EVALUATION OF THE APPARENT DIGESTIBILITY OF PROTEIN, ENERGY AND AMINO ACIDS OF SIX PROTEIN SOURCES AT THREE INCLUSION LEVELS FOR JUVENILE WHITE SHRIMP *LITOPENAEUS VANNAMEI* IN HIGH PERFORMANCE CONDITIONS

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The majority of the shrimp feeds are formulated disregarding the availability of its components with potential for limiting animal performance and increasing the effluent load. Digestibility methods should take into account different inclusion levels, the processing of the feed ingredients, feed preparation method, on-farm feed management and the growth of the animals should be equal to or greater than practical farming conditions. In this study the ingredient digestibility and shrimp performance were evaluated simultaneously in a recirculating aquaculture system (RAS) with shrimp stocked at a mean density of 45 shrimps in 32 tanks with 500 L and settling columns designed for the removal of shrimp solids. The digestibility trials with the six protein sources: Chilean fish meal (FM), soy protein concentrate (SPC), poultry by product meal (PBM), corn gluten meal (CGM), beef meat and bone meal (MBM) and hydrolyzed feather meal (HFM) was performed at inclusion levels of 10, 20 and 30% in a reference diet giving a total of 18 test diets. The results showed that the apparent digestibility of tested ingredients was significantly affected by their inclusion levels in the test diets and this effect was more pronounced for corn gluten meal and poultry by product meal, which displayed the greatest amino acids imbalance. The ingredients that presented the highest coefficients for the apparent dry matter, protein and energy digestibility and amino acid availability was FM and SPC in contrast to poultry by product meal and hydrolyzed feather meal which apparent digestibility coefficients were significantly inferior. The lowest cost for the digestible protein and energy was provided by MBM, SPC and HFM. The apparent digestibility coefficients obtained in this study were lower than those reported in the literature possibly reflecting the ingredient processing and the method that minimizes the leaching of the feces. The mean weekly weight gain ranged from 1.09 to 1.55 g shrimp^{-1} week^{-1} for CGM and FM at 30%, respectively and was significantly affected by the ingredient type, contrary to the inclusion level and the order from the higher to the lower weekly weight gain: FM > SPC > HFM > PBM > MBM > CGM. Survival rates ranged from 80 to 97.6%.

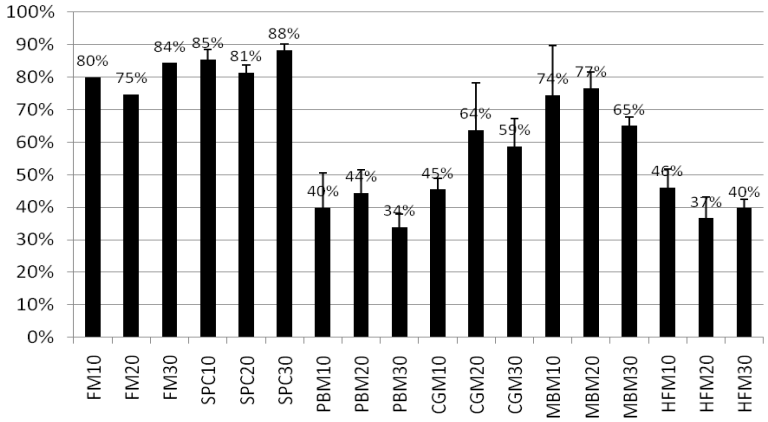

Fig. 1: Apparent crude protein digestibility coefficients for FM, SPC, PBM, CGM, MBM and HFM included at 10, 20 and 30% in a diet for the *Litopenaeus vannamei*