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Effects of enriched *Artemia* with *Saccharomyces cerevisiae* and *Chaetoceros gracilis* on growth performance, stress resistance and fatty acid profile of *Litopenaeus vannamei* postlarvae

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Abstract
The present study was aimed to evaluate the effects of *Artemia* enrichment with baker's yeast *Saccharomyces cerevisiae* (Y) and *Chaetoceros gracilis* (C) on growth performance, stress resistance as well as fatty acid profile of *Litopenaeus vannamei* post larvae (PL) for 15 days. Newly hatched *Artemia franciscana* nauplii (N) served as a control group. Survival did not change among different experimental groups. PL in C and N groups had the highest (767.0± 117.0µg) and the lowest (367.0± 44.0 µg) dry weight, respectively, and PL in Y group showed intermediate value (567.0± 117.0µg). PL in Y and N groups had the highest (52.3 ± 2.9%) and the lowest (31.3 ± 2.8%) survival rate, when exposed to the fresh water stress test, respectively. The concentrations of eicosapentaenoic acid and docosahexaenoic acid were higher in *Artemia* enriched with *C. gracilis* than other groups. Moreover, the n-3 to n-6 PUFA ratio was significantly higher in PL fed C group than other treatments. In conclusion, feeding enriched *Artemia* with *C. gracilis* or *S. cerevisiae* can improve growth performance and stress resistance in *L. vannamei* PL.

Keywords: *Artemia,* baker's yeast, fatty acid profile, microalgae, white leg shrimp

1. Introduction
Various species of yeast, either in live form to feed live food organisms including probiotic live yeast, autolyzed yeast and yeast fractions (yeast cell walls or yeast extracts) are being developed as functional feed additives, or as a source for more purified products in aquaculture (Ferreira *et al.,* 2010) [11]. In addition, whole cell yeast or products containing different yeast cell wall fractions used as immunostimulants in fish and crustacean diets (Ringø *et al.,* 2012) [29]. In this regard, the beneficial effects of brewer's yeast (*Saccharomyces cerevisiae*), which contains various immunostimulating compounds such asβ-glucans, nucleic acids, chitin, mannan oligosaccharides and other cell wall components, have been reported on growth performance, stress and disease resistance in various fish and crustacean species (Ringø*et al.,* 2012) [29]. Moreover, it has also been used as probiotic enrichment agent for *Artemia*, because of its rapid growth, ease in its culture, rich source of enzymes, RNA and free nucleotides, B-complex vitamins, amino acids and appropriate cell diameter (Fazeli and Azari-Takami, 2006; He *et al.,* 2011) [10, 14].
Because of the smaller shelf life of the widely available commercial n–3 long chain polyunsaturated fatty acids (n-3 LC-PUFA) supplements for enriching live food, there is a growing interest in marine microalgae, which contain high levels of these essential fatty acids. Furthermore, microalgae are used as a food source in hatcheries for larval stages of most species of interest for commercial aquaculture, and some strains of microalgae are recognized as excellent sources of proteins, carbohydrates, lipids, vitamins, essential fatty acids (EFA), pigments and sterols to be used as food and feed additives (Krienitze and Wirth, 2006) [18]. In addition, microalgae have an important role in aquaculture and also in the enrichment of zooplankton for feeding fish larvae. In this context, *Chaetoceros* sp. are reported as the best live feed for *Artemia* because of high levels of n-3 LC-PUFA especially eicosapentaenoic acid (EPA, 20:5n-3) (Lora-Vilchis*et al.,* 2004) [23]. *Artemia* nauplii constitute the principal animal