（学位第３号様式）

学 位 論 文 要 旨

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題　目	Effects of various functional feed additives on the Performance of Aquatic Animals （水産動物における各種機能性飼料添加物の効果）

The need for improvement of growth, feed utilization and health condition in aquatic animal are a major concern in aquaculture industry. Although antibiotics have contributed to enhance disease resistance, the problems associated with spread of drug resistance pathogens, food safety problem, suppression of animal's immune systems are a major concern. Functional feed additives are best alternative and have gained major recognition in aquaculture industry. In this research, the first part involves spent oleaginous yeast *Limpomyce starkeyi* inclusion as functional supplement in red sea bream *Pagrus major* at 0.05, 0.1, 0.5, 1% or 1, 1.5, 2, 2.5% and the growth and health response parameters were evaluated in two experiment respectively. Results showed inclusion of *L. starkeyi* improves growth parameters (feed intake, feed conversion ratio, weight gain, specific growth rate), blood parameters (lowering AST and ALT), immune (IgM, Peroxidase), oxidative status (BAP, low d-ROM), digestive enzymes (pepsin, amylase, trypsin) and stress tolerance in *P. major* with optimum supplementation at 2.5% of the dietary proportion.

In the second part, the benefits of single or mix probiotic bacteria strains, *Streptococcus faecalis* (SF), *Bacillis amyloliquefaciens* (BA), *Lactobacillus plantarum* (LP) and *Bacillus mesentericus* (BM) were evaluated in amberjack *Seriola dumerili* and red sea bream *P. major*. The experiment with amberjack consist of two supplement groups; SF+BA at 0.2% ($1x10^9$cfu/g, $1x10^8$cfu/g) and SF+LP+BM+BA at 1% ($2x10^8$cfu/g, $8x10^7$cfu/g, $2x10^4$cfu/g, $1x10^8$cfu/g) of dietary proportion. In red sea bream, 4 supplement diets were prepared according to the following design using the aforementioned CFU/g cells: mix strain SF+BA, SF+LP+BM+BA, SF+LP+BM and BA single strain at 0.2%, 1%, 0.5% and 0.5% respectively, of the dietary proportion. Amberjack experiment was conducted in duplicate while red sea bream in triplicate of which each trial consists of a control group. Probiotic bacteria supplement has improved physiological condition, intestinal lactic acid bacteria count, oxidative status (SOD, BAP, low d-ROM) and liver lysozyme activity in *S. dumerili*. In red sea bream, significant improvement in growth (IGF1, IGF2) and immune (TNF-α, IL-b) relative gene expression, oxidative status (BAP) in SF+BA and SF+LP+BM+BA group. SF+BA group showed highest immune response (Ig, lysozyme). The mix strain SF+BA and SF+LP+BM+BA were relatively the best mix of strain for both *S. dumerili* and *P. major* based on the overall performances.