

# Effects of Dietary Supplementation of Egg and Tuna Hydrolysates on Growth, Feed Utilization and Disease Resistance Against *Vibrio parahaemolyticus* of Pacific White Shrimp, *Litopenaeus vannamei*



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## Abstract

This study evaluated the effect of egg and tuna hydrolysates on weight gain (WGR), feed conversion ratio (FCR) and disease resistance against *Vibrio parahaemolyticus*. A control diet (SLP) was prepared including 4.7% squid liver powder. Another five diets were formulated including 2% and 4% of egg hydrolysate-1 and 2 (OVA1-2, OVA1-4, OVA2-2 and OVA2-4) and 2% tuna hydrolysate (TH-2). Five replicate groups of treatments, each containing 32 shrimp (0.41±0.00 g) per tank (220 L), were fed with the relevant diet for 10 weeks at 4-15% daily biomass gain. At the end of the feeding trial, WGR and FCR were calculated. The remaining shrimp in each treatment were pooled and redistributed into four replicate tanks (110 L) to contain 15 shrimp per tank. Then, tanks were inoculated with 40 mL of  $1.83 \times 10^5$  CFU  $\text{mL}^{-1}$  *V. parahaemolyticus* bacteria solution and challenged for 240 h, recording the hourly cumulative mortality percentage.

Shrimp fed hydrolysate-incorporated diets showed significantly higher growth than SLP treatment. Except for the OVA1-2 group, the highest growth was observed in the OVA2-4 group among hydrolysate groups. Dietary supplementation of OVA1-2 and OVA2-4 significantly improved feed utilization than SLP diet.

During the bacteria challenge test, tuna hydrolysate treatment showed a higher survival than other treatments and SLP diet fed group showed the lowest.

This study indicated that dietary hydrolysate supplementation improves growth, feed utilization and survival against *V. parahaemolyticus*.

## Experimental Design and Sampling

### Experimental setting evaluations

- ✓ 32 Shrimp per tank
- ✓ 5 replicates per treatment
- ✓ Initial body weight -  $0.41 \pm 0.00$  g
- ✓ Treatments were assigned in RCBD
- ✓ 4-15% Feeding ration
- ✓ Shrimp were fed for 10 weeks
- ✓ Growth performance was measured
- ✓ Feed utilizations were calculated



### Bacteria challenge

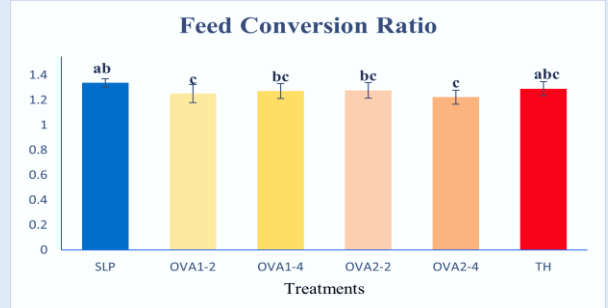
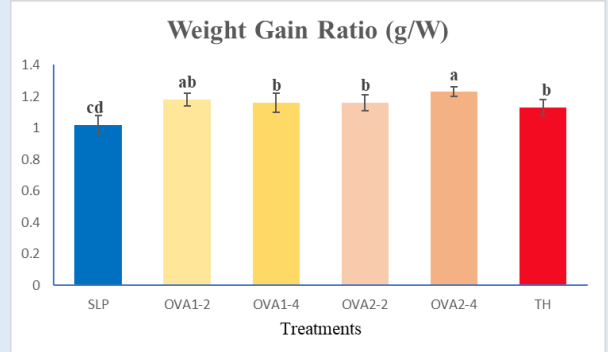
- ✓ After the feeding study, the remaining shrimp in each treatment were pooled
- ✓ 15 shrimp per tank
- ✓ Four replicate tanks (110 L)
- ✓ Inoculated with 40 mL of  $1.83 \times 10^5$  CFU  $\text{mL}^{-1}$  bacteria solution



- ❖ Mortality was recorded for 240 h

## Results

### Growth and Feed Efficiency



## Background and Objectives

- Protein hydrolysates are promising ingredients in aquafeed industry due to their nutritional value and functional properties on
  - ✓ Growth performance
  - ✓ Feed utilization
  - ✓ Immunomodulation
  - ✓ Antimicrobial and antioxidant activities

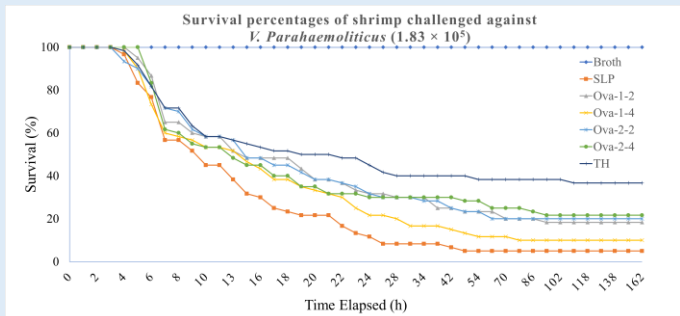
- This study assessed the effect of egg and tuna hydrolysates on
  - ❖ Weight gain (WGR, grams/week)
  - ❖ Feed conversion ratio (FCR)
  - ❖ Disease resistance against *Vibrio parahaemolyticus*

## Materials and Methods

### Diet formulation

Ingredients	Experimental diets					
	SLP	Ova-1-2	Ova-1-4	Ova-2-2	Ova-2-4	TH
Tuna meal (60%P)	9.17	9.17	9.17	9.17	9.17	9.17
Squid liver powder	4.70					
Egg hydrolysate 1		1.91	3.82			
Egg Hydrolysate 2				1.91	3.82	
Tuna Hydrolysate						0.72
Corn gluten	2.00	2.00	2.00	2.00	2.00	2.00
Wheat Gluten	2.50	2.50	2.50	2.50	2.50	2.50
Soybean meal	43.7	46.7	44.7	46.7	44.7	47.7
Wheat flour	18.0	18.0	18.0	18.0	18.0	18.0
Starch	6.46	6.32	7.21	6.32	7.21	5.34
Soybean oil	1.93	1.86	1.82	1.86	1.82	1.86
Fish oil	2.00	2.60	2.60	2.60	2.60	2.60
Lecithin	1.48	0.88	0.16	0.88	0.16	1.59
Mineral Mix <sup>1</sup>	2.00	2.00	2.00	2.00	2.00	2.00
Vitamin Mix <sup>2</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Cholesterol	0.06	0.06	0.02	0.06	0.02	0.09
Choline chloride	1.00	1.00	1.00	1.00	1.00	1.00
MCP <sup>3</sup>	3.00	3.00	3.00	3.00	3.00	3.00
Guar gum	1.00	1.00	1.00	1.00	1.00	1.00
Total (%)	100	100	100	100	100	100
Proximate composition (% dry matter)						
Crude protein	37.9	37.6	37.6	37.7	38.6	38.7
Crude lipid	9.26	9.92	10.0	9.61	9.75	9.73
Ash	9.26	9.21	9.10	9.11	9.06	9.46
Moisture	7.40	7.18	7.22	7.30	7.34	7.38

### Challenge Study



## Conclusions

- ✓ All the dietary hydrolysate supplementations improves growth and feed utilization.
- ✓ Dietary tuna hydrolysate supplementation improved the survival against *V. parahaemolyticus*.