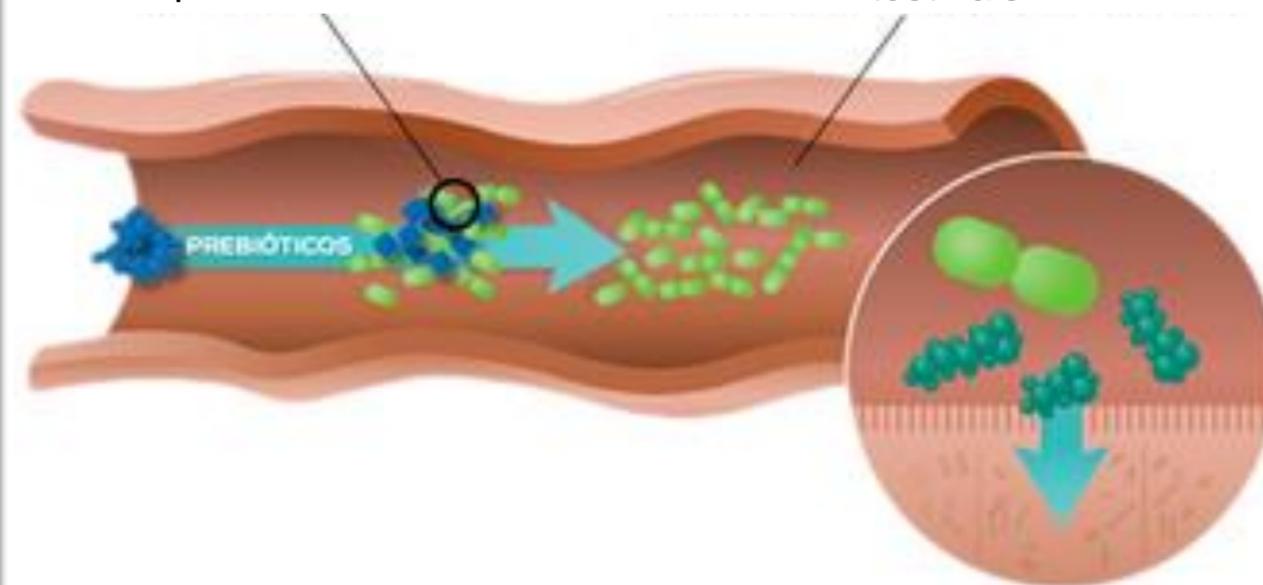


Prebiótico colonizado por microorganismos probióticos através da fermentação ou respiração microbiana



Bactérias benéficas que se nutrem de prebióticos

Promovem o crescimento das bactérias benéficas e são uma fonte de energia para as células intestinais



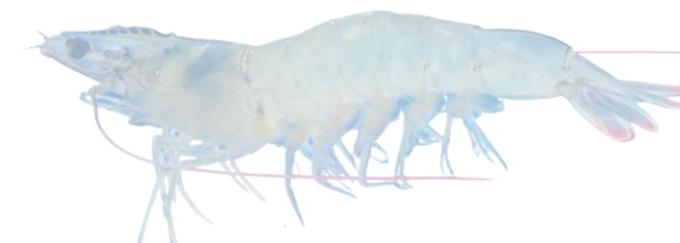
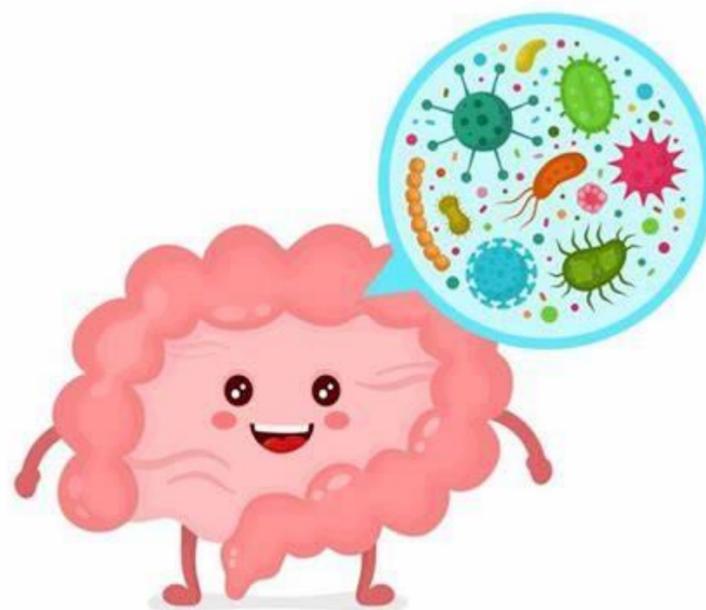


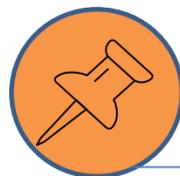
Microbiota intestinal



Conjunto de microrganismos (comensais, simbióticos, patógenos etc.) que coloniza um hábitat específico.

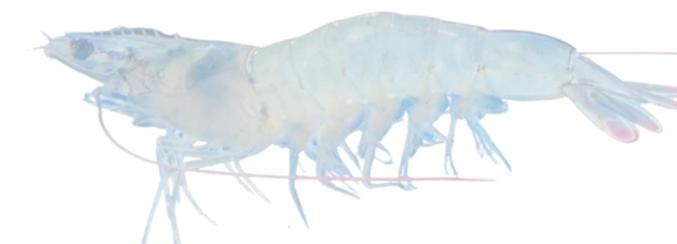
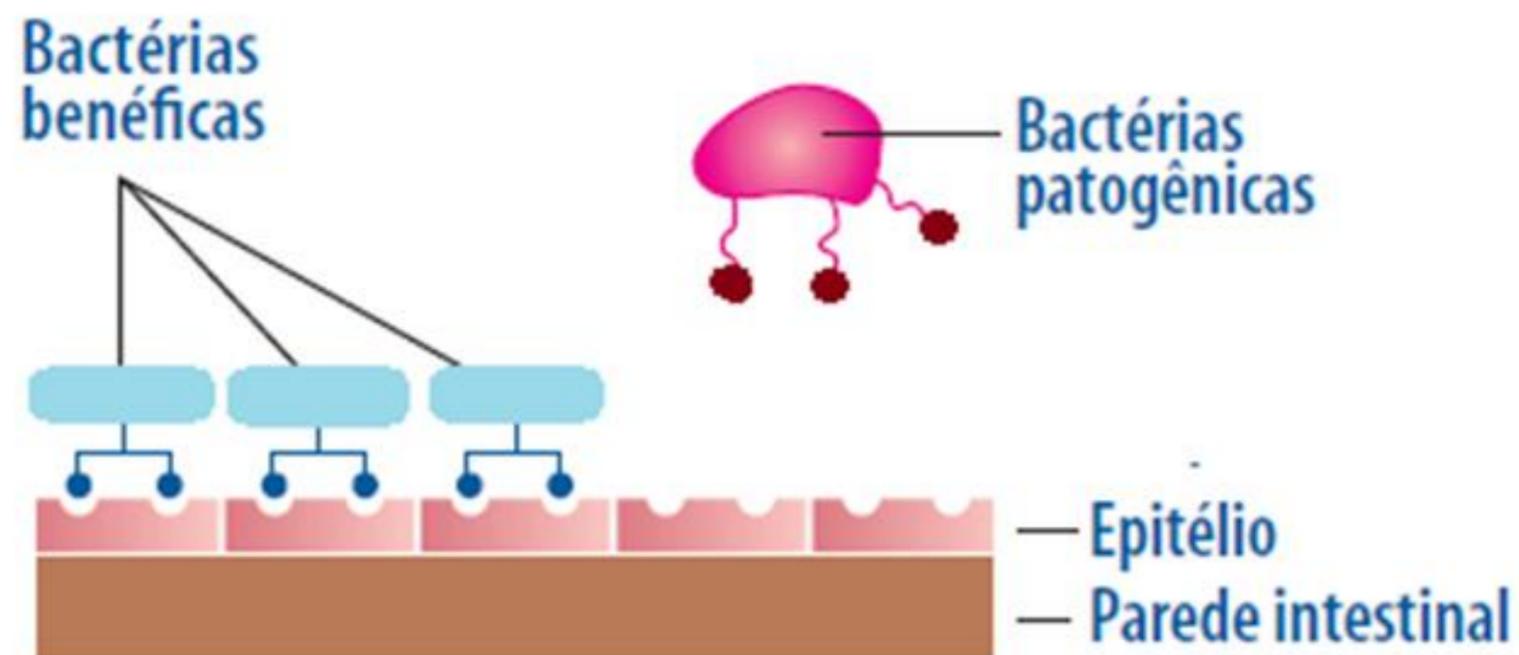
A **microbiota intestinal** é uma parte crítica do funcionamento geral dos camarões e peixes.





Microbiota intestinal

Nos camarões o intestino é considerado a principal via de transmissão de patógenos (De Schryver et al., 2008). Por isso, a microbiota intestinal desempenha papéis importantes na saúde do hospedeiro, mantendo o equilíbrio e resiliência contra os patógenos (Rungrassamee et al., 2016).





Eubiose x Disbiose

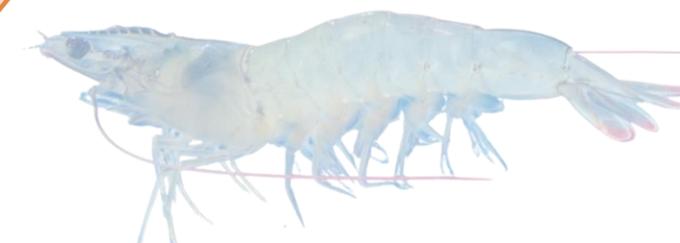


Eubiose

Quando a microbiota intestinal, teoricamente "normal" e "equilibrada", presumivelmente atende a todos os requisitos para que possamos nos beneficiar de seus efeitos sobre a saúde nos níveis metabólico, imunológico, típicos de um indivíduo saudável.

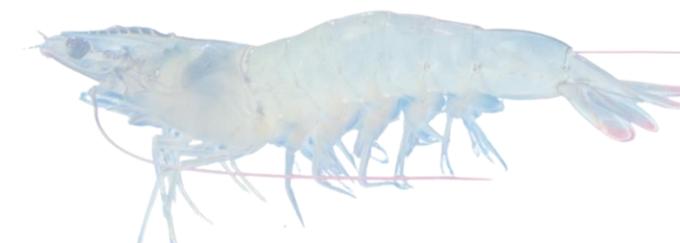
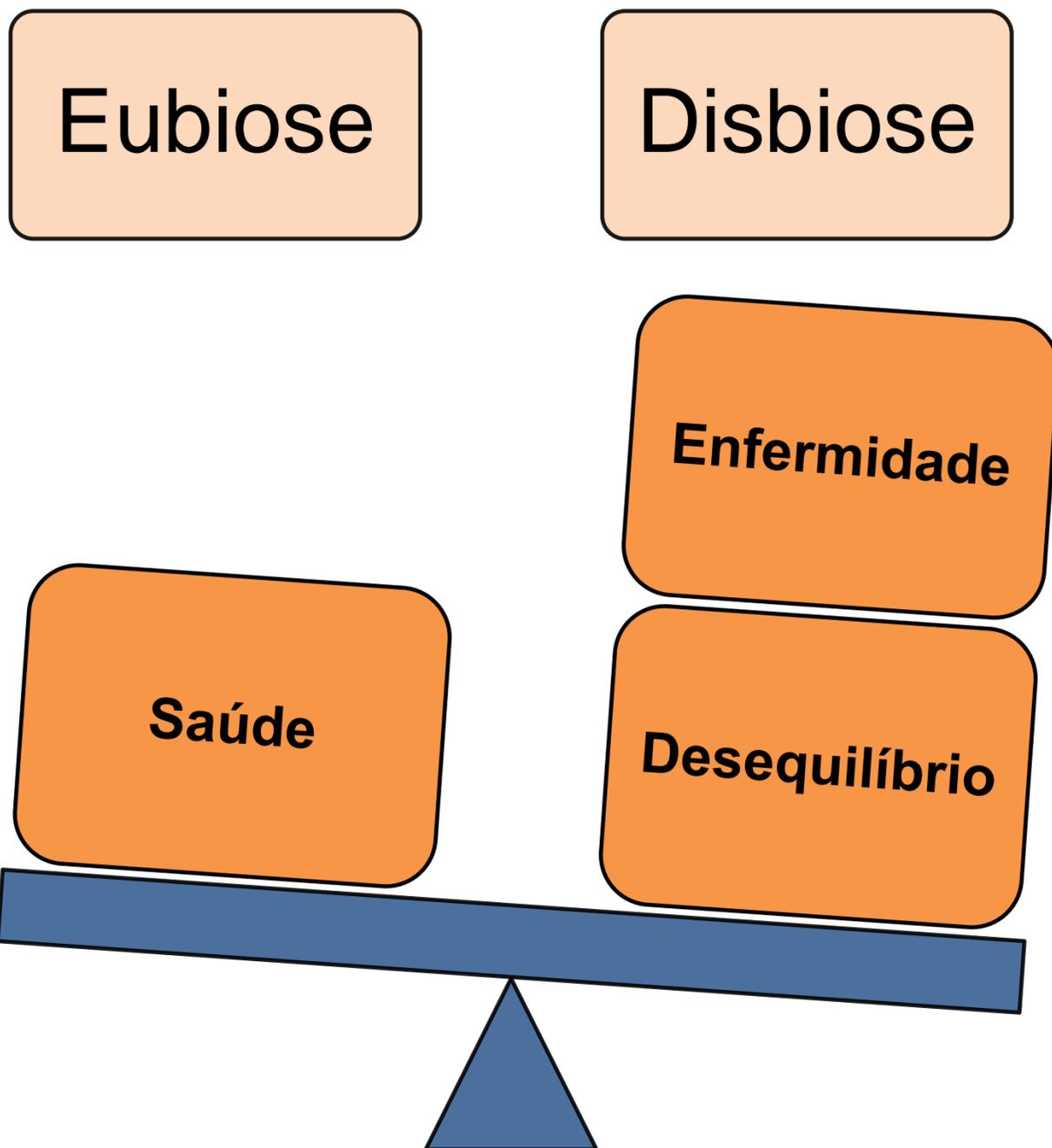
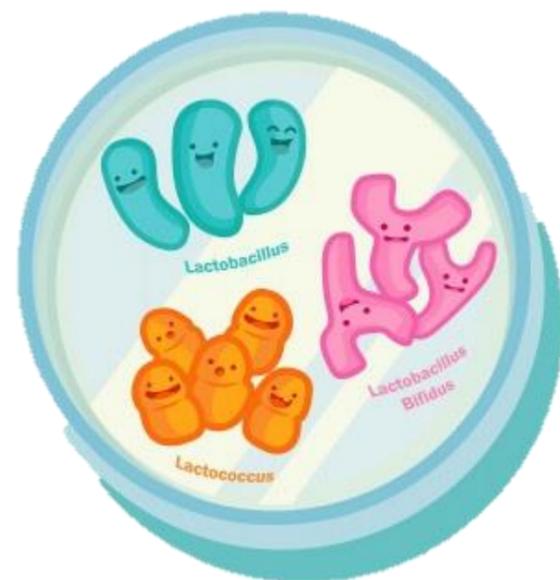
Disbiose

Desequilíbrio na composição bacteriana de um nicho ecológico em comparação com o padrão considerado teoricamente "normal" e "equilibrado", com desaparecimento temporário ou definitivo de alguns dos efeitos benéficos para a saúde.





Eubiose x Disbiose





Eubiose x Disbiose



REVIEWS IN Aquaculture



Reviews in Aquaculture, 1–20

doi: 10.1111/raq.12513

Microbiome diversity and dysbiosis in aquaculture

Sandra Infante-Villamil^{1,2} , Roger Huerlimann^{1,2} and Dean R. Jerry^{1,2,3}

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- 2 College of Science and Engineering, Centre for Sustainable Tropical Fisheries and Aquaculture, James Cook University, Townsville, QLD, Australia
- 3 Tropical Futures Institute, James Cook University, Singapore

Journal of Invertebrate Pathology 186 (2021) 107387



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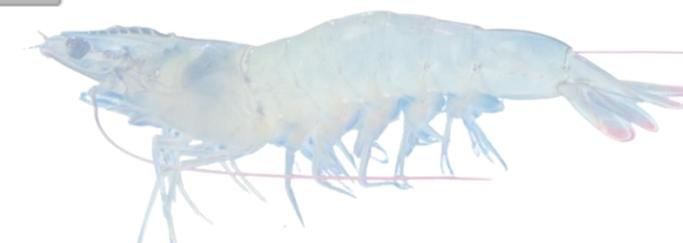
Journal of Invertebrate Pathology

journal homepage: www.elsevier.com/locate/jip



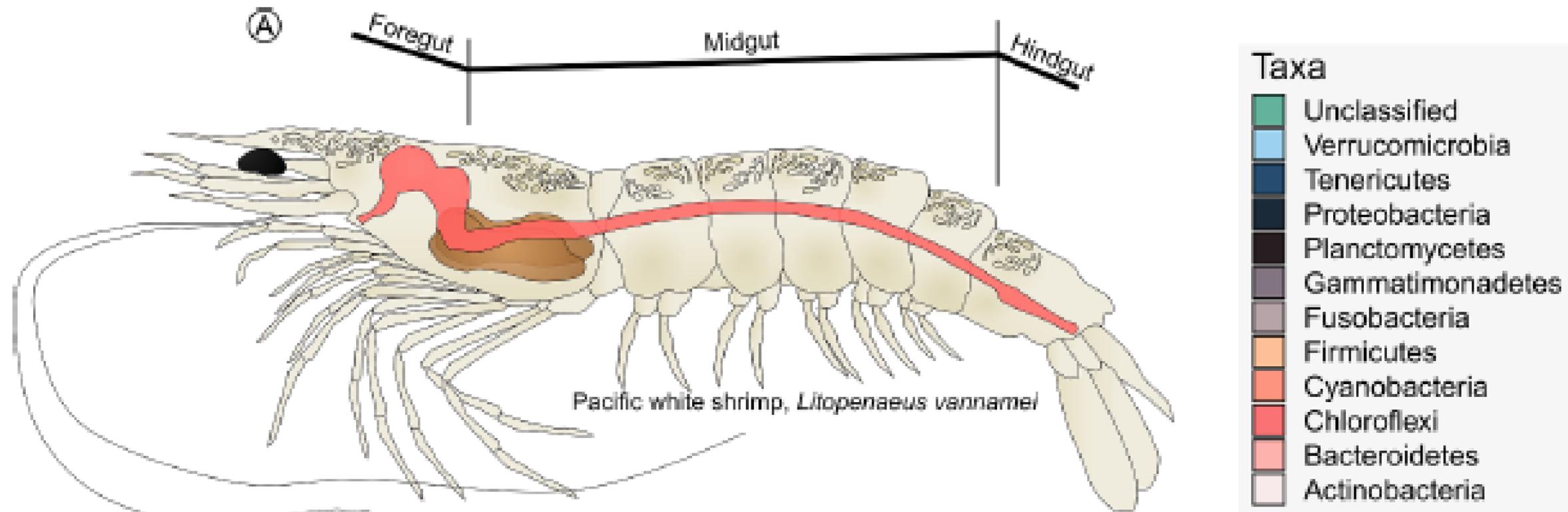
Understanding the role of the shrimp gut microbiome in health and disease

Corey C. Holt^{a,b,c,d,*}, David Bass^{a,c}, Grant D. Stentiford^{a,c}, Mark van der Giezen^{b,c,e,*}



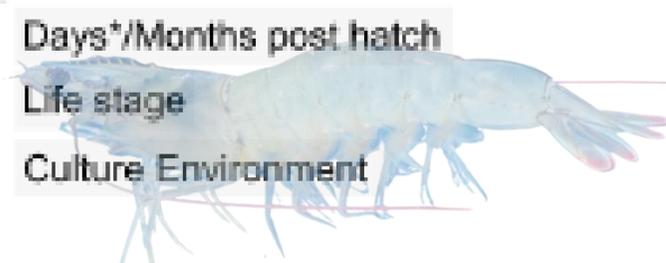
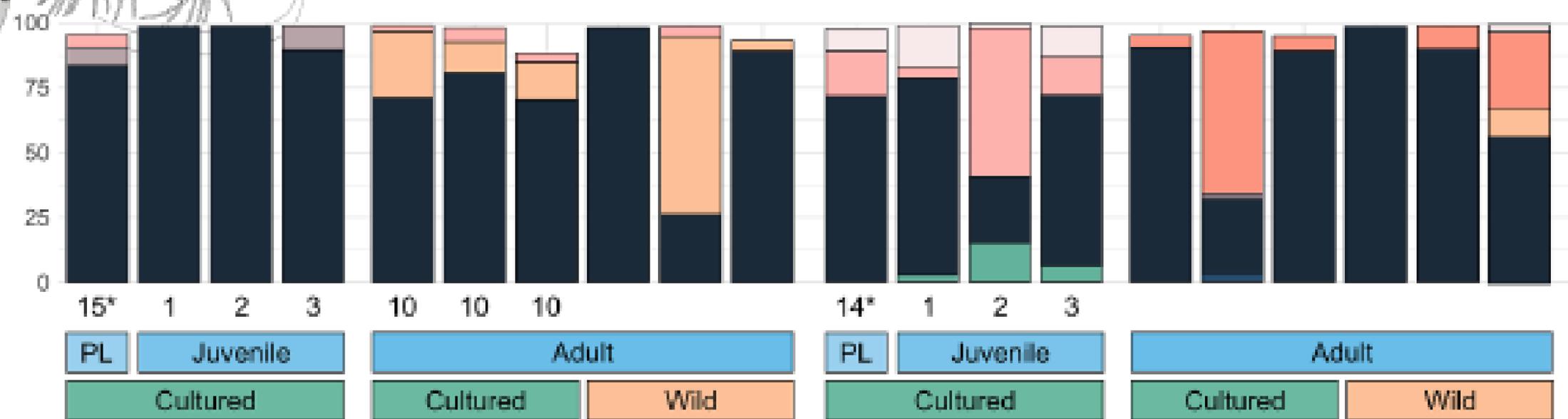


Eubiose x Disbiose



(B) Black tiger shrimp, *Penaeus monodon*

(C) Pacific white shrimp, *Litopenaeus vannamei*





Eubiose x Disbiose



Received: 22 January 2021 | Revised: 27 December 2021 | Accepted: 19 January 2022

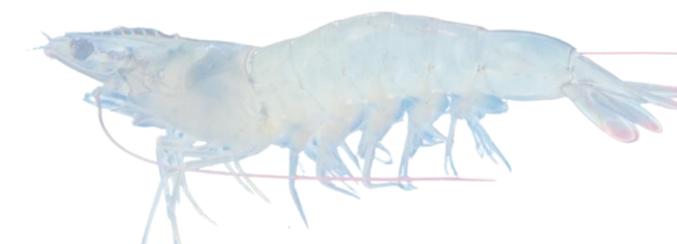
DOI: 10.1111/raq.12659

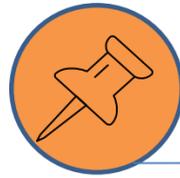
REVIEWS IN Aquaculture

REVIEW

Harnessing the potentialities of probiotics, prebiotics, synbiotics, paraprobiotics, and postbiotics for shrimp farming

Joanna Xuan Hui Goh¹ | Loh Teng-Hern Tan^{1,2} | Jodi Woan-Fei Law¹ |
Hooi-Leng Ser¹ | Kooi-Yeong Khaw³ | Vengadesh Letchumanan¹ |
Learn-Han Lee¹ | Bey-Hing Goh^{3,4}





Eubiose x Disbiose

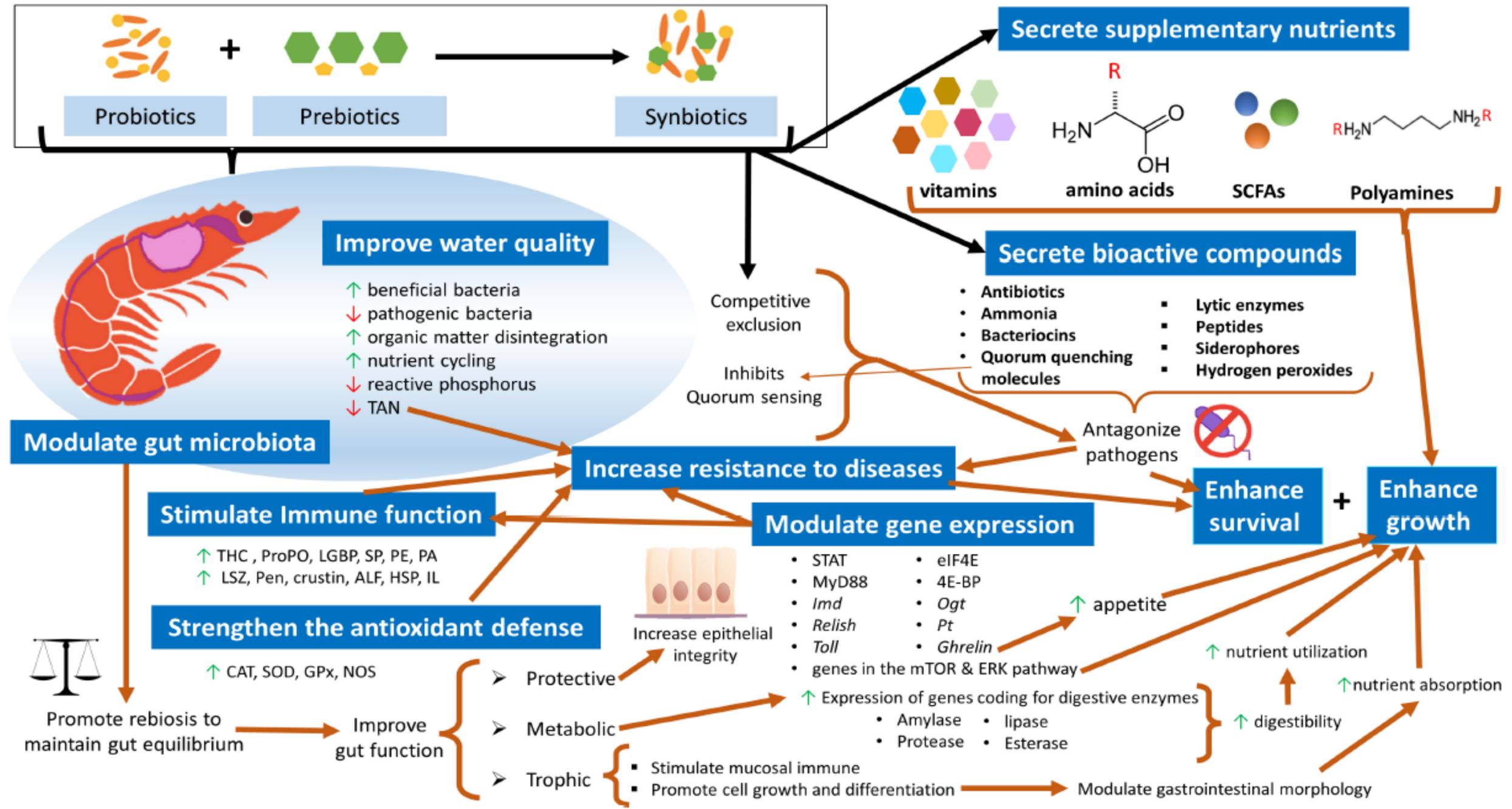
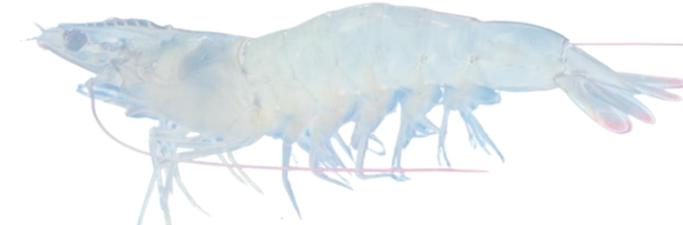
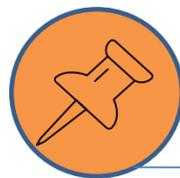
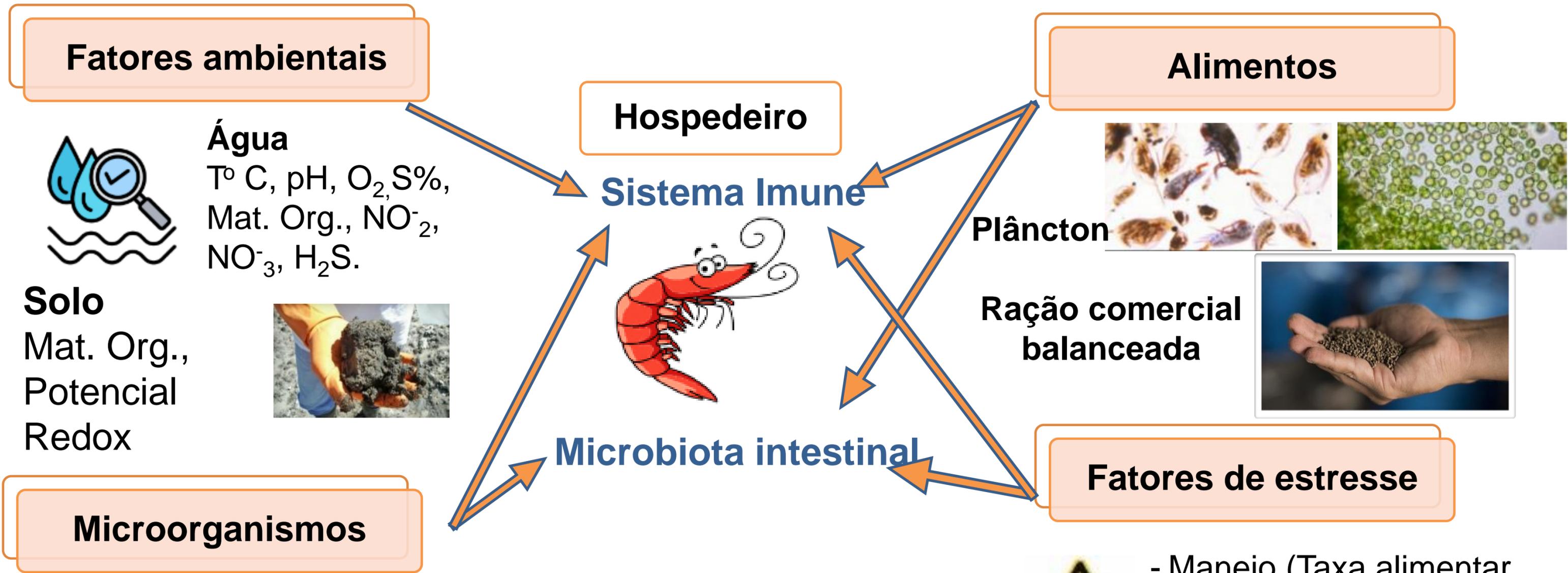


FIGURE 2 Mechanisms of action of probiotics, prebiotics, and synbiotics on shrimps

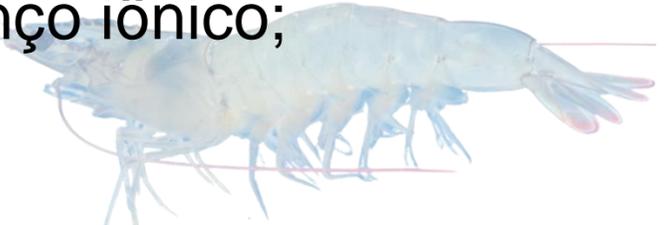
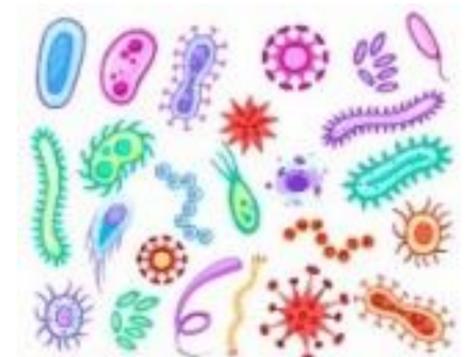




Sistema Imune x Microbiota intestinal



- Manejo (Taxa alimentar, densidade de estocagem, etc.);
- Balanço iônico;





Sistema imune x Microbiota intestinal



Hospedeiro

Sistema Imune

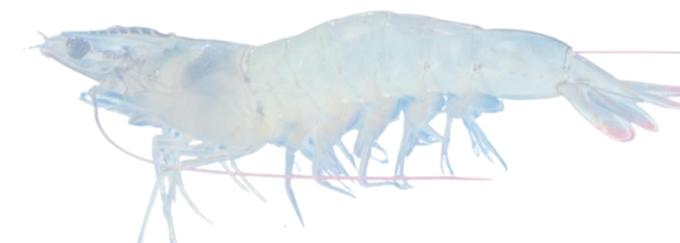


Microbiota intestinal



Efeitos da microbiota no hospedeiro

- Saúde,
- Eficiência de FCA,
- Taxa de crescimento,
- Resistência ao estresse,
- Função do sistema imunológico,
- Resistência a patógenos,
- Sobrevivência.



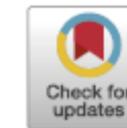


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Aquaculture

journal homepage: www.elsevier.com/locate/aquaculture



Effect of ionic adjustment frequency in low-salinity water on zootechnical performance, water quality and mineral composition of *Litopenaeus vannamei* in a synbiotic nursery system

Valdemir Queiroz de Oliveira^a, Otávio Augusto Lacerda Ferreira Pimentel^b, Caio Rubens do Rêgo Oliveira^c, Elizabeth Pereira dos Santos^c, Alitiane Moura Lemos Pereira^d, Alfredo Olivera Gálvez^c, Luis Otavio Brito^{c,*}

Received: 5 June 2021 | Revised: 1 September 2021 | Accepted: 6 September 2021

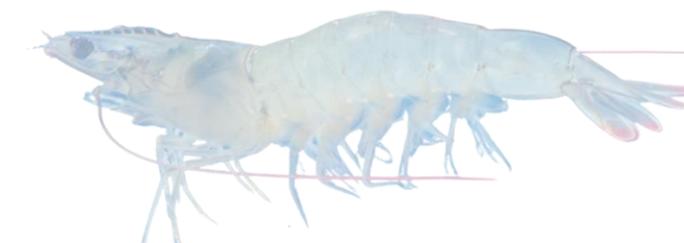
DOI: 10.1111/are.15580

ORIGINAL ARTICLE



Effects of organic carbon sources on water quality, microbial flocs protein and performance of *Macrobrachium rosenbergii* post-larvae reared in biofloc and synbiotic systems

Robson Batista dos Santos¹ | Petrônio Alves Coelho Filho² | Alex Pereira Gonçalves² |
Rafaela Alves dos Santos² | Mariana Lins Rodrigues³  | Eudes de Souza Correia¹ |
Valdemir Queiroz de Oliveira⁴  | Luis Otavio Brito¹ 



Assessment of different ionic adjustment strategies in low-salinity water on the growth of *Litopenaeus vannamei* and microbial community stoichiometry in a synbiotic nursery system

Otávio Augusto Lacerda Ferreira Pimentel¹  | Valdemir Queiroz de Oliveira^{1,2}  |
Caio Rubens do Rêgo Oliveira¹  | William Severi¹  | Alfredo Olivera Gálvez¹  |
André Megali Amado^{3,4}  | Luis Otavio Brito¹ 

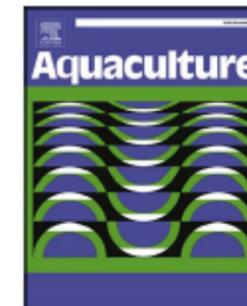


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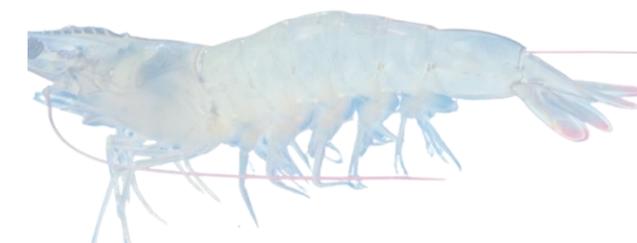
journal homepage: www.elsevier.com/locate/aquaculture



Effect of different frequencies of the addition of *Brachionus plicatilis* on the performance of *Litopenaeus vannamei* in a nursery biofloc system with rice bran (anaerobic and aerobic) as an organic carbon source



Rildo José Vasconcelos de Andrade, Elizabeth Pereira dos Santos, Gisely Karla de Almeida Costa, Clarissa Vilela Figueiredo da Silva Campos, Suzianny Maria Bezerra Cabral da Silva, Alfredo Olivera Gálvez, Luis Otavio Brito*





The effect of different synbiotic preparation strategies on water fertilization and zootechnical performance of *Macrobrachium rosenbergii* reared in the nursery stage

Robson Batista dos Santos¹ · Petrônio Alves Coelho-Filho² ·
Chaiane Santos Assunção² · Tais Nunes dos Santos² · Josefa Honorio da Silva² ·
Gênison Carneiro Silva¹ · Luis Otavio Brito¹

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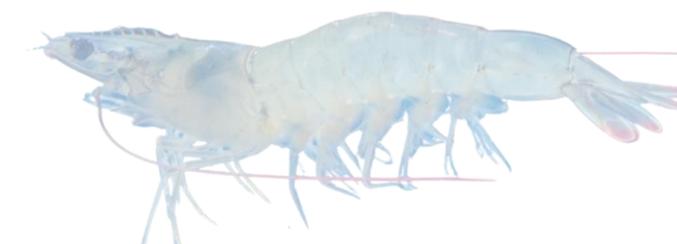
DOI: 10.1111/are.16132

ORIGINAL ARTICLE



Use of recirculation and settling chamber in synbiotic multi-trophic culture of *Crassostrea* sp. with *Litopenaeus vannamei*

Priscilla Celes Maciel de Lima | Allyne Elins Moreira da Silva | Danielle Alves da Silva |
Carlos Yure Barbosa de Oliveira | William Severi | Luis Otavio Brito | Alfredo Olivera
Gálvez





Effects of different forms of artificially salinized in low-salinity water of *Penaeus vannamei* in the grow-out phase in a synbiotic system

Gênison Carneiro Silva, Agatha Catharina Limeira, Gisely Karla de Almeida Costa, Suzianny Maria Bezerra Cabral da Silva, Paulo Roberto Campagnoli de Oliveira Filho, Luis Otavio Brito*

Departamento de Pesca e Aquicultura, Universidade Federal Rural de Pernambuco, Dois Irmãos, Recife, Pernambuco, 52171-900, Brazil.

Simbiótico na água com *Bacillus*

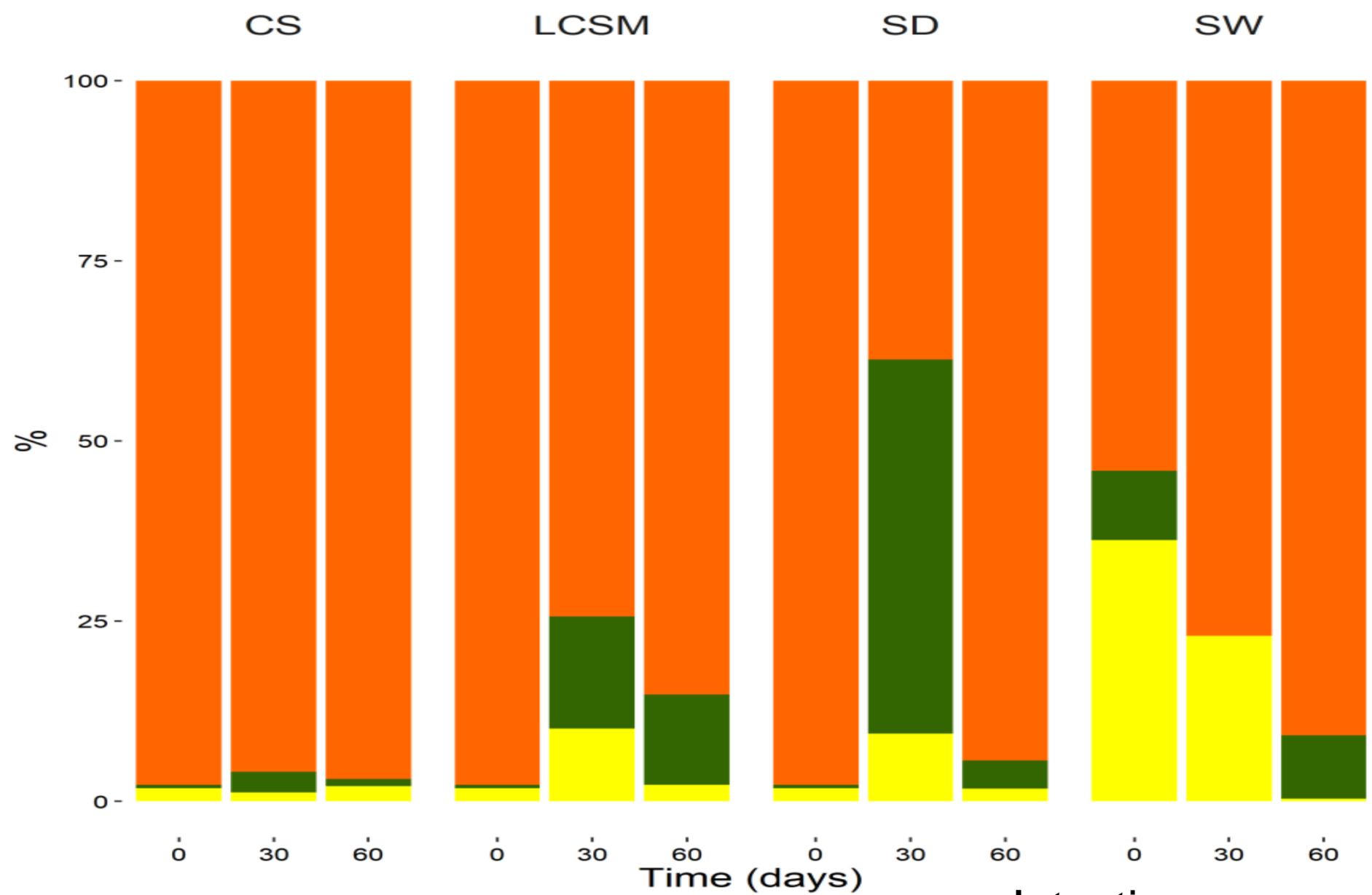
+

Ração com *Bacillus* + *Lactobacillus* + leveduras

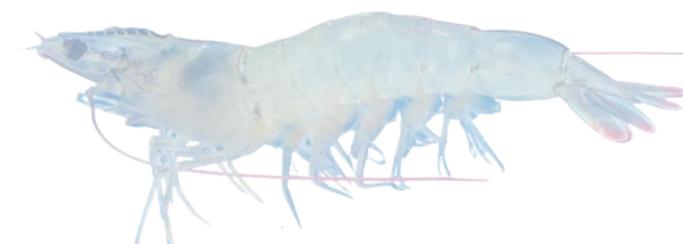
+

~0,8g MOS/ kg de ração

2g Probiótico+Prébiótico/ kg de ração



MYP
NSFB
SFB



Intestino

Effects of different forms of artificially salinized in low-salinity water of *Penaeus vannamei* in the in a symbiotic nursery system

Agatha Catharina Limeira, Gênisson Carneiro Silva, Gisely Karla de Almeida Costa, Suzianny Maria Bezerra Cabral da Silva, Alfredo Olivera Galvez, Luis Otavio Brito*

Departamento de Pesca e Aquicultura, Universidade Federal Rural de Pernambuco, Dois Irmãos, Recife, | Pernambuco, 52171-900, Brazil.



Simbiótico na água com *Bacillus*

+

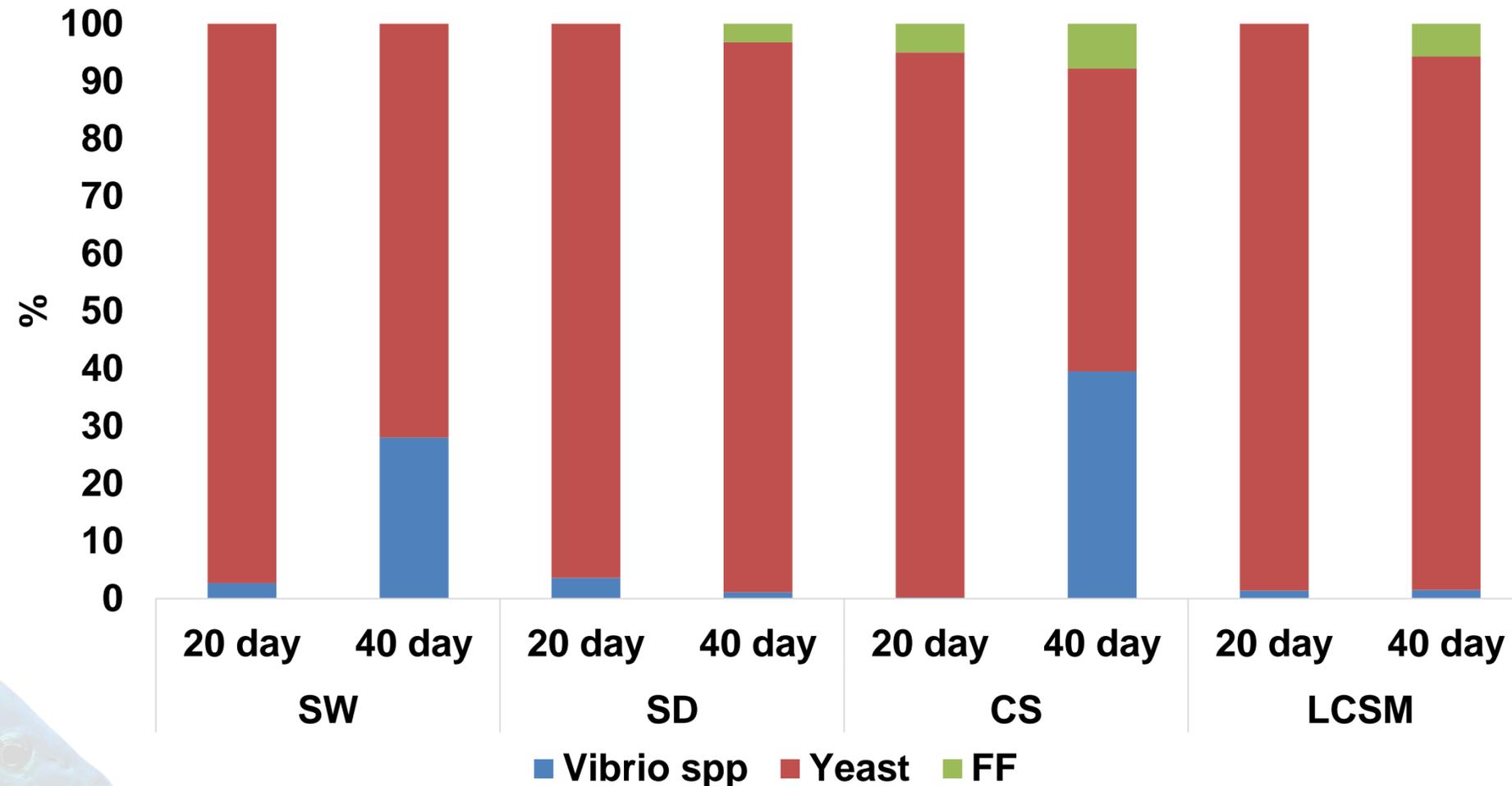
Ração com *Bacillus* + *Lactobacillus* + leveduras

+

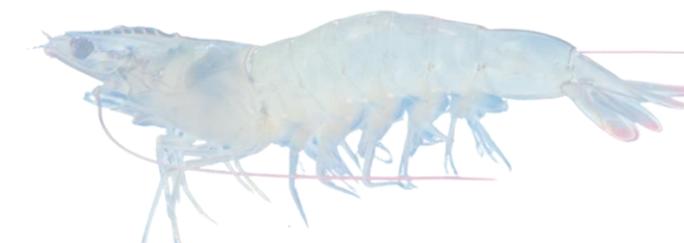
~0,8g MOS/ kg de ração

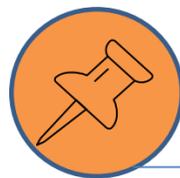
2g Probiótico+Prébiótico/ kg de ração

Presumptive total count



Intestino





Processo de preparação

Fonte de carbono



Melaço de cana de açúcar ou açúcar

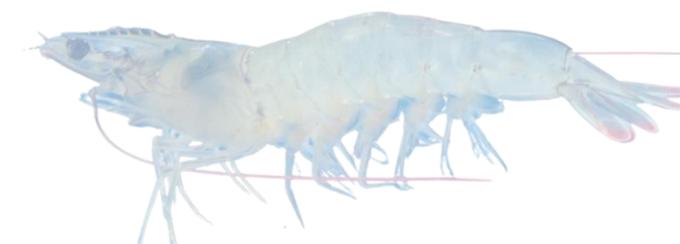
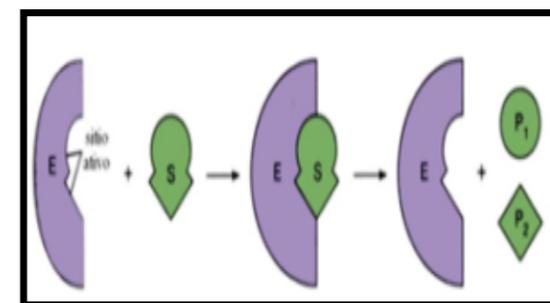


Farelos- arroz, soja ou trigo



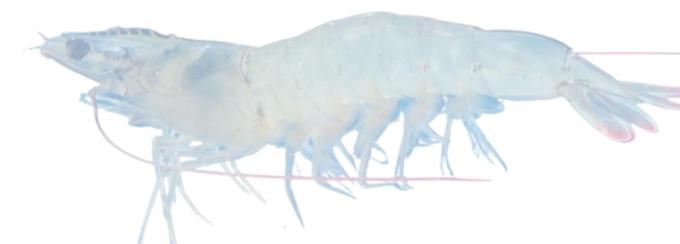
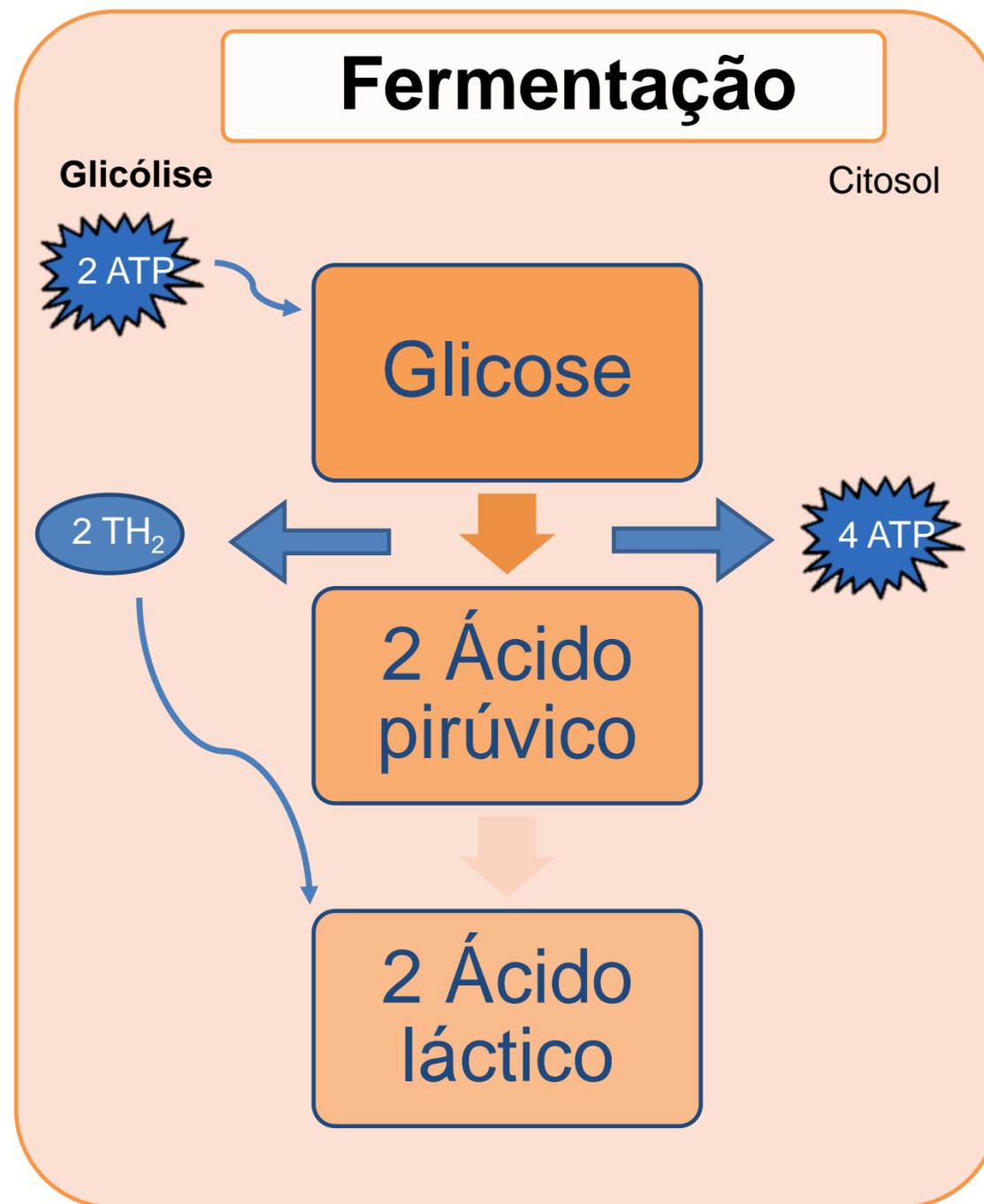
Alcalinizante

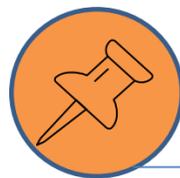
Probióticos



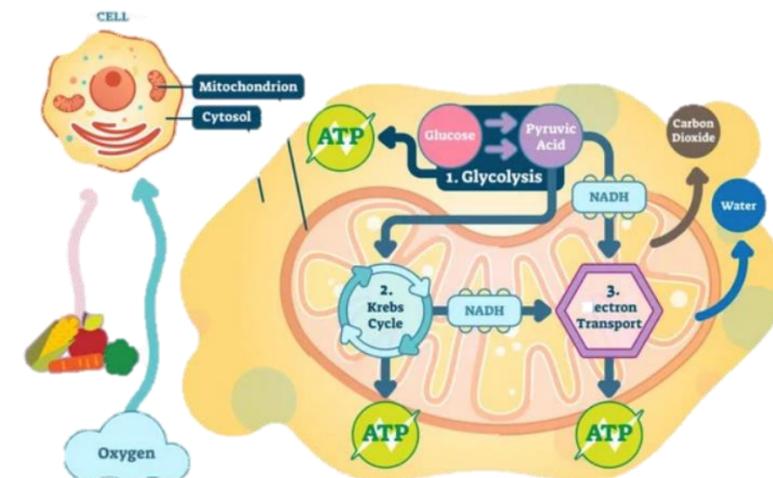
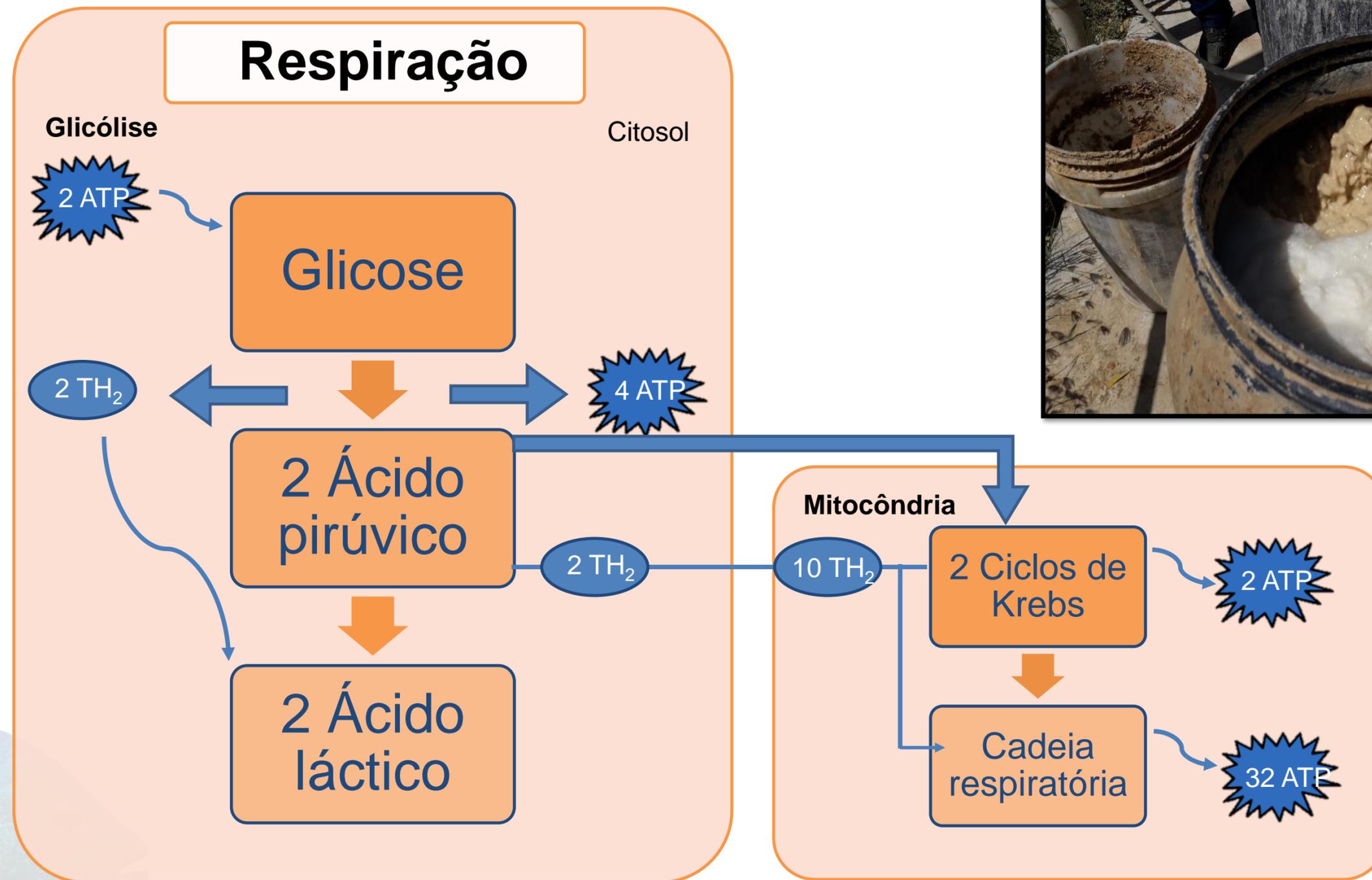


Processo de preparação





Processo de preparação



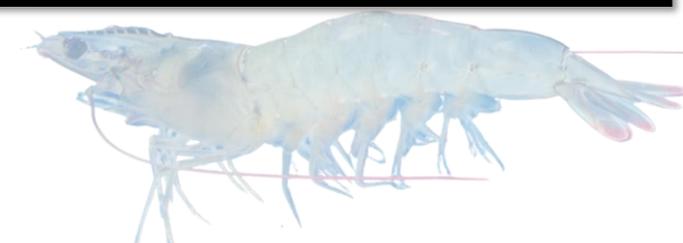


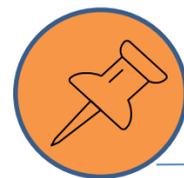
Simbiótico na água



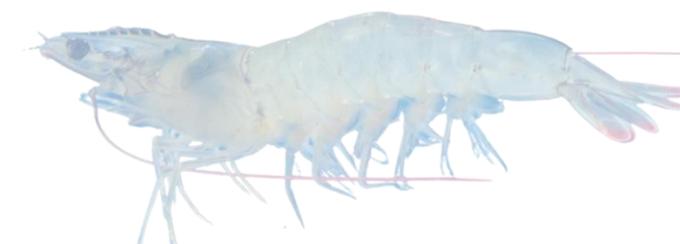


Simbiótico junto com a ração

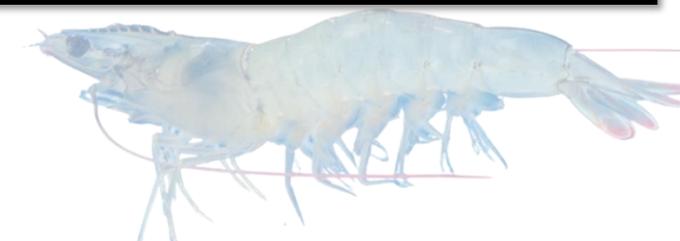


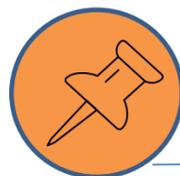


Simbiótico junto com a ração



Simbiótico junto com a ração





Simbiótico junto com a ração



Aquaculture International
<https://doi.org/10.1007/s10499-022-00955-y>



The effect of different synbiotic preparation strategies on water fertilization and zootechnical performance of *Macrobrachium rosenbergii* reared in the nursery stage

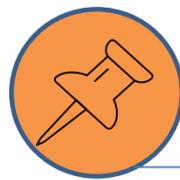
Robson Batista dos Santos¹ · Petrônio Alves Coelho-Filho² ·
 Chaiane Santos Assunção² · Tais Nunes dos Santos² · Josefa Honorio da Silva² ·
 Gênison Carneiro Silva¹ · Luis Otavio Brito¹

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Aquaculture International

Table 2 Proximate composition of the synbiotic used as fertilizer in the water of prawn *Macrobrachium rosenbergii* reared in the nursery phase

Variable	Phases			
	RB	ANA	AER	ANA + AER
Lipids (%)	17.99 ± 0.73 ^d	19.62 ± 0.48 ^c	26.32 ± 0.21 ^b	28.91 ± 0.57 ^a
Proteins (%)	17.41 ± 0.15 ^b	17.18 ± 0.15 ^b	18.27 ± 0.21 ^a	17.32 ± 0.19 ^b



Simbiótico junto com a ração



Aquaculture 530 (2021) 735703

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ELSEVIER

Study of fermented feed by mixed strains and their effects on the survival, growth, digestive enzyme activity and intestinal flora of *Penaeus vannamei*

Mingzhu Zhang^a, Luqing Pan^{a,*}, Depeng Fan^b, Jingjing He^a, Chen Su^a, Shuo Gao^a, Mengyu Zhang^a

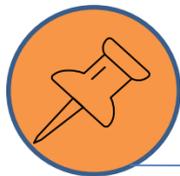
Table 5

Amino acid contents of the commercial feed and the fermented feed under optimum conditions (inoculum size proportion of STBL1: STBS1: SQVG18 = 1%:3%:3% m/m, temperature 35 °C, time 24 h, material to water 1:0.6 g/mL).

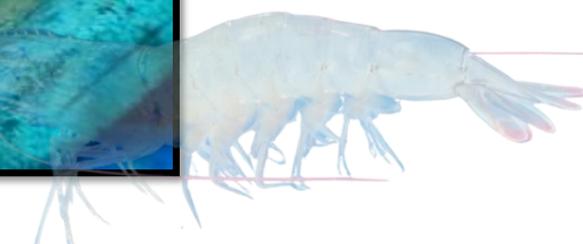
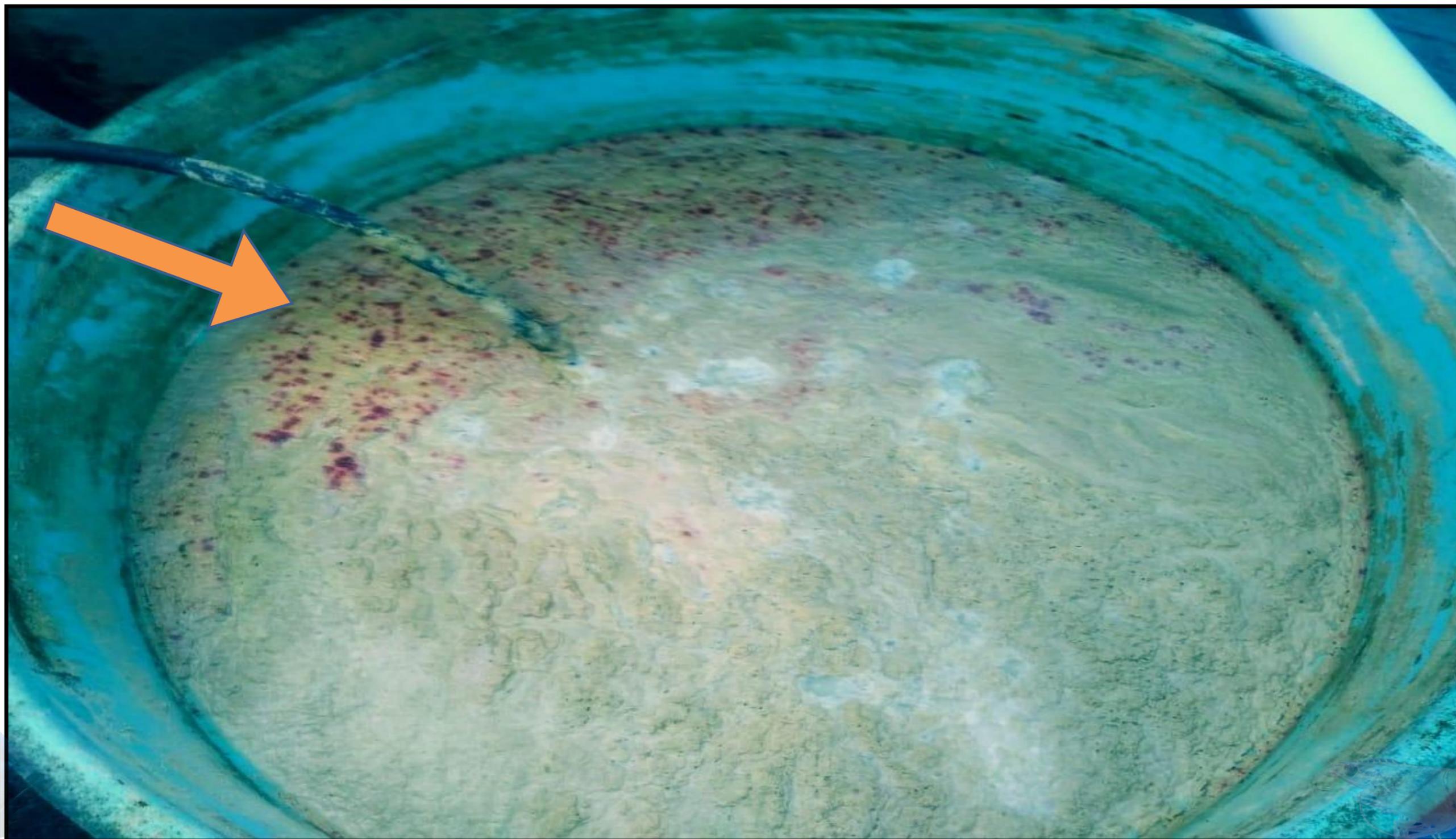
Amino acids (%)	Commercial feed	Fermented feed
Aspartate	2.82 ± 0.09 ^a	3.31 ± 0.05 ^b
Threonine	0.98 ± 0.03 ^a	1.16 ± 0.01 ^b
Serine	1.50 ± 0.05 ^a	1.74 ± 0.01 ^b
Glutamate	5.24 ± 0.09	6.27 ± 0.02
Glycine	1.86 ± 0.05 ^a	2.15 ± 0.02 ^b
Alanine	1.81 ± 0.05 ^a	2.15 ± 0.01 ^b
Cysteine	0.19 ± 0.01	0.21 ± 0.01
Valine	0.83 ± 0.03 ^a	0.94 ± 0.02 ^b
Methionine	0.77 ± 0.04	0.83 ± 0.08
Isoleucine	0.53 ± 0.02	0.59 ± 0.03
Leucine	1.97 ± 0.07 ^a	2.26 ± 0.01 ^b
Tyrosine	1.09 ± 0.08	1.51 ± 0.02
Phenylalanine	1.84 ± 0.09	2.05 ± 0.02
Lysine	1.59 ± 0.07^a	1.85 ± 0.01^b
Histidine	0.82 ± 0.02 ^a	0.91 ± 0.01 ^b
Arginine	1.95 ± 0.08 ^a	2.20 ± 0.04 ^b
Proline	1.79 ± 0.04 ^a	1.90 ± 0.02 ^b
Essential amino acids	11.29 ± 0.44^a	12.78 ± 0.13^b
Total	27.62 ± 0.84^a	31.66 ± 0.03^b

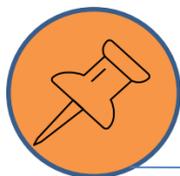
Different subscript letters indicate significant differences in the raw (P < 0.05).



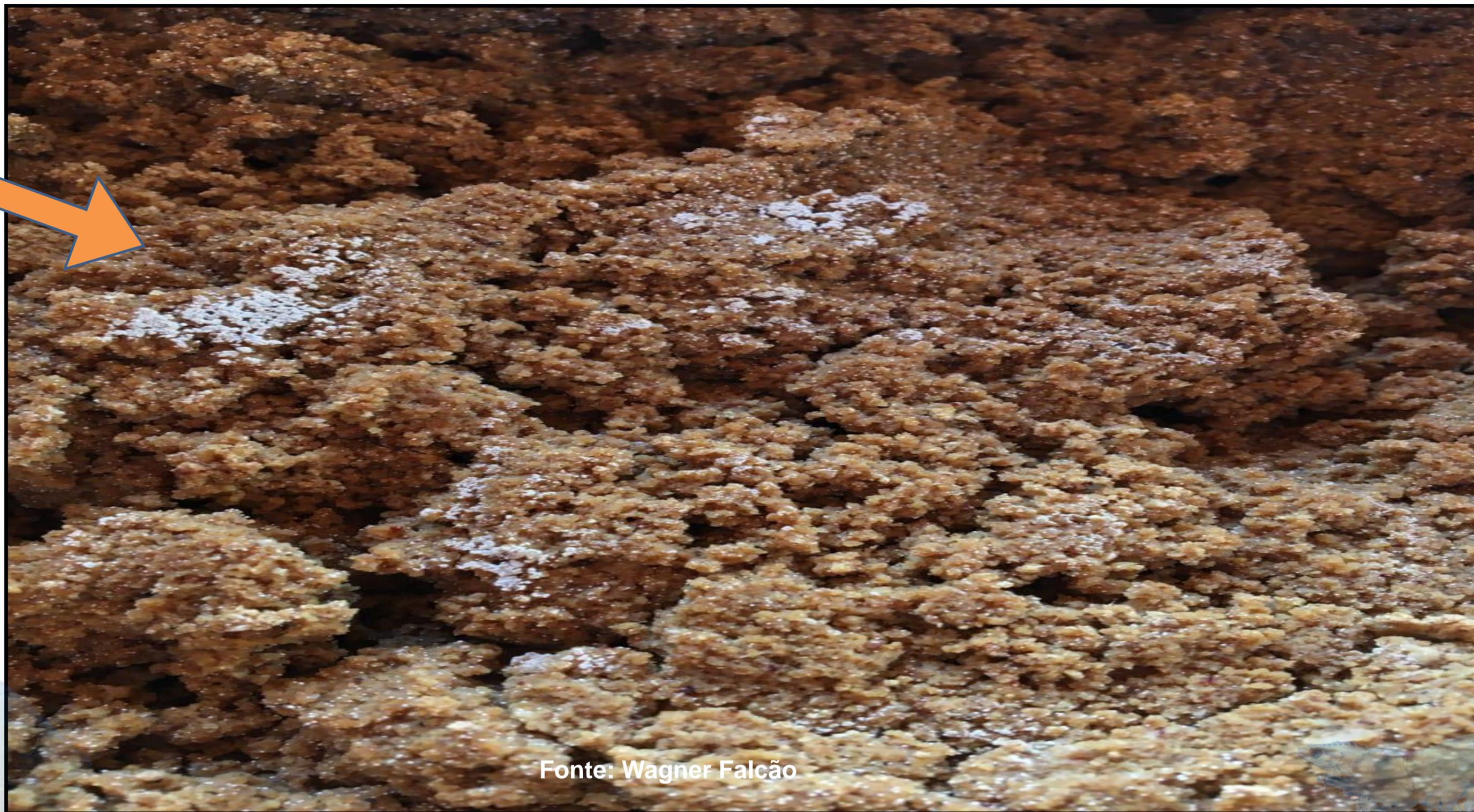


Desafios

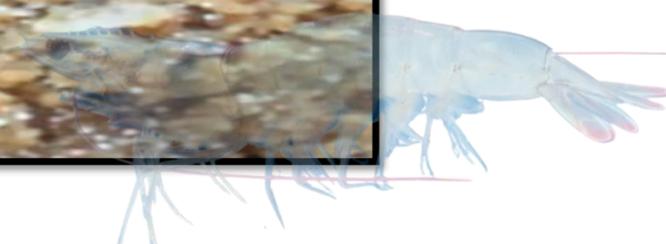


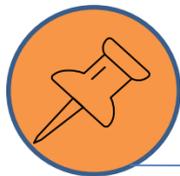


Desafios



Fonte: Wagner Falcão



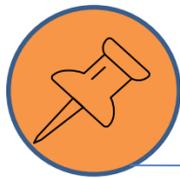


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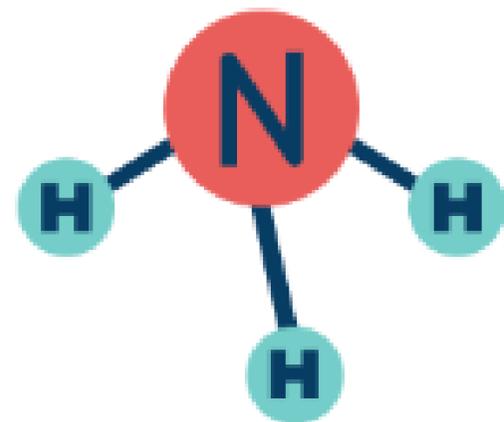


Fonte: Carla Samantha Univasf

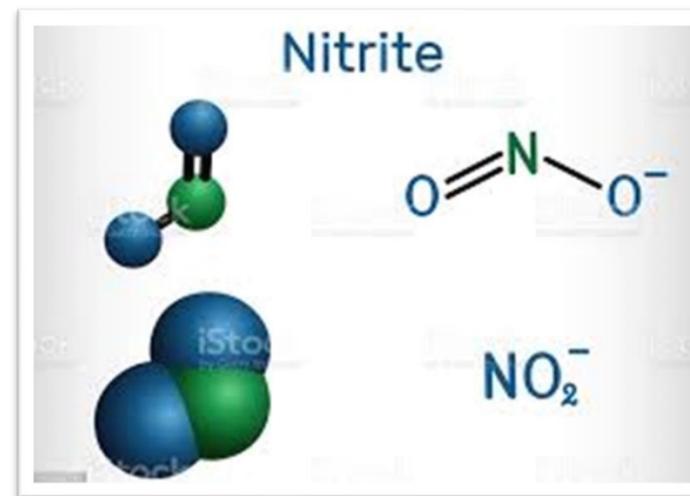




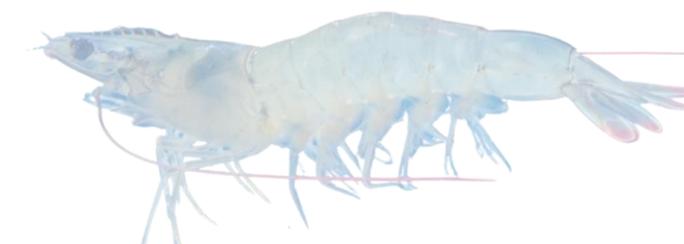
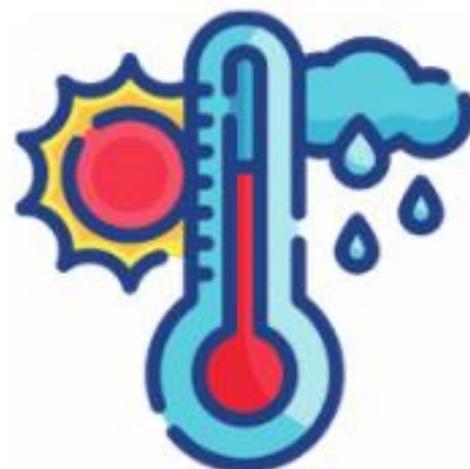
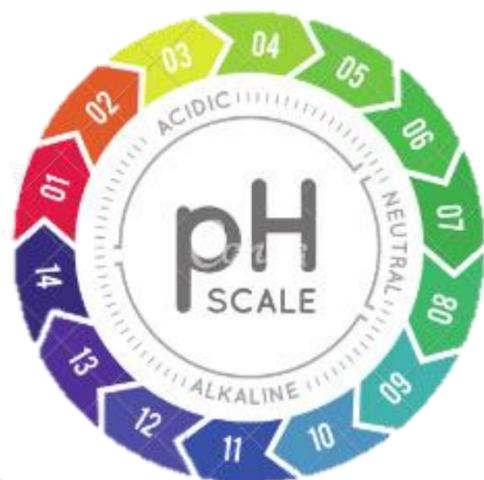
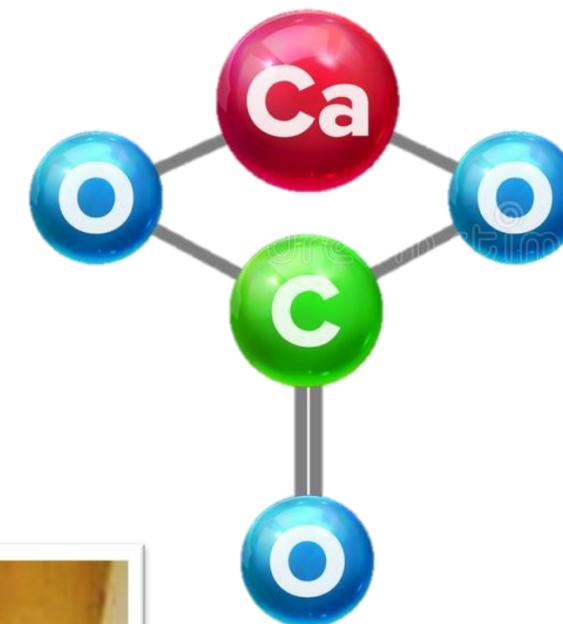
Desafios



Amônia

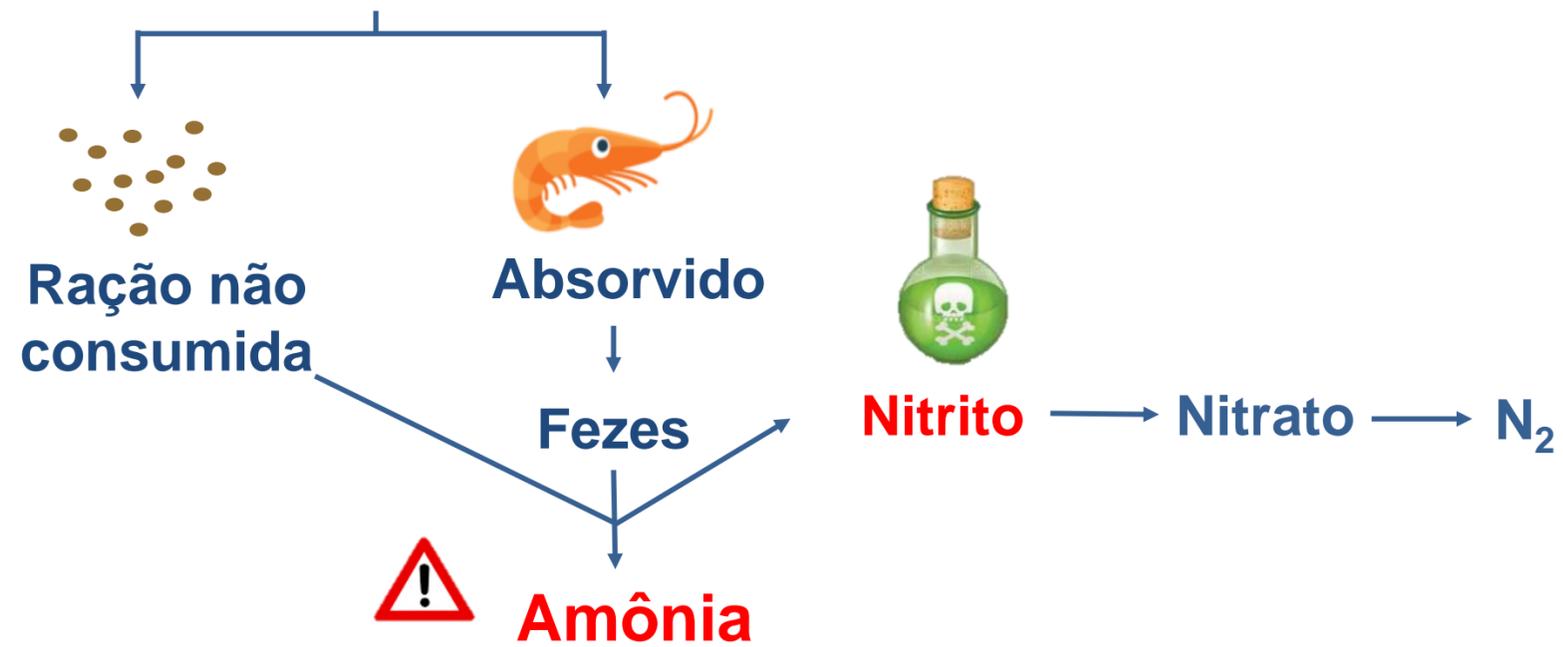
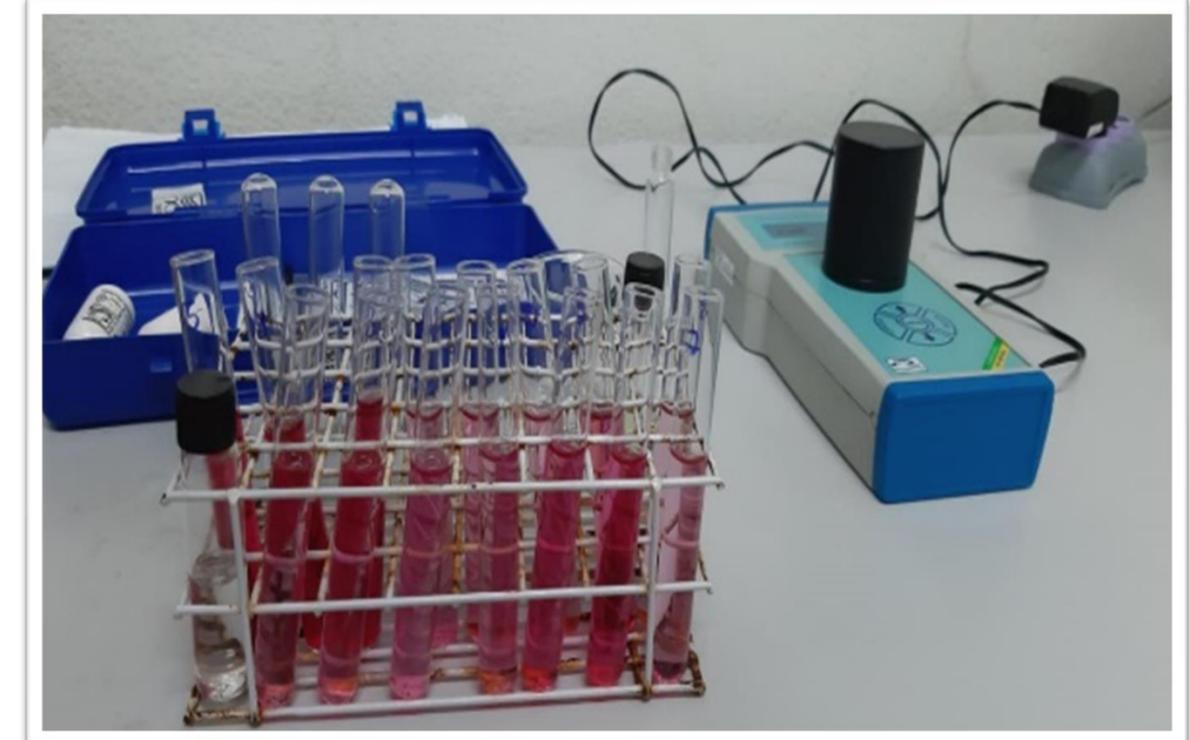
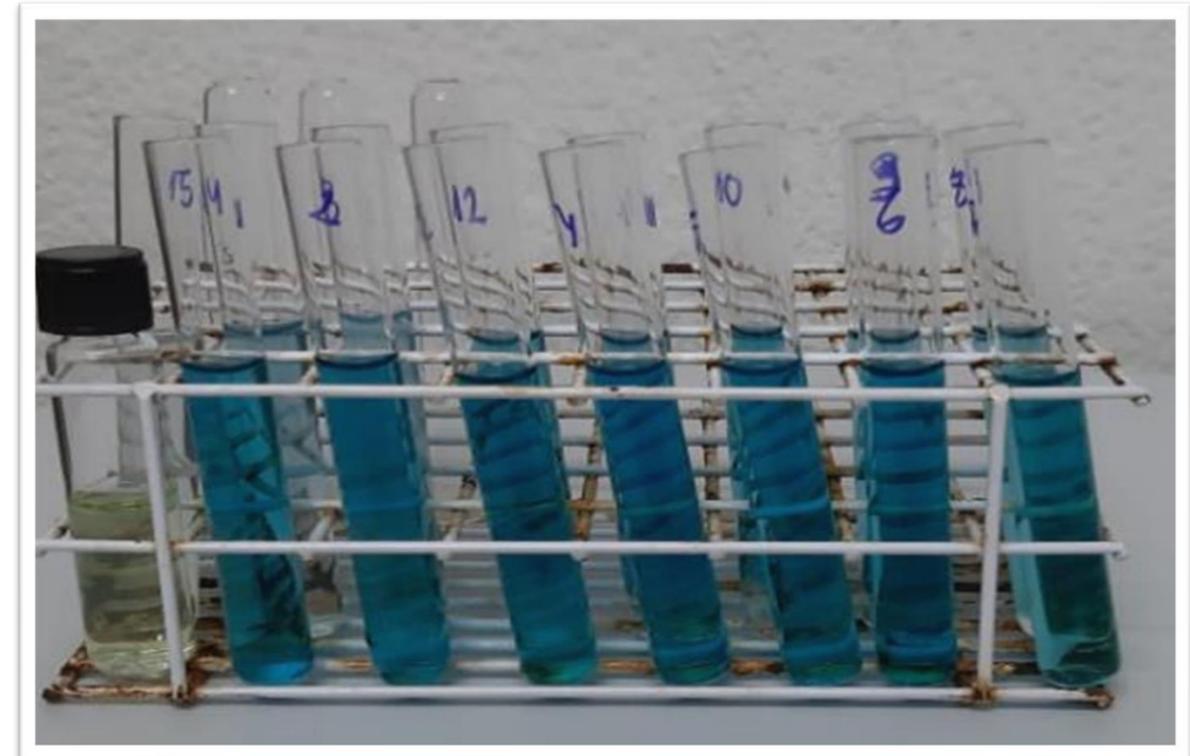


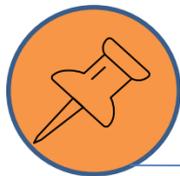
CaCO3





Desafios

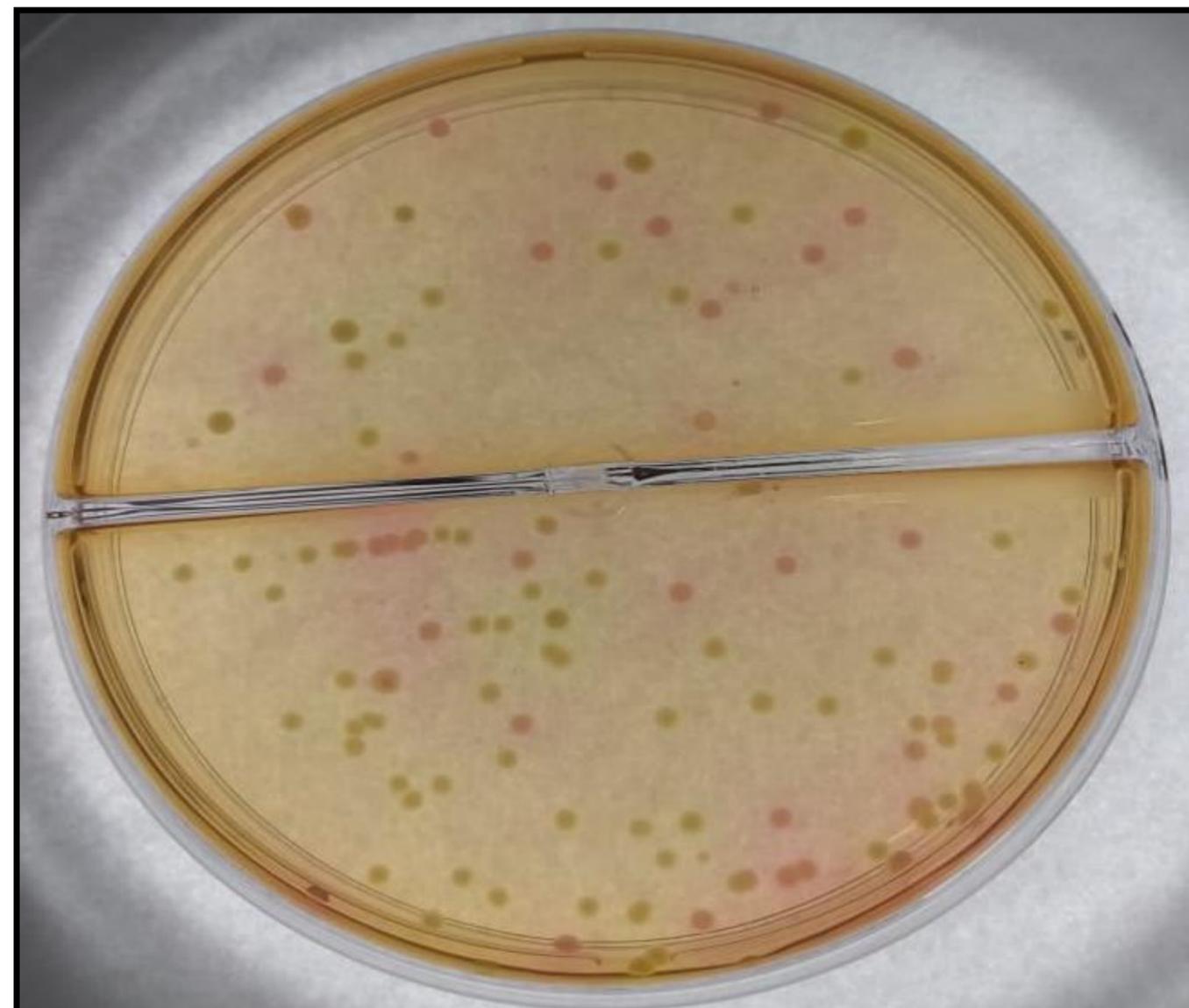




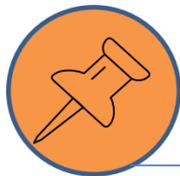
Desafios



TCBS - Intestino de camarões



MYP - Hepatopâncreas de camarões



Desafios



Características macroscópicas e microscópicas de vibriose

Fonte: Carlos Apoim



Fazenda Camamu - BA





Fazenda Camamu- BA



Biosseguridade + Nutrição + Pós-larvas

Simbiótico água + ração

Thiago Zironi (Proprietário)

Marcelo Lima (Consultor)

Luis Otavio (Protocolo experimental)

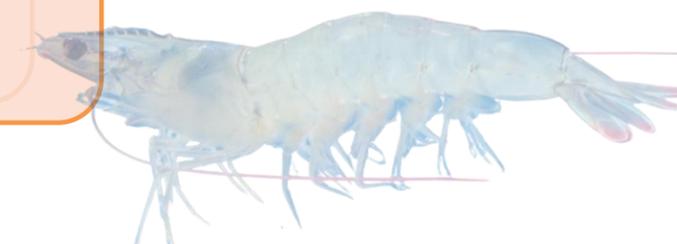
60-175dias

Sobrevivência 75-95%

10 a 38g

1,2-1,8 FCA

80 a 120 cam m²





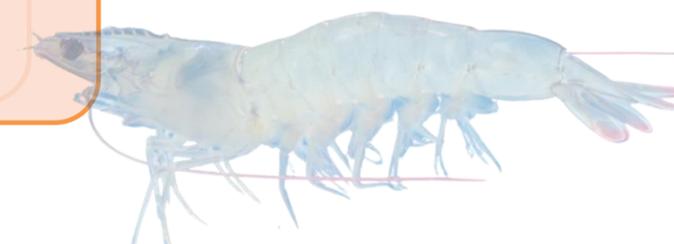
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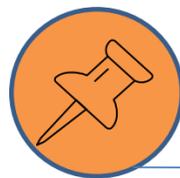


Biosseguridade + Nutri
Simbiótico águ
Thiago Zironi (F
Marcelo Lima (C
Luis Otavio (Protoco

95%

2





Obrigado pela atenção



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