Improving livability and productivity in shrimp drives your profitability

CELMANAX™ Aqua delivers unique benefits to drive shrimp productivity

The global shrimp production market has been impacted by acute hepatopancreatic necrosis disease (AHPND), caused by the *V. parahaemolyticus* pathogen. This is a severe challenge in shrimp farming, causing up to 100% mortality. ARM & HAMMER™ Animal Nutrition has developed a science-backed solution to inhibit the growth of *V. parahaemolyticus*, thereby improving shrimp survival rate.[1] Introducing CELMANAX Aqua, uniquely designed to support the health of shrimp worldwide.

CELMANAX Aqua is a multicomponent, all-natural postbiotic and prebiotic feed supplement that has Generally Recognized as Safe (GRAS) status as a feed ingredient. The refined functional carbohydrates in CELMANAX Aqua have been shown to inhibit pathogenic bacteria, support immune function and improve growth and performance across species.

CELMANAX Aqua Aids Shrimp Production and Management of AHPND

Direct pathogen inhibition[2]:

In vitro studies showed dose dependent inhibition of various *V. parahaemolyticus* strains isolated from various shrimp growing regions around the world (Table 1).

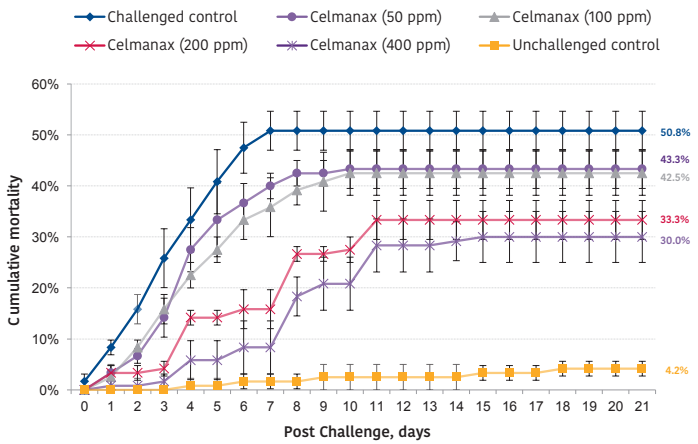
Table 1: In vitro growth inhibition of various strains of *V. parahaemolyticus* by CELMANAX Aqua liquid.

	V. parahaemolyticus strain				
	# 42	# 44	# 41	# 49	# 51
APHND Status	Neg	Pos	Pos	Neg	Neg
Country of Origin	Vietnam	Vietnam	Mexico	Ecuador	Vietnam
% Inhibition	100	100	100	100	100

Improved shrimp survival rate and immune function in challenge trial[2]:

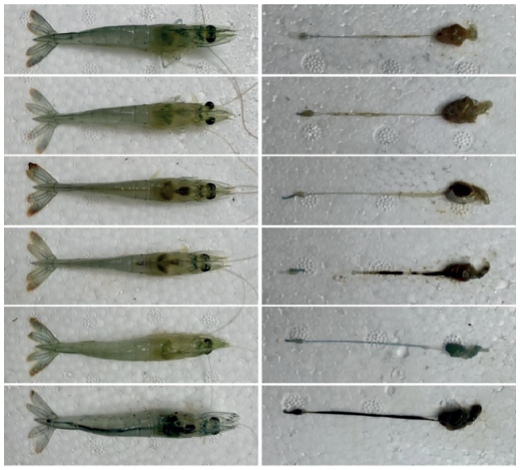
Shrimp challenged with *V. parahaemolyticus* and supplemented with CELMANAX Aqua showed a dose-dependent reduction in mortality rate (Figure 1) and gross signs of AHPND (Figure 2). Improvement in key immune markers and antimicrobial peptides were also noted.

Figure 1. Cumulative mortality in shrimp challenged with *V. Parahaemolyticus.*



Phenoloxidase activity and respiratory burst activity was higher in CELMANAX Aqua-supplemented shrimp challenged with *V. parahaemolyticus* compared to challenged shrimp fed control diet. Expression of anti-microbial peptide genes, Penaedin-3a and Crustin were also upregulated in shrimp fed CELMANAX Aqua.

Figure 2. Gross signs of APHND and HP of experimental shrimps at 48h after challenge.



Note: Health status of shrimp determined by gut fullness and size and color of hepatopancreas.

CELMANAX benefit on performance[3]:

Shrimp that were supplemented with CELMANAX Aqua supplementation increased final BW, rate of weight gain and percent survival compared to control treatment (P<0.05) (Table 2).

There was also a decrease in feed conversion ratio (FCR) in Celmanax Aqua supplemented shrimp compared to control treatment (P<0.05).

In conclusion, CELMANAX Aqua supplementation in shrimp diets can support growth and immune function and improve survivability against the AHPND challenge.

Table 2. Effect of CELMANAX Aqua supplementation on shrimp growth performance.

Parameter	Control	CELMANAX 100 PPM	CELMANAX 200 PPM
Initial BW, g	1.20 ± 0.05	1.20 ± 0.05	1.20 ± 0.05
Final BW, g	9.24 ± 0.18^{c}	10.51 ± 0.08^{b}	11.14 ± 0.23^{a}
Weight gain rate, %	611.1 ± 14.2^{c}	708.1 ± 6.0^{b}	756.8 ± 17.5^{a}
Survival, %	80.0 ± 2.5^{b}	90.0 ± 8.7a^{b}	98.0 ± 3.5^{a}
FCR FI/BW	1.72 ± 0.07^{a}	1.35 ± 0.03^{b}	1.31 ± 0.12^{b}

Superscripts within a row abc P≤ 0.05 indicate significant differences between treatments.

1 Study conducted at Can Tho University, Vietnam, 2023 – On file **2** Study conducted at University of Arizona, 2016- On file **3** Study conducted at Shanghai Ocean University, China

To learn more about how CELMANAX Aqua can help improve your shrimp production, contact your ARM & HAMMER Animal Nutrition representative.