Article about shrimp immunological trial with next generation acidifier from Dr. Eckel

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Dr. Eckel next generation acidifier strengthens pathogen defense of shrimp

1 Introduction

Industrial scale aquaculture relies on the advantages of highly nutritious pelletized compound feed. The use of feed additives such as acidifiers has become a vital component of modern aquaculture production systems that are often threatened by on-farm disease in order to attain sustainable growth and high production rates.

Acidifiers are associated with the improvement of the gut health through both the reduction of the pH and a better buffering capacity of the diet. Moreover, they are believed to act as bio-control agents to treat bacterial infections. Shrimp only have innate immunity and proteins dedicated to the pathogen recognition have a major role in the shrimp's immune system. Two main proteins that deserve to be mentioned are C-type lectin and the peptide penaeidin. The first is a carbohydrate binding protein which is both involved in the, defence against bacterial and gene expression of immune related genes. The latter has antimicrobial properties that help eliminate the white spot syndrome virus and other bacteria. C-type lectins are an important part of the signalling pathway that activates a proper immune response which is required to keep the shrimp organism alive (see Figure 1).

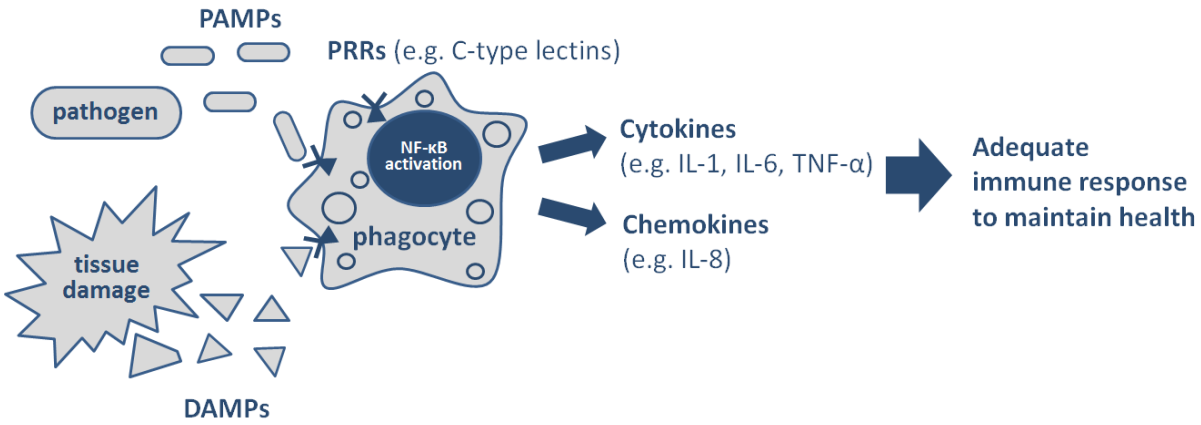

Figure 1: Role of C-type lectins in the immune response against pathogens.
PAMPs = pathogen-associated molecular pattern molecules on the surface of bacteria/fungi/protozoa/viruses; DAMPs = damage-associated molecular pattern molecules released by damaged body cells; PRRs = Pattern recognition receptors like C-type lectins
Source: Illustration by the author (Tilman Wilke, Dr. Eckel Animal Nutrition)

2 Methodology

Our objectives were to estimate the immunological effect of Dr. Eckel's next generation acidifier on the immune related genes of Pacific White Shrimp (*Litopenaeus vannamei)*. The expression of those genes was assessed molecularly by PCR (qPCR) for both acidifier-treated shrimp and untreated shrimp as control. In the province of Zambales, Philippines, four ponds compartments were used during the trial: two as control and two where the product was tested. Each compartment had a stocking density of 80 per m^2 and the trial lasted for 72 days from post larvae stage to an average harvestable body weight of 13 g. In total about 240.000 shrimp were stocked. Shrimp were fed with commercial shrimp feed based on their growth stage, starting from a fry mash/starter pellet feed to a grower/finisher pellet feed when the shrimp reached the harvesting period. In the treatment group acidifier from Dr. Eckel was added at a ratio of 2 kg per tonne. Determination of growth performance of the shrimp was conducted based on average daily weight, feed conversion rate, percent of survival rate and biomass.

3 Results

At the beginning of the trial (stocking) no differences between the feeding groups could be observes. After 72 days of culture, all the shrimp from the treated group and control group were harvested. The analysis of the qPCR showed that gene expressions of the immune related genes C-type lectin and penaeidin were significantly up-regulated (see Figure 2).

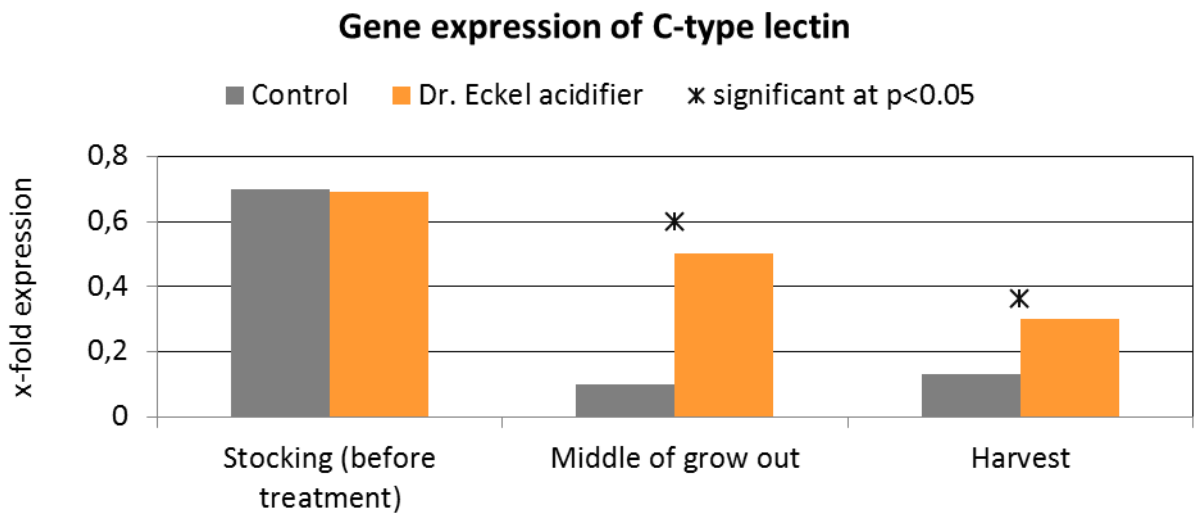

Figure 2: Gene expression of C-type lectins in sampled shrimp at different phases of the trial

In conclusion, the study demonstrates the effect of the Dr. Eckel acidifier on immunity of shrimp by up-regulating and increasing the expression of the immune related genes. C-type lectin and penaeidin are important partes of the shrimp's immune defense against pathogenic bacteria, fungi and viruses. This effect can be considered beneficial especially during infections and stress in cultured shrimp. Such disease can include the white spot

syndrome virus (WSSV), white feces syndrome and the early mortality syndrome (EMS) also known as acute hepatopancreatic necrosis syndrome (AHPNS). As a consequence, overall cost of production will decrease and will allow for increased profits.