

# Use of Empro proteins in shrimp

## Introduction

Empro produces different protein meals by hydrolysis of purified chicken feathers via a patented production process. FM725 is a premium hydrolysed feather meal aimed at attaining optimum digestibility. FM-X is an experimental product with smaller peptides and soluble protein. The aim of this trial is to partially replace the fishmeal in the shrimp diet and select the optimal replacement/inclusion level.

## Feeding trial set up

From a same batch of *L. vannamei* shrimp, a total number of 400 individuals with an average weight of 3.2-3.3 grams were divided over 20 baskets of 60L each - one control and 4 treatments with 4 replicates each. All baskets were placed in 2 bigger connected tanks, so environmental parameters were the same for all treatments. Water quality was maintained with bioflocs. Feeding was done automatically, quantities adjusted weekly for biomass. The trial ran for 6 weeks and survival, growth and FCR were measured weekly.



## Feeds

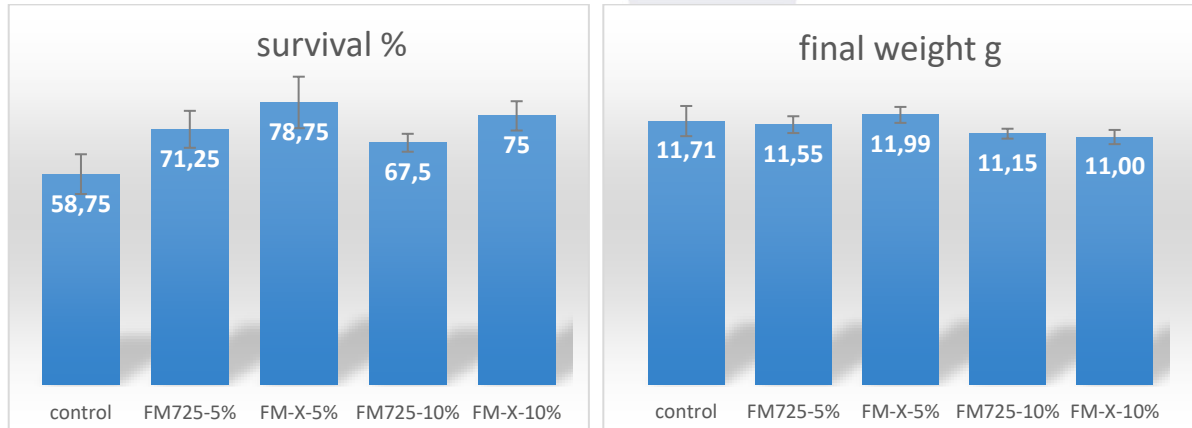
All feeds contained 38% protein/7% lipids. The control diet included 20% Danish fishmeal LT, the treatments contained different inclusion levels of the FM725 and FM-X and formulations were made isocaloric and isonitrogenous by adapting fish oil and wheat flour.

### Composition of the experimental diets

	control	FM725 5%	FM-X 5%	FM725 10%	FM-X 10%
Corn gluten	5	5	5	5	5
Danish fishmeal LT	20	14	12,4	8	6,4
Wheat flour	39,7	40,7	41,2	41,7	42,2
Fish oil	2,8	2,8	2,9	2,8	2,9
Empro FM725		5		10	
Empro FM-X			5		10
other	32,5	32,5	32,5	32,5	32,5

Other include haemoglobin powder, soybean meal, wheat gluten, soya lecithin and vitamin/mineral premix.

## Results



## Overview

	control	FM725 5%	FM-X 5%	FM725 10%	FM-X 10%
Initial weight (g)	3,25	3,23	3,31	3,31	3,30
Final weight (g)	11,71	11,55	11,99	11,15	11,00
Weekly growth (g)	1,41	1,38	1,44	1,31	1,28
Survival %	58,75	71,25	78,75	67,5	75
FCR	2,05	1,49	1,58	1,80	1,55

## Conclusion

Replacement of 40 up to 68% of fishmeal with the Empro meals has no negative effect on growth. There is a clear positive effect of FM725 on survival and the product including small peptides and solubles strengthens this effect. This can be explained by the higher attractability of the diet, making the shrimp eat more and make them stronger. This was a weak batch as of the beginning (low survival rates especially for the control) so the Empro proteins might also have improved stress resistance resulting in a higher survival.

The higher survival rates also influence the FCR, which is of course better with a higher survival. The higher inclusion rate of 10% does not improve growth rates but still results in a better survival. Best results were obtained with the 5% FM-X protein mix.

## Recommendation

A significant proportion of fishmeal (up to 68%) can be replaced with FM725 or FM-X. A final inclusion level of 5% for example results in a similar growth as the control feed but improves survival. Calculating the cost of the replacement feeds, shows that inclusion of 5% Empro proteins can lower the total cost of the feed up to 10%. Together with an improved survival this results in a more cost efficient shrimp production.