

# Digestibility of Empro proteins in shrimp

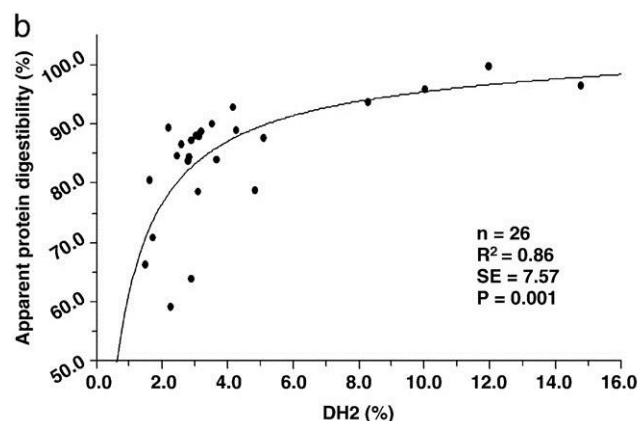
## Introduction

Empro produces different protein meals by hydrolysis of purified chicken feathers via a patented production process. EM'PAQ is a premium hydrolysed feather meal, PRO VIVA is a protein meal with a well-balanced soluble protein fraction and a wider range of peptides and PEP'SOL is a soluble protein concentrate. The degree of protein hydrolysis *in vitro* is determined with species specific enzymes and correlated with the *in vivo* apparent digestibility.

## Methodology

Protein digestion in the digestive tract of *L. vannamei* shrimp was simulated through the reaction of Empro proteins and proteolytic enzymes from the hepatopancreas of these shrimp. The degree of hydrolysis obtained by the pH-stat method is positively correlated to apparent protein digestibility in shrimp (Lemos *et al.*, 2009).

A suspension of the Empro proteins in distilled water was set at pH 8 following the addition of enzyme extract for protein digestion. Enzymatic breakage of the Empro peptide bonds produces slight reduction in pH that is registered and automatically neutralised via NaOH addition. After 1h reaction, the amount of NaOH used is proportional to the number of peptide bonds cleaved and provides the degree of hydrolysis (%DH). The Predicted apparent Protein Digestibility (PPD) is then calculated by a regression between *in vivo* apparent protein digestibility and *in vitro* protein digestion.

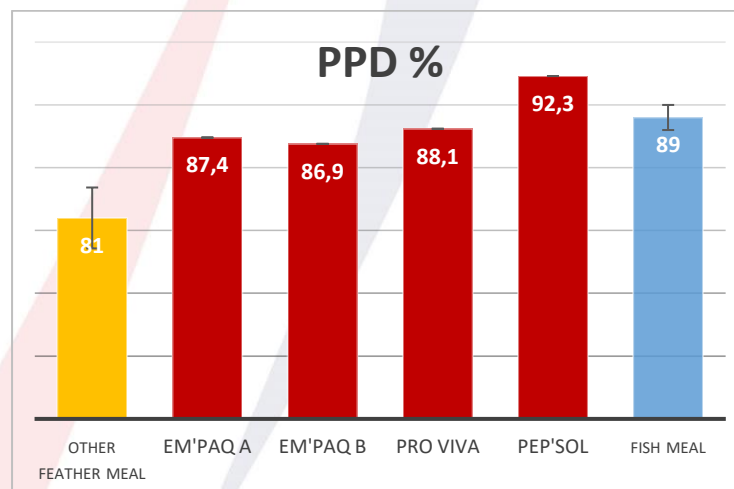


Prediction of *in vivo* apparent protein digestibility in juvenile whiteleg shrimp by *in vitro* protein digestion with its digestive enzymes (DH) of different raw material samples (Lemos *et al.*, 2009)

## Results

The degree of protein hydrolysis (DH) and the calculated PPD (Predicted Protein Digestibility) (Lemos *et al.*, 2009) are presented in the below table.

	Degree Hydrolysis DH (%) (s.d.)	PPD (%)
PEP'SOL	6,50 (0,03)	92,3
EM'PAQ, batch A	4,16 (0,34)	87,4
EM'PAQ, batch B	4,00 (0,07)	86,9
PRO VIVA	4,41 (0,23)	88,1



Predicted protein digestibility by DH% of different ingredients (Lemos *et al.*, 2009), compared to Empro products

## Conclusion

The degree of hydrolysis (DH) of all the EMPRO meals was high with PEP'SOL reaching the highest level of 6,5%. This is explained by the increased soluble protein fraction with its shorter chain peptides that are easier digestible. DH values for 'regular' feather meals ranged between 2 and 3 (personal communication Daniel Lemos), corresponding with predicted *in vivo* protein digestibility of 78-83%. **The Empro protein meals have a DH% value of more than 4 which is significantly higher, resulting also in a higher predicted *in vivo* digestibility of up to 88%.** These values are very similar to various fish meal samples analysed by the same method.

## Reference

Lemos, D., Lawrence, A.L., Siccardi III, A.J., 2009. Prediction of apparent protein digestibility of ingredients and diets by an *in vitro* pH-stat degree of protein hydrolysis with species-specific enzymes for juvenile Pacific whiteleg shrimp *L. vannamei*.