**Title: Studies on the nucleotide nutrition and development of functional feeds for cultured marine species**

Although nucleotides (NT) have long been implicated as feed attractants in both vertebrate and invertebrate species, research into potential growth and health benefits of dietary NT in aquaculture species has just been implemented in early 2000s. To date, research pertaining to NT nutrition in fishes has shown rather consistent and encouraging, beneficial results in fish health management. Red sea bream, *Pagrus major,* and amberjack, *Seriolla dumerili,* are the two most important aquaculture species in East Asia. Intensive aquaculture of these species often caused stressful conditions which negatively affected their growth and health performances. Under these circumstances, research on dietary modulation for potential growth and health management is necessary for sustainable culture of these species. In this regards, development of functional feed through supplementing functional nutrients could be an effective alternative strategy. In my Ph.D study, NT (individual and mixed) and its related products have been evaluated as functional nutrients and individual NT/nucleoside has been supplemented in low fishmeal (FM) based diet to develop cost effective functional feeds for these two species.

Efficacy of NT related products were evaluated initially in a growth trial through supplementing a basal diet with NT related products like; nucleoside by- products (NBP) and inosine at 1, 3 and 0.03, 0.1% consecutively to formulate five experimental diets, including a control diet. After 60 days feeding trial, results suggested that inosine and low concentration of NBP (1%) could be effectively used as dietary supplements for better growth and health performance of *P. major*. Seven separate studies were also conducted to evaluate the functional effects as well as to optimize the supplementation levels of important purine and pyrimidine NT, *viz.* inosine 5′ monophosphate (IMP), adenosine 5′ monophosphate (AMP), guanosine 5′ monophosphate (GMP), uridine 5′ monophosphate (UMP) and cytidine 5′ monophosphate (CMP) for red sea bream and inosine nucleoside for amberjack. Results indicated that, in red sea bream, the optimal levels of supplementation of IMP, inosine, UMP was 0.4%. For the GMP and CMP, their optimum supplementation ranged from 0.45 to 0.48% and from 0.44 to 0.50%, respectively. In contrast, relatively low and a wide range of optimum AMP supplementation level were observed through regression analysis (0.16% for growth and 0.41 % for immunity). Relatively low optimum supplementation level was also observed for mixed NT (1.0 to 1.5 %) in red sea bream. While, in the case of amberjack inosine at 0.6% supplementation showed optimum performance of growth and health parameters. Overall, the growth, feed utilization, stress resistance, intestinal health and immune responses of both species were enhanced by dietary supplementation and at determined optimum levels all performance showed the best condition. The interaction effects of nucleoside, inosine with another functional supplement, vitamin C was also evaluated and I found interaction effects of inosine and vitamin C on adaptive immunity and combined use of inosine and vitamin C is possible to improve hemato-immunological responses of red sea bream.

 In final step of my research I supplemented NT (inosine, IMP and GMP) in low FM based diet as an initial step of low/non FM based functional feed development for marine species. It was found that supplementation of inosine. IMP and GMP facilitates the use of alternative protein and 50 -75% FM protein could be replaced with single source of alternative protein (soybean protein) without compromising growth and health performance of amberjack and red sea bream, respectively.