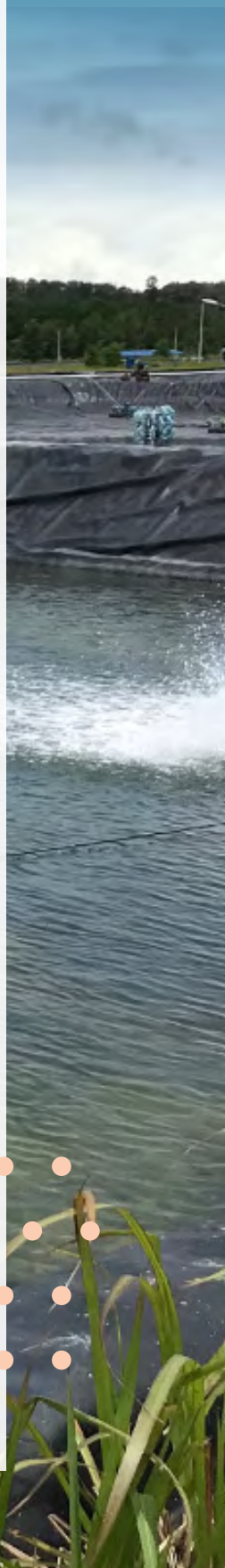
calix

AQUACULTURE
CUSTOMER STORY \ OCTOBER 2021
PAHANG, MALAYSIA

Reducing pollution while increasing yield

at a shrimp farm pond liner, in Pahang, Malaysia



AQUA-Cal+™

Case Study Snapshot

Background

This farm had problems with reduced yields and deteriorating water quality. We suggested using AQUA-Cal+ standard protocol to improve water quality and in doing so destressing the shrimp and improving yield.

CHALLENGES

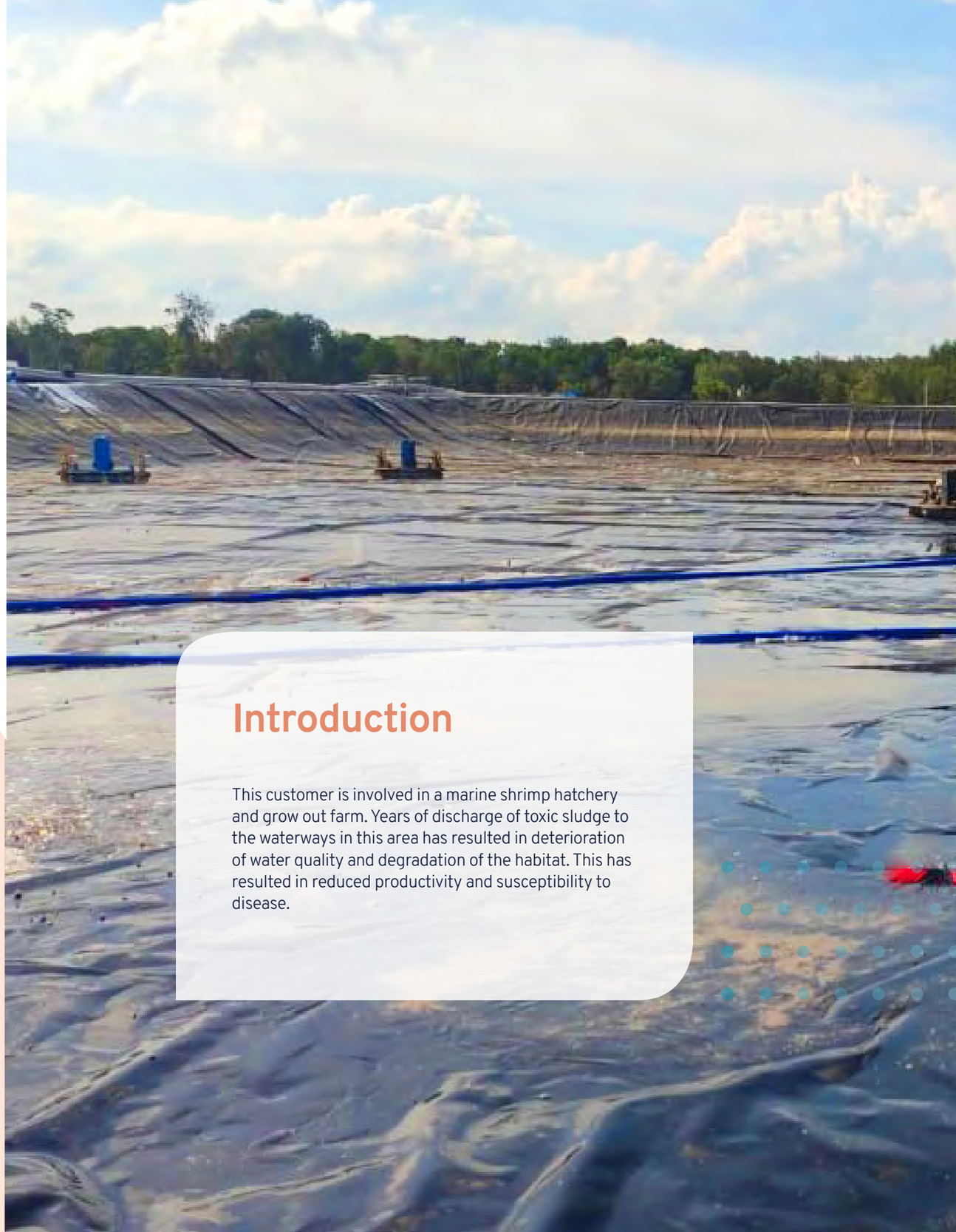
- Low survival rates
- Poor water quality

SOLUTION

AQUA-Cal+ is a water conditioner, developed by Calix, that safely addresses disease and pollution, delivering improved feed performance and yield.

BENEFITS

- Increased water quality
- Increased survival rates
- Increased harvest weights



Introduction

This customer is involved in a marine shrimp hatchery and grow out farm. Years of discharge of toxic sludge to the waterways in this area has resulted in deterioration of water quality and degradation of the habitat. This has resulted in reduced productivity and susceptibility to disease.

The Solution

AQUA-Cal+, making aquaculture more sustainable

AQUA-Cal+ has already begun to transform prawn and shrimp farming, as well as fin fish farming. It improves water condition, reduces stress on the animals and helps lead to increased harvest weight and survival rates, whilst protecting the environment.

Multiple benefits in a single solution:

Improved water quality

- AQUA-Cal+ works as a water and pond bottom conditioner; clarifying the water, controlling pH and releasing alkalinity as required to aid in the digestion of organic matter.

Less stress on prawn and shrimp

- With stabilised conditions in the pond, stress is reduced. When stress is reduced and water condition is improved, both fish and prawns become healthier and more productive.

Sludge volume reduced

- As AQUA-Cal+ neutralises the pond bottom sludge and accelerates its breakdown, pond bottom septicity is prevented. AQUA-Cal+ helps release organic material for the growth of phytoplankton (natural food for shrimp), while binding the toxic contaminants. Subsequently, the smell of the sludge is greatly reduced, with less toxic compounds in the water.

Iron suppression

- Conditioning with AQUA-Cal+ removes the iron by flocculation from the water, significantly reducing turbidity and toxicity. The stocking of the pond after the water is conditioned reduces the subsequent mortality of the post-larvae.

*Under ideal conditions.

Higher revenue – yield at harvest up to 20%*

- Results from trials on both Pacific White Shrimp and Tiger Prawns show that AQUA-Cal+ has a superior performance to probiotics in controlling ammonia, nitrite and pond bottom sludge.
- The data consistently shows AQUA-Cal+ stabilises alkalinity; suppresses extreme changes in pH; provides ingestible essential magnesium and calcium; reduces turbidity, improves light penetration; improves phytoplankton productivity; reduces toxic metals in the system (copper and zinc); and reduces ammonia and nitrite.

LINER POND PROTOCOL

https://www.calix.global/wp-content/uploads/2021/04/LINER-POND-PROTOCOL_rebranded87944.pdf

Observations

Pond size: 4000m_2
Depth: 1.5 m
Stock density: 138 pc/m^2
Fully Lined pond
Culture: Vannamei shrimp

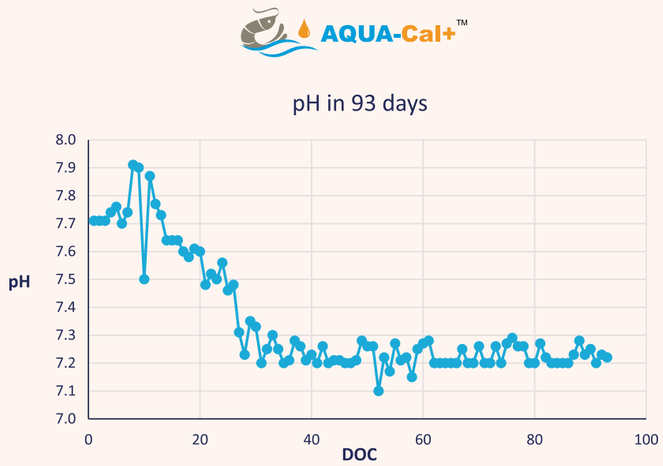
Pond	Days Of Culture (Days)	Average Body Weight (g)	Survival Rate (%)	Feed Conversion Rate (FCR)	Total Harvest Weight (Kg)	Est Harvest Revenue (RM)	Difference Against Control (Kg)	(%)	(RM)
Control	99	28	44.31	2.09	5916	177,838	-	-	-
AQUA-Cal+	94	25	66.05	1.88	7733	218,839	+1817	+30.7	+41,001

The cost of 68ppm / 272 kg of AQUA-Cal+ = Rm1360 (cost for full grow out including pre-treatment)

Hence the nett extra revenue generated by using AQUA-Cal+ = RM41,001 – RM1360 = **RM 39,641**

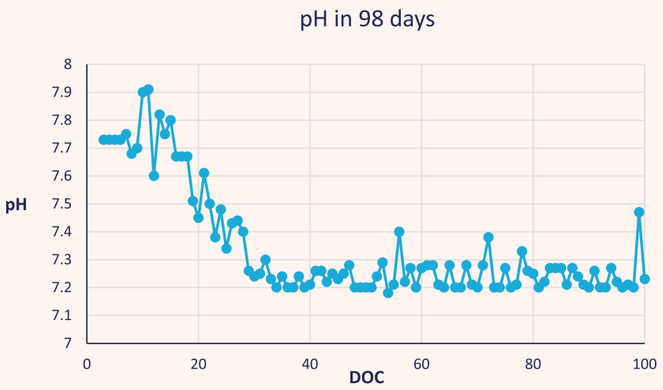
Better pH stability with AQUA-Cal+

The pond using AQUA-Cal+ has a more stable pH and less fluctuations compared with the control. This means less stress on the shrimp, enabling better survival and healthier animals.



Pond 17 (With AQUA-Cal+)

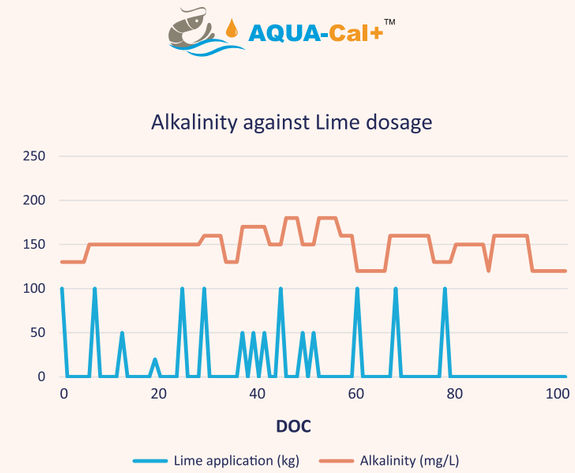
Control



Pond 19 (Without AQUA-Cal+)

Alkalinity control with AQUA-Cal+

As we can see in the graph, the pond using AQUA-Cal+ is easier to control at an optimum alkalinity level.

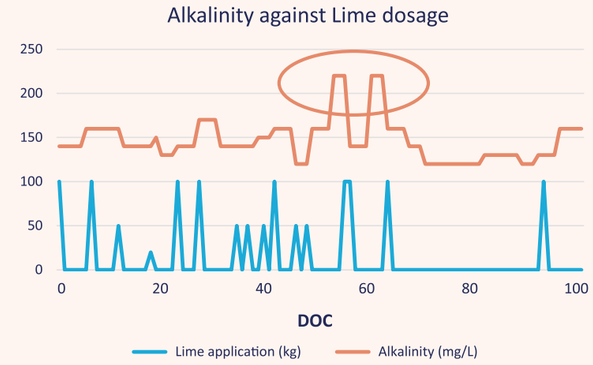


Pond 17 (With AQUA-Cal+)

Total lime use 1220 kg

In pond 19 we see an alkalinity spike which can potentially cause an undesirable pH. We also saw some saving in lime dosing. A more stable pH leads to controlled moulting.

Control

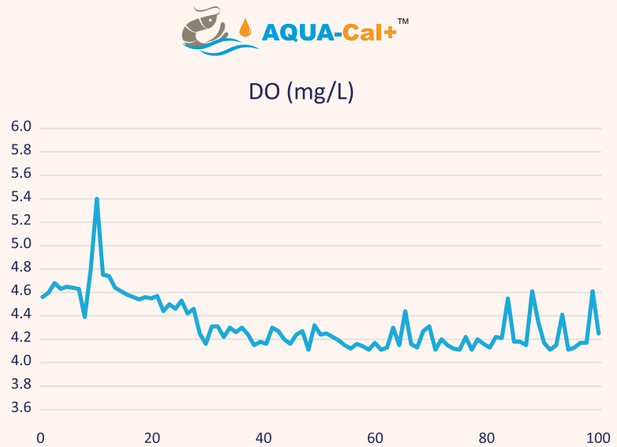


Pond 19 (Without AQUA-Cal+)

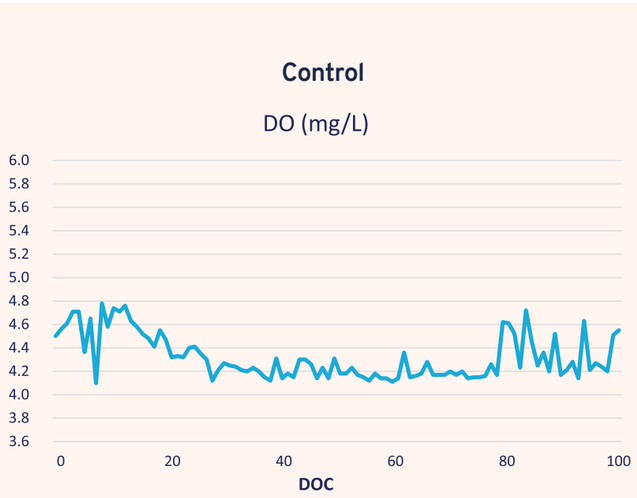
Total lime use 1220 kg

Dissolved Oxygen

Dissolved Oxygen (DO) of the AQUA-Cal+ pond is quite similar to the control pond. As daily sludge drainage is the usual practice, algae growth may be limited in the pond by removing the nutrient source. As a result, we do not see a significant difference in dissolved oxygen.



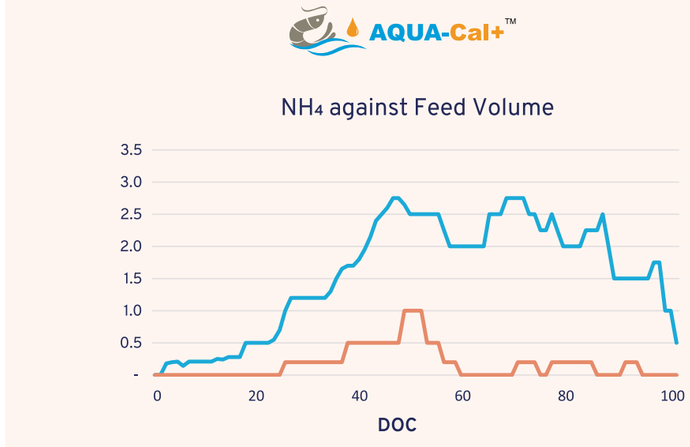
Pond 17 (With AQUA-Cal+)



Pond 19 (Without AQUA-Cal+)

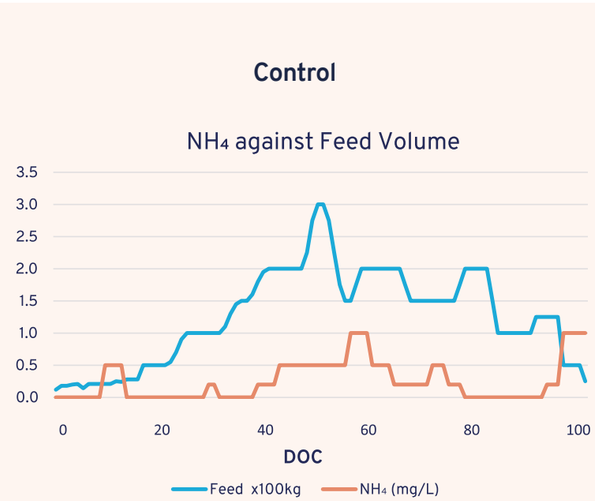
Ammonia suppression using AQUA-Cal+

Ammonia suppression in the AQUA-Cal+ pond is more significant with more feed input compared with the control. This is due to higher survival rates.



Pond 17 (With AQUA-Cal+)

In the control pond, even with a low feed volume, ammonia still increased quite significantly.

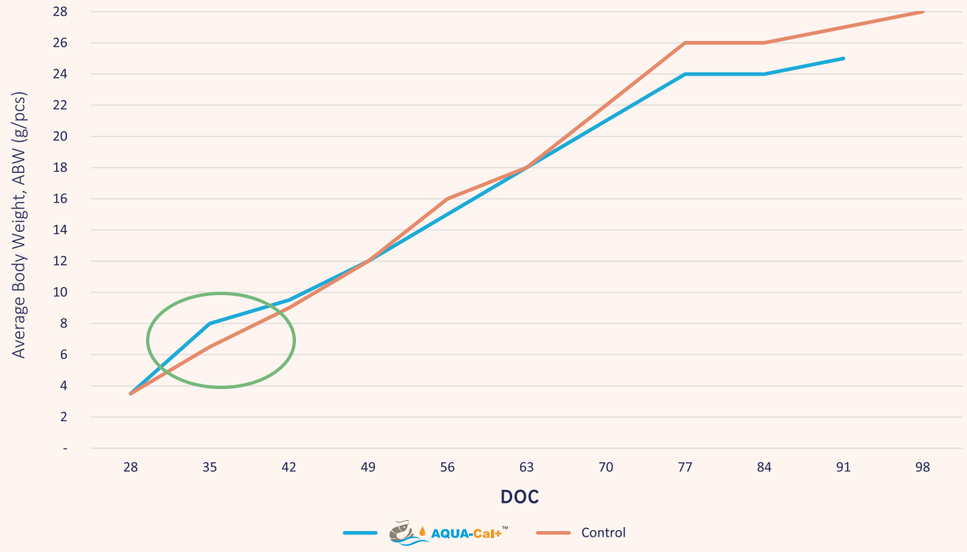


Pond 19 (Without AQUA-Cal+)

Better growth with AQUA-Cal+

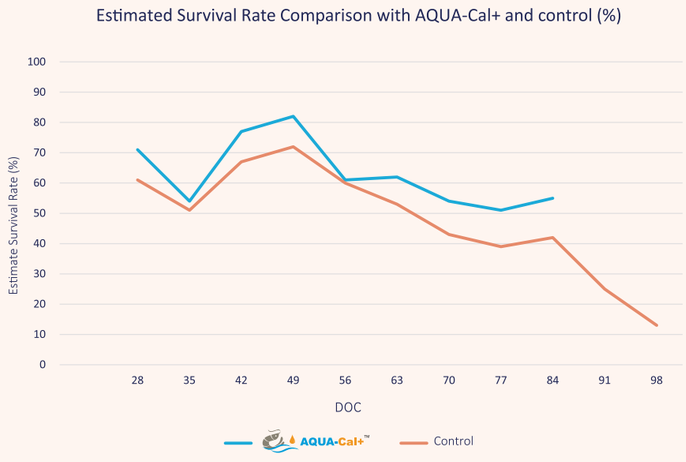
As we can see below, the circle shows that AQUA-Cal+ has a much better growth rate than the control in the early grow out stage where sludge drainage has not yet occured. However, in the later stages we see a slow down. The reason for this is that AQUA-Cal+ uses the phosphate in the feed for the Struvite reaction that controls ammonia.

As shrimp need both protein and phosphate for growth, shrimp growth is slowed. This can be rectified by dosing phosphate and stopping or reducing sludge drainage. This provides a phosphate sink (as in earthen ponds) and allows further reduction in feed conversion ratio (FCR) due to better algae availability.



Much better survival rate with AQUA-Cal+

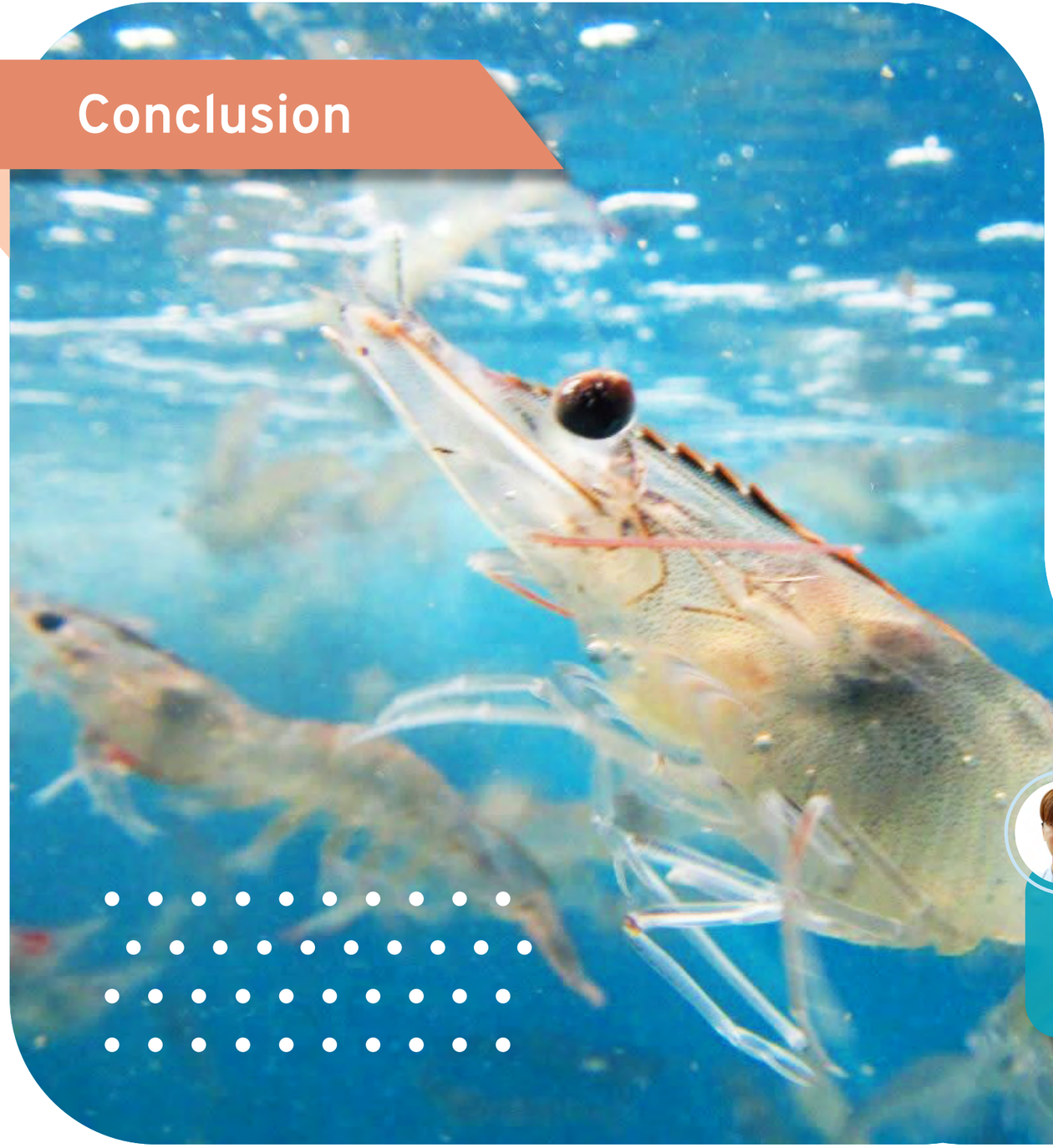
As we can see in the graph, the AQUA-Cal+ pond's estimated survival rate is much higher than in the control pond.



	Control Pond	AQUA-Cal+ Pond
Final survival rate (%)	44.31	66.05

As for the final survival rate (this figure was provided by the customer), the pond that used AQUA-Cal+ had an increased survival rate of around **22%**. The customer also mentioned a higher biomass in the AQUA-Cal+ pond compared with the control pond.

Conclusion



This farm, like many in the area, was suffering from poor water quality and reduced yields. This is a recurring pattern throughout Asia and can be traced back to the common practice of sludge discharge directly into waterways.

We can clearly see the benefits of using AQUA-Cal+ in a liner pond, even though our full protocol was not followed.

Survival rate is improved as AQUA-Cal+ cleans up the watertable during pre-treatment. When the post larvae (PL) are introduced, the water quality is improved and stabilised. This removes one of the major stress factors in early culture (poor water quality) which allows better survival rates and ultimately improved yield.

During the culture we were able to control pH, alkalinity and ammonia, again reducing stresses and allowing increased survival rate.

Both DOC and FCR were improved.

We see enhanced ABW in the early stages of the culture. This drops off once the farmer reverts to the usual drainage pattern. We have advised the farmer to reduce the frequency of drainage allowing sludge to be left in the pond. This provides a source of phosphate to allow the Struvite reaction to continue during the full culture, subsequently allowing the ABW to continue to be better than the standard culture.

Wilson Lum
Applications Engineer Aquaculture

AQUA-Cal+ is a great alternative and a more sustainable approach to shrimp culture. Guided by our expertise and protocols, we help farmers reduce pollution while increasing their yield and revenue.

A more sustainable industry means aquaculture and shrimp farming can become a more efficient way of growing food and feed the protein needs of a growing human population.

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