Successful RAS shrimp farming:
Combining Health and Genetics With Systems Design and Best Operations

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Should these be considered Competition

Country	Reported Cost ($/kg)	Seed ($/1,000)	Feed ($/kg)	Calculated Cost ($/kg) Average performance
Vietnam	3.70-4.40	3.70	1.70	4.80
Thailand	3.00-4.20	4.00	1.50	4.00
India	2.80-3.50	3.70	1.20	3.00
Ecuador	2.30-2.50	2.00	1.10	2.90
Colombia	2.40-2.60	3.50	1.20	2.60

Capital Costs vs Productivity USD/1,000 tons

Capital costs of Shrimp farming:

Build intensive farm in Central America: 4 million

Thailand 7 million

Purchase an extensive farm in Ecuador: 15 million

Typical Indoor RAS system for shrimp: USD /1,000 tons

Clear Water	> 40 million USD
Floc	> 20 million USD

Requiring More Emphasis:

Engineering:

Design, Automation, Robotics

Systems are complex;

with innovation required

Marketing:

Differentiation, Fresh Markets, Recognition

Need dedicated efforts to educate

the Consumer

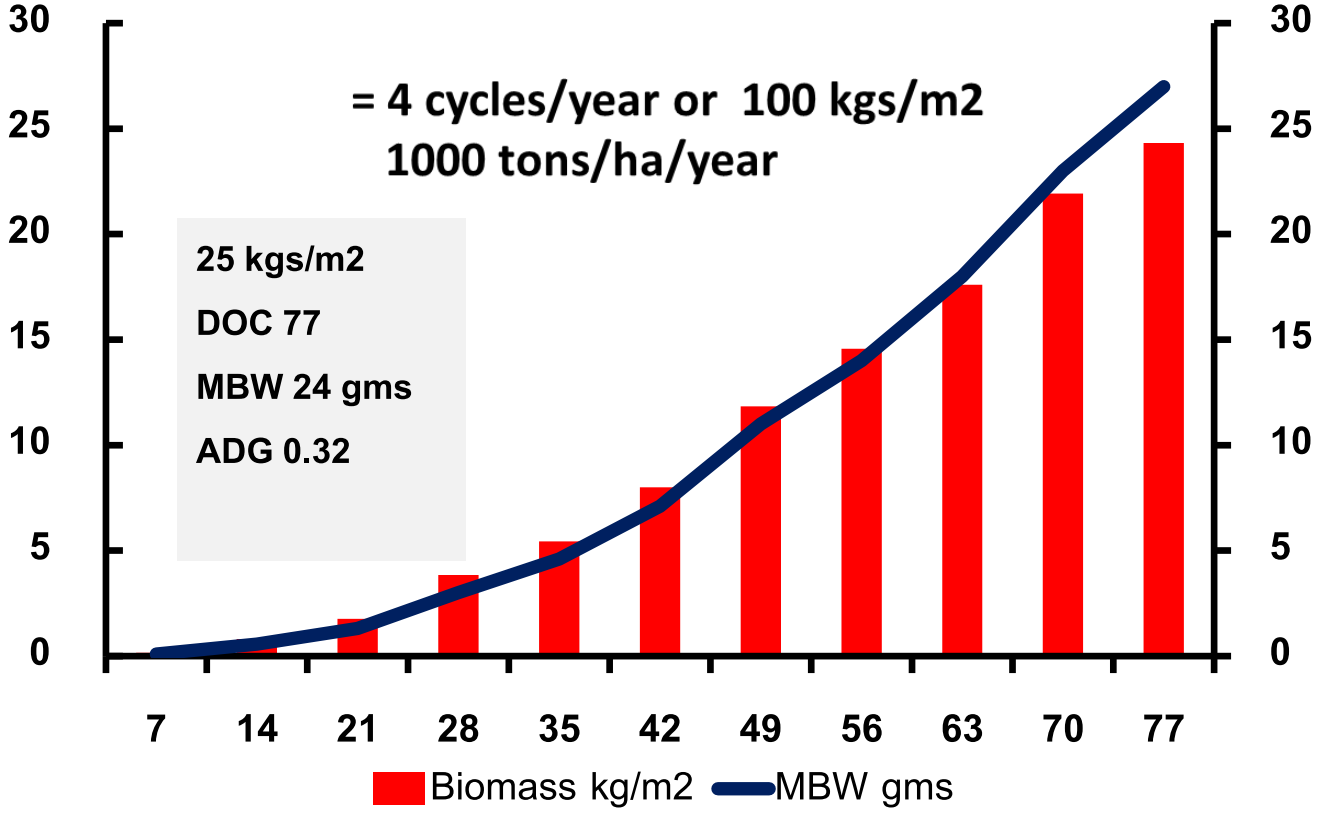
CLEAR WATER OR FLOC RAS

	Bio-Floc	Clear Water
Density (#/m3)	250	650
Growth (ADG)	0.30	0.35
Survival	80	80
FCR	1.3	1.3
Yield (kg/m3)	5.0	10.0
CAPITAL COST	LOWER	HIGHER

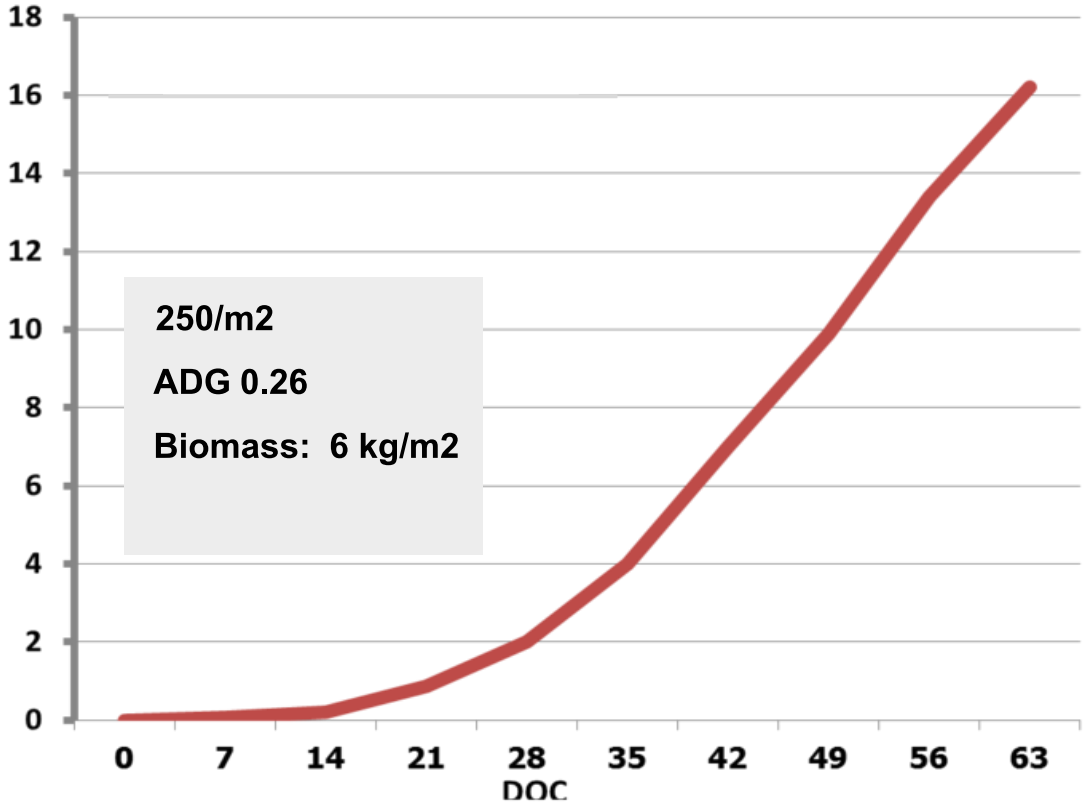
Productivity of Clear Water vs Biofloc RAS

Clear Water

Pilot RAS System operated by CPF Thailand (2019)



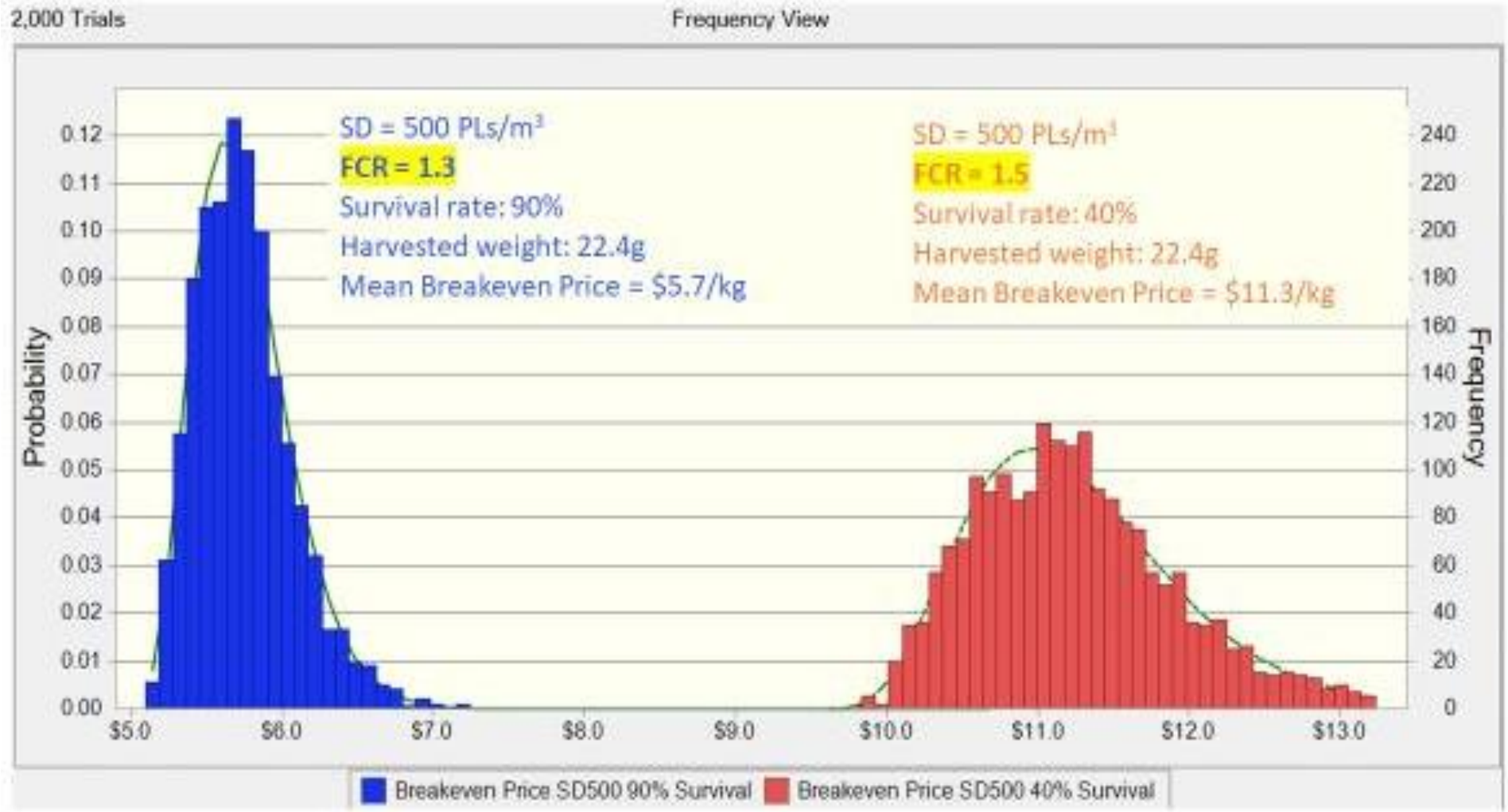
Bio Floc



COSTS MUST BE REDUCED

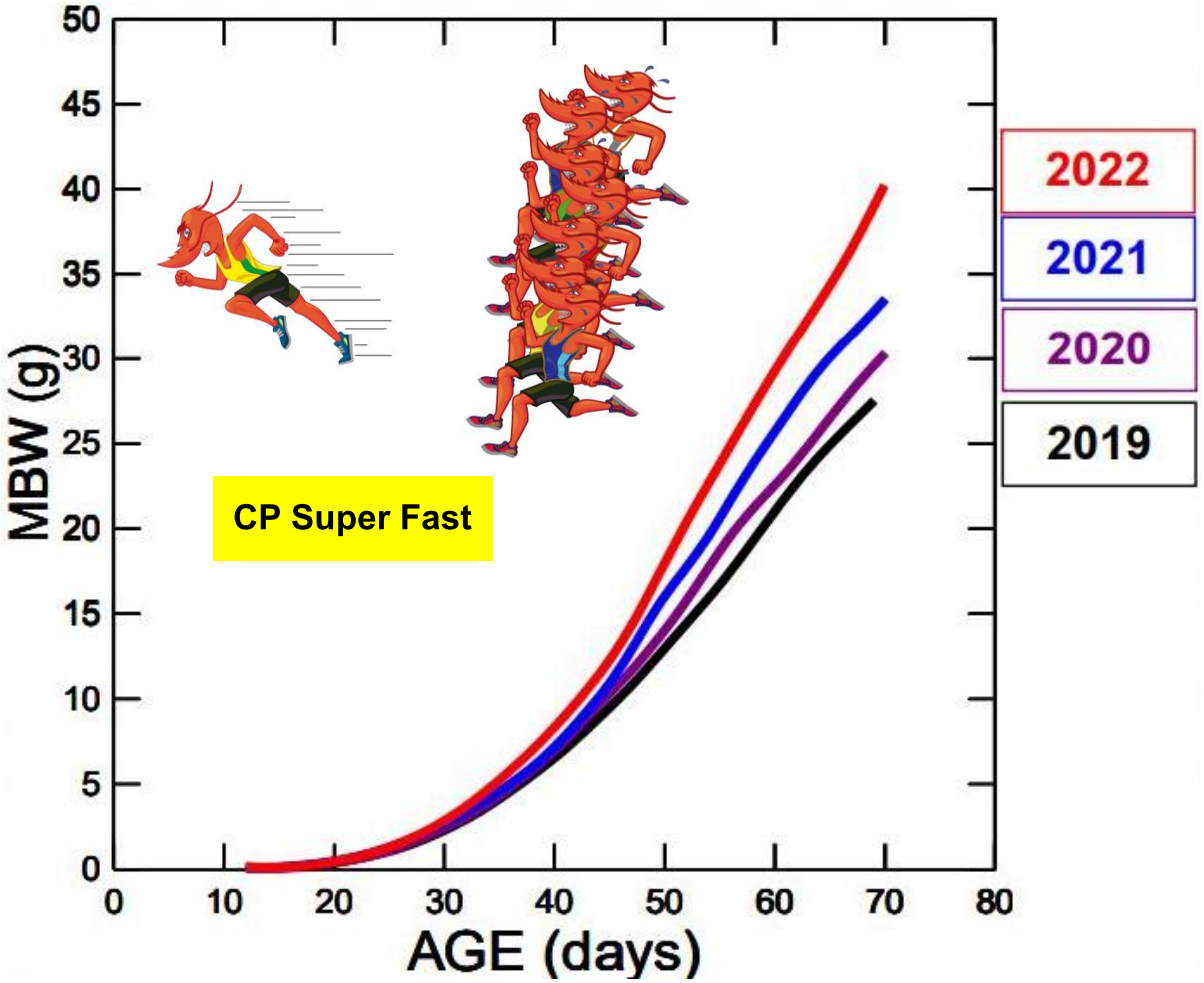
Requirements to Reduce the Costs of RAS shrimp

Breakeven Price for the Large-Scale RAS Shrimp Production in the US



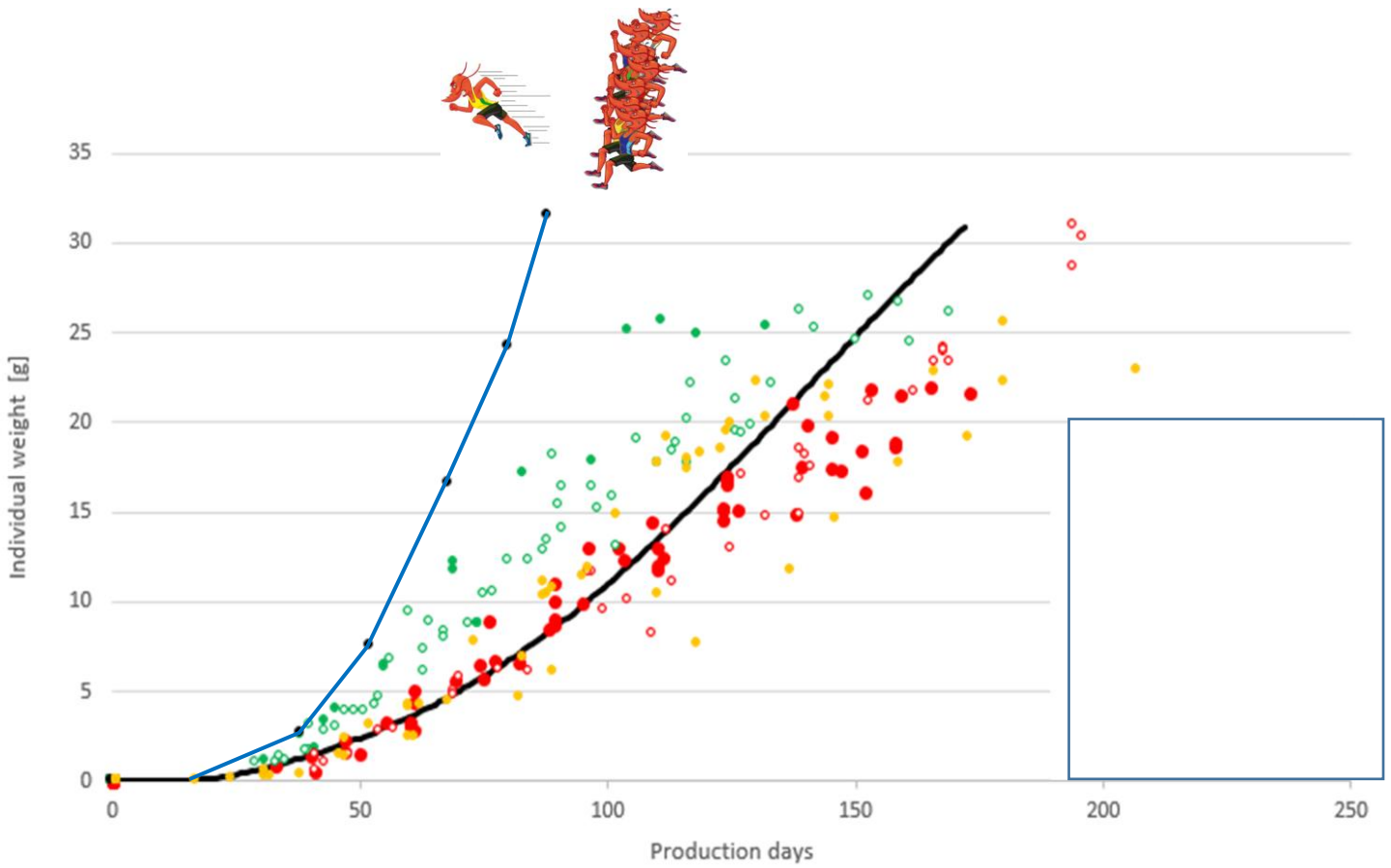

G
Genetics
X
E
Environment
X
M
Management

Development of the Homegrown Bolt Line: Indoor Super Bio-secure systems



Culture system; Bio floc, Temp 30-31 °C, Feed 48% high protein

Homegrown Bolt Line has increased success in Europe and USA RAS Culture



Genetic Potential vs Genetic Realization

Maximize Expression of Genetic Potential

Maintain constant optimum environment:

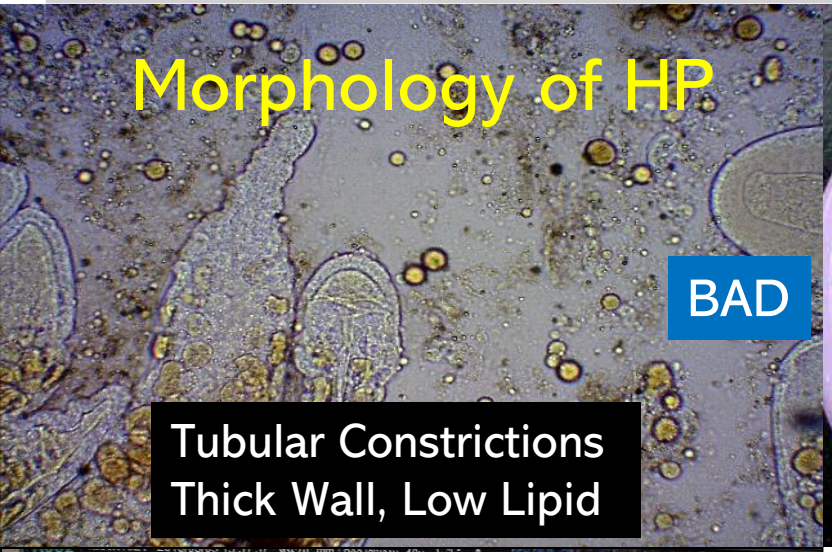
Temperature: 29-31C minimum fluctuation

Water quality: pH, nitrogen, C02, dissolved organic load

Protein and nutrient balance: More is not always best

Healthy Post Larvae

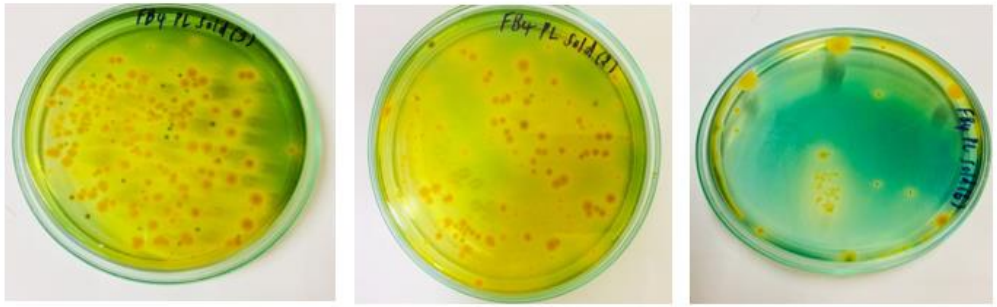
How do I evaluate the quality of a post larvae I do not know hatchery tank history



Size of Pls: number per gram : minimum (250 for pl 10)

Coefficient of Variation: <10-12%

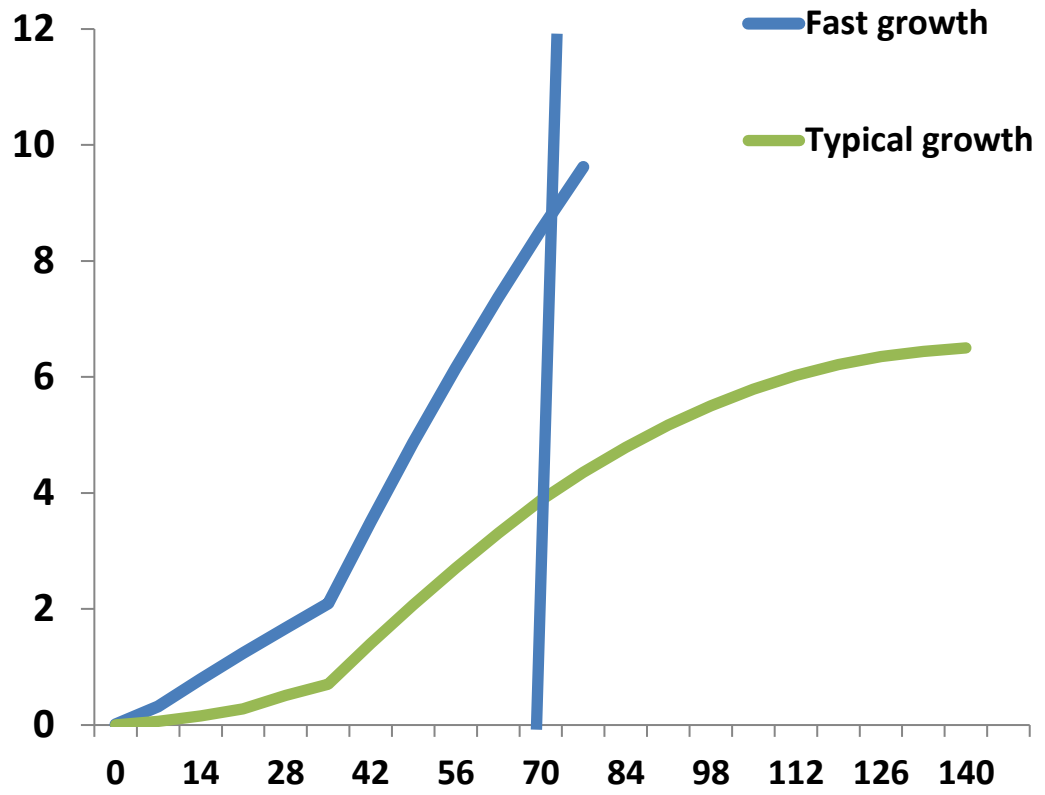
TCBS plate counts of "post larvae tissue" tells a lot about probability of early pond failure



Yellow: < 10x4
Green: < 10x3 / gram of pl

Big Issue: Why do they Die? RAS syndrome

Chronic Vibriosis from ‘Stresses”



Shrimp most often start to die at 60-70 days

Increase fcr, lower biomass yield--

Maintaining Health!!!

Appropriate system for stocking and feed rates reduces stress;

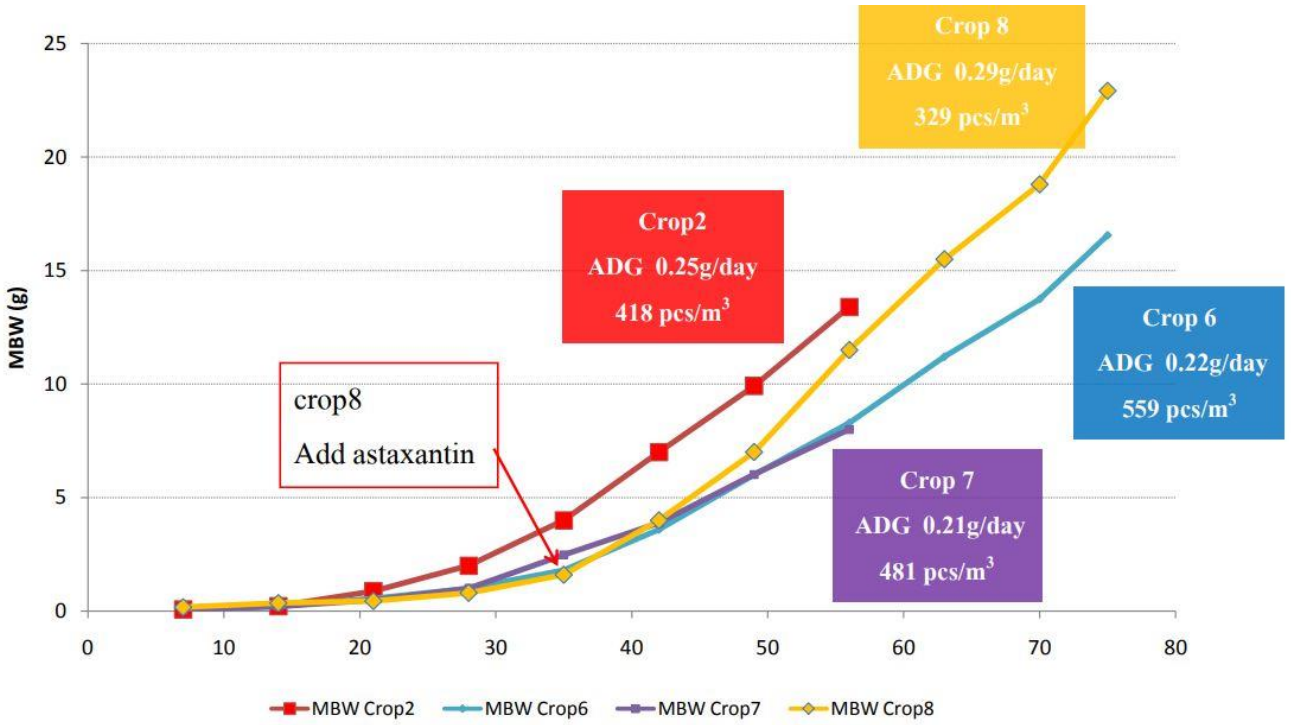
Low Stress results in healthy shrimp

No Chronic Vibriosis

Minimize STRESSES:
Low oxygen
Nitrites
pH fluctuation
Temperature fluctuation
Sulfides
High C02
Toxicity
High Organics/bacteria loads

Stressful Indoor RAS Culture results in Blue Shrimp

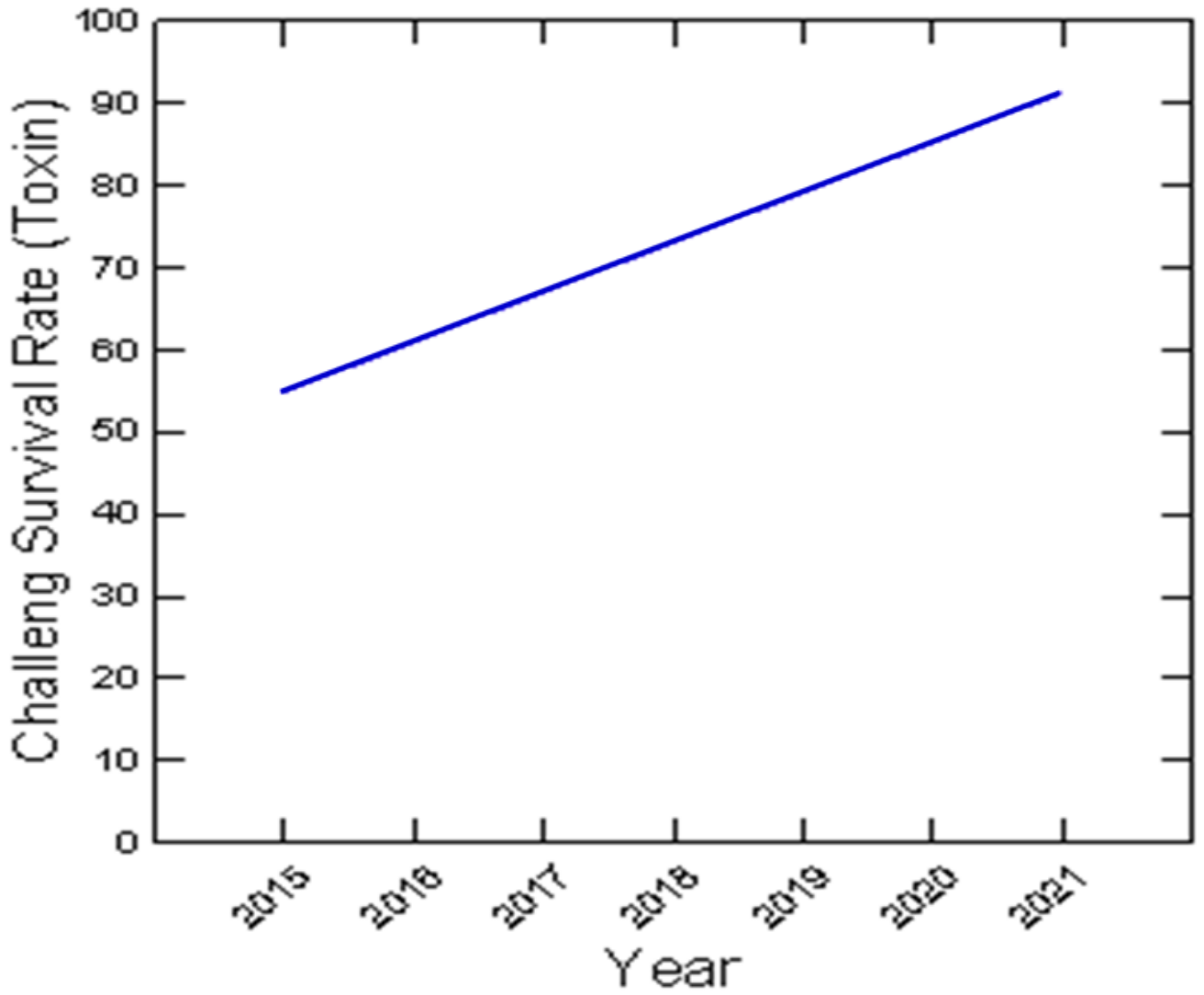
Is this a good Look?



Astaxanthin addition results in increase in growth and Survival

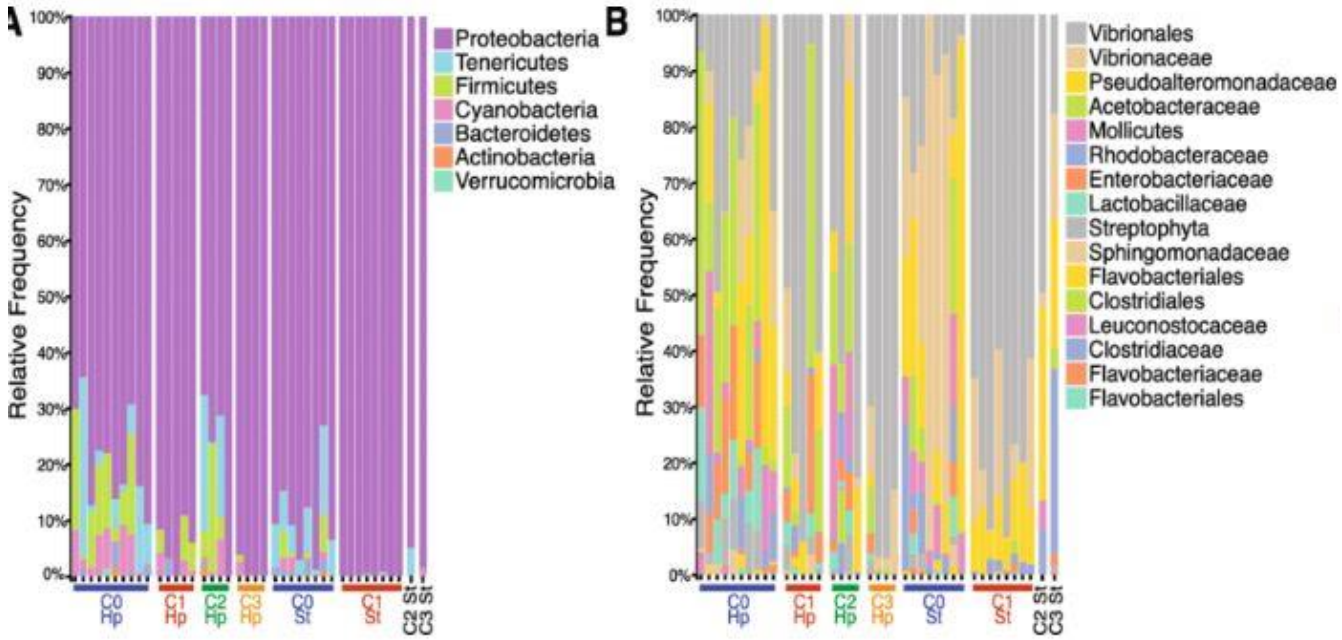
Epigenetic selection
can increase survival (robustness) of shrimp under stress

Increased tolerance to APHNS toxins over generation of selective breeding in the presence of NO_2 stress



Future Technologies that will impact- but will not solve "Inappropriate Management"

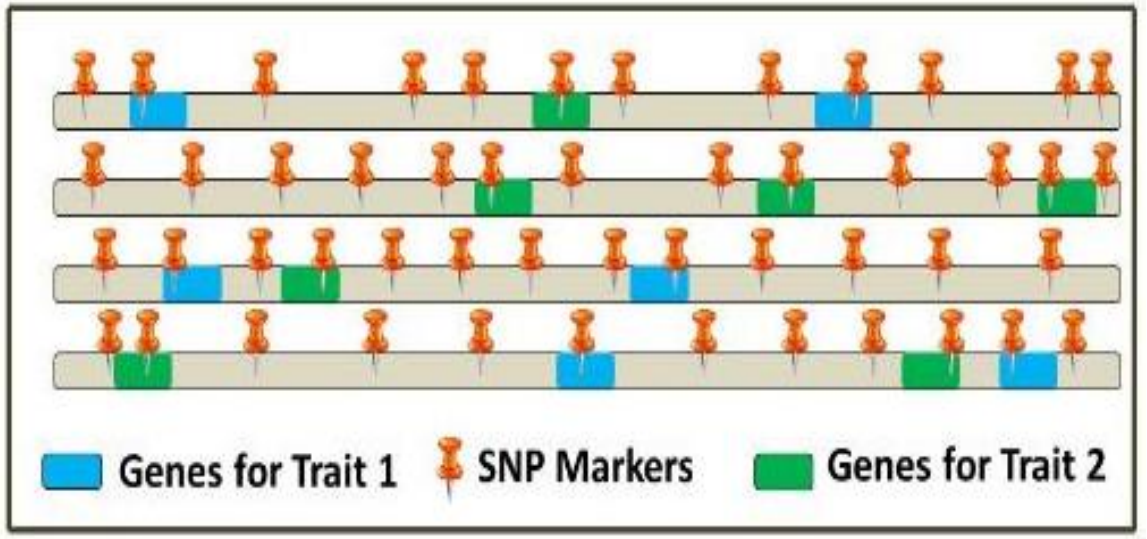
Metagenomics



Define microbial community interactions:

Cause and Effect

Genomics



Individual selection instead of family selection

Select for growth and robustness

The future of aquatic animal health and sustainability

- Genomics
- RNA Sequencing
- Epigenetics
- Autophagy
- Metagenomics
- Quorum Sensing
- Vaccines
- Artificial Intelligence/Analytics
- Probiotics/Prebiotics
- Gene Editing

The Microbial Community:
Diverse, stable Microbial communities: Less Disease

Poly-β-Hydroxybutyrate (PHB) Improves Nursery-Phase Pacific White Shrimp *Litopenaeus vannamei* Defense against Vibriosis

Magdalena Lenny Situmorang, Gede Suantika, Marchelia Santoso, Abdul Khakim, Indra Wibowo, Pingkan Aditiawati, Haniswita

First published: 20 October 2019 | https://doi.org/10.1002/naaq.10132 | Citations: 12

Applied Microbiology and Biotechnology (2024) 108:59
https://doi.org/10.1007/s00253-023-12897-3

APPLIED GENETICS AND MOLECULAR BIOTECHNOLOGY

Check for updates

Intestine bacterial community affects the growth of the Pacific white shrimp (*Litopenaeus vannamei*)

Dongwei Hou[1] · Bin Yin[1,2] · Sheng Wang[1] · Haoyang Li[1,2] · Shaoping Weng[1,2,3] · Xiewu Jiang[4] · Hui Li[4] · Chaozheng Li[1,3,5] · Jianguo He[1,2,3,5] · Zhijian Huang[1,3,5]

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Effects of *Bacillus subtilis* on growth performance and intestinal flora of *Penaeus vannamei*

Hongzhen Cao, Duanduan Chen, Leifeng Guo, Rong Jv, Yunteng Xin, Wei Mo, Chen Wang, Pengfei Li, Hui Wang


WE HAVE TRAVELED A LONG WAY
BUT HAVE NOT ARRIVED YET
HomeGrown
SHRIMP
CPF