PRELIMINARY INVESTIGATION ON THE REPRODUCTIVE QUALITY OF MALE *PENAEUS MERGUIENSIS* DE MANN (1888) IN CAPTIVITY

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Keywords: spermatophore, *Penaeus merguiensis*, captivity, wild, Singapore straits.

Introduction

Penaeus merguiensis is the second-most important species in penaeid shrimp aquaculture in Malaysia as well as in other Southeast Asian countries. *P. merguiensis* is the preferred species in the US markets because of its creamy colour. Therefore, if Malaysia wishes to increase the export of its shrimp to the US markets, efforts should be made towards increasing the culture of the species. Captive maturation of the species is necessary so that constant nauplii production could be assured. Since male problems have been cited in the low quality and number of nauplii production in captivity, it is important to evaluate and document changes in the sperm quality of *P. merguiensis used* in the captive production of nauplii using observations of external sperinatophore morphology and weight determinations, sperm counts and calculations of percentage normal and abnormal sperms.

Materials and Methods

Male *P. merguiensis* adults were stocked in a 10 - ton tank and fed a combination of live diets (squids, *Artemia* biomass and polychaetes). Three unablated males were examined at the analyzed for spermatotophore quality at the 1st, 2nd and 3rd month in captivity respectively. Manual ejaculation of spermatophores was conducted and the spenmatophores weighed to the nearest 0.001 g. The spematophores were then carefully homogenized in a glass tissue grinder in a 6 ml Ca^2-free saline water to obtain sperm. The total number of spermatozoa was estimated by placing a sample of the homogenized suspension in a haemocytometer and counting through standard cell count procedures (Aujero, 1982). The diameter and spike length of 40 spermatozoa from each spermatophore were also measured to the nearest 0. 001 μm.

Results and Discussion

There was no noticeable change in the external morphology of the spermatophores during the study period. However, there was a significant decrease in the sperm index (number of sperm / body weight) during the study period. The sperm index was 1.63 x 10^6 during the 1st week. However, at the 8th and 12th week in captivity, the sperm index decreased to 1. 17 x 10^6 and 0. 88 x 10^6 respectively. The spenmatophore index was also found to decrease during the study period. The percentage of abnormal sperm was found to increase significantly from 37.45% during the first week to 87. 11% in the 12th week. The sperm sizes were also compared statistically. There was a significant increase in both the spiked (10.97μm to 12.16μm) and non-spiked (6.65μm to 6.80μm) sperm size of shrimps sampled from week 1 to week 8. After this, there was a significant reduction in the spiked (12.16μm to 11.35μm) and non-spiked (6.80μm to 6.67μm) respectively. There are three morphologically abnormal sperm forms; malformed body, spike bent and spike lost (Wang et al. 1995). All these forms were observed in this study but majority of the abnormal sperms was the spikeless forms. The spikeless forms generally represent immature forms (Wang et al. 1995). Since all shrimps used in the study were matured it could be inffered that the spikes were lost as a result of captive conditions such as poor water quality or unstable environmental conditions such as excessive water temperature, bacterial infection, heavy metal contamination. The spikes represent an acrosomal filament, which is necessary for both sperm orientation on the ovum surface and subsequent penetration through the vitalline envelope (Clark et al. 1981). Therefore, even though a male could possess healthy looking spermatophore, if the vast majority of the sperms were spikeless forms, the possibility of their capability of fertilizing spawned eggs was minimal. This fact agrees with the finding of Talbot et al. (1989) who noted that melanization or blackening of the spermatophore never occurred during the 131 -day experiment to determine the extent of male reproductive tract degenerative syndrome in captive *P. setiferus*. *P. merguiensis* is a soft shelled animal and is not as hardy as some others species like *P. monodon*. Therefore, any fluctuation in the normal environmental condition may adversely affect their reproductive and physiological make-up.

Conclusions

This experiment aside from documenting changes in the sperm quality of *P. merguiensis in* captivity, is also important to shrimp breeders as it allows us to know the relative period that male *P. merguensis* would be most useful in breeding experiments. However, because this experiment is a preliminary study further research need to be conducted on how to improve the useful live of male *P. merguiensis* in captivity.

References

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Supported by IRPA Grant 01-02-04-0155