

学 位 論 文 要 旨	
氏 名	Amina Salina Moss
題 目	<p>The use of marine snails and their derivatives as dietary supplements for kuruma shrimps, <i>Marsupenaeus japonicus</i> and Japanese flounders, <i>Paralichthys olivaceus</i> (クルマエビ(<i>Marsupenaeus japonicus</i>) 及びヒラメ (<i>Paralichthys olivaceus</i>) における海産巻貝の飼料素材としての利用性に関する研究)</p>
<p>As marine aquaculture continues to grow, new technology is being developed to make it an efficient and prosperous industry. This includes finding feed resources that are cost-efficient to include in the diets of fish and shrimps, so that the cost of feed is reduced. Previous research on farm-made feed have found that it is cheaper for fish farmers to make their own feed, especially if they are using locally-available ingredients. Snails tend to be found in many aquatic and land environments. Land snails have been used in the feeds of pigs, poultry, fish and shrimps for years, however research on marine snails being used is very scarce. Therefore, the study was able to show that it is possible to use marine snail shells and marine snail protein in the diets of larval and juvenile kuruma shrimps, as well as the Japanese flounder fish. Shells derived from marine snails represent over 80% of shellfish waste. Therefore, five experimental trials were done to assess the effectiveness of using snail shells as a source of calcium and a source of macro-minerals for larval and juvenile kuruma shrimps, as well as the Japanese flounder fish. Firstly, a 42-day trial was done on juvenile kuruma shrimps to evaluate snail shells as a source of calcium. Shrimps were fed a positive control diet, containing commercial Ca, while snail shells were supplemented in three diets at the inclusion level of 2%, 5% and 10%. In this trial, it was concluded that using 10% snail shells as Ca replacement was effective in improving the shrimps' growth performance and condition index. Overall, diets that had a higher Ca/P ratio performed better. This experiment was also done with larval kuruma shrimps, but they were fed 1%, 2% and 4% snail shells instead. The positive and negative control diets had better growth and survival. Additionally, unlike with juvenile shrimps, it was seen that larval shrimps had better growth performance with diets containing a lower Ca/P ratio. A similar trend was seen in the experiments where snail shells were used to replace macro-minerals (potassium, calcium, magnesium and phosphorus). Diets associated with lower Ca/P ratio in larvae and higher Ca/P ratio in juvenile had better growth performances. In order to research the effectiveness of using snail shells as source of macro-minerals in the feeds of juvenile Japanese flounder fish, five diets were made and fed over a period of 56 days. Two different levels of snail shells were given to the fish, 3% and 6%, along with two different levels of macro-minerals (2.4% and 0%). It was concluded that the flounders had good growth performance when fed diets containing 6% of snail shells with reduced macro-mineral supplementation (2.4%) or without supplementation (0%). Finally, snail muscle, snail viscera, whole snail, and defatted whole snails were used to replace squid and krill meal in the diets of juvenile kuruma shrimps at 20% inclusion level. Snail viscera which is usually discarded as waste was found to be an effective replacement of squid and krill meal.</p>	