Scenedesmus almeriensis from an integrated system waste-nutrient, as sustainable protein source for feed to rainbow trout (Oncorhynchus mykiss)

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Scenedesmus almeriensis from an integrated system waste-nutrient, as sustainable protein source for feed to rainbow trout (*Oncorhynchus mykiss*)

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Abstract

In the last decade substantial innovation in feeds have led to a significant reduction in fishmeal inclusion rates in feed for aquaculture. Nevertheless, to maintain the current growth of aquaculture, the demand of nutrient will increase at the same rate. So finding a sustainable alternative protein source to replace fish meal in fish feed continues being an important issue to supply the growing market demand of aquaculture products. This study has been conducted to examine the feasibility of partially replacing fishmeal in feed for rainbow trout, for a sustainable algal biomass obtained from the pig manure treatment. The biomass obtained was mainly composed by *Scenedesmus almeriensis* with a nutritional composition of 46.7% of protein and 4.1% of fat, and was included in feed for rainbow trout at increasing levels of replacement of the fishmeal: 0 (control), 5%, 10%, 20% and 40%. The feeding trial was performed for 82 days in trout with an initial weight of ~75 g. The effect of the replacement level of the fishmeal in diets was evaluated on growth performance, protein utilization, fish health, biosecurity of the products, and on the quality of final product. Trout fed with diet containing microalgal biomass showed a lower growth, but within normal values for trout in that growing period. Regarding the rest of parameters, non-negative effects on the health, on biosecurity and on the final quality product were observed. This study highlights the novel strategy of using microalgae as nexus between pig manure-nutrient-food to nutrient recycling, and opens a wide range of possibilities to obtain a sustainable protein source for aquaculture.

Keywords: rainbow trout, microalgae, fishmeal replacement, *Scenedesmus almeriensis*, nutrient recycling

1. Introduction

The aquaculture is considered as the livestock production with the major projection facing the future to feed the world (Tacon and Metian, 2013). In this challenging context, the key for the expanding global aquaculture industry is the sustainable production at acceptable cost and ensuring biosecurity and quality for the consumers (Kobayashi et al., 2015). With the aquaculture expansion, the demand for fishmeal, as one of the most important aquaculture production input, will continue increasing. Despite of the aquaculture growth, during last decade, the dietary inclusion of fishmeal has decreased (Tacon and Metian, 2015), due to the efficiency of balanced diets and for