KZYJC
ISSN:1001-0920
ISSN: 1001-0920
Volume 38, Issue 03, July, 2023

Control on Growth-Out and Hemocyte Production of Scalloped Spiny Lobster (*Panulirus homarus*) and Pronghorn Spiny Lobster (*P. penicullatus*) in Floating Cages

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ABSTRACT— Mariculture of spiny lobster (*Panulirus*) has been developed to enhances seafood production. However, adult spiny lobster not limited for seafood but also for hemocyte production. Hemocyte may able use for microbial endotoxin screening that infect human. This study conducted to evaluated about production and control of adult spiny lobster not only for seafood product but also to yield hemocyte. Two species were cultured *i.e*. scalloped spiny lobster (*P. homarus*) and pronghorn spiny lobster (*P. penicillatus*) captive in pre adult size to adult size within six months. Five hundred spiny lobster in total from 300 individuals of scalloped spiny lobster and 200 individual of pronghorn spiny lobster were cultured in floating cages with feed fresh mangrove snail (*Telescopium telescopium*) meat. Results showed two distinct population from two species of lobsters yielded different body weight assumed as fast growth and slow growth. Adult scalloped spiny lobster with fast growth produces more hemocyte compared to slow growth but not for pronghorn spiny lobster that tend to similar. Scalloped spiny lobster suitable as animal model to produce hemocyte that useful for microbial endotoxin screening in future.

KEYWORDS: Blood volume, Fast growth control, Floating cages, Grow-Out, Seafood, Spiny lobster.

1. INTRODUCTION

Spiny lobster (*Panulirus*) production in Indonesia has been planned for production boost fisheries commodity that able support nation economic growth [1], [2]. Huge potential of puerulus in coastal area of Indonesian islands may support spiny lobster production with sustainably [3], [4]. Lesson learned from Australia and Vietnam about spiny lobster aquaculture needs big efforts in particular for complete technology and managerial with benefits rose of spiny lobster production not only seafood but also variety products [5- 8].

Indonesia spiny lobster aquaculture existing situations is ready to develop [9]. Culture technology has been completed with modification hormone and techniques even closer to hatchery system [10- 14]. Unfortunately, seafood from spiny lobster competing with other countries that affect capital earning and low-cost production in short period [15]. It is need attention that spiny lobster should focus on other beneficial function there is for medicinal [16], [17]. Many results showed hemocyte of crustacean including from spiny lobster potentially use for medicinal function in particular for microbial endotoxin screening [18]. After Covid 19 pandemic era, infection disease due to transmitted pathogen or polluted environment may impact to reducing human immune system that affect many disease cases. Bacteria borne-pathogen

need to test with simply methods and hemocyte from spiny lobster probably able to handle this function. The research purposes are to evaluate control on grow-out of scalloped spiny lobster and pronghorn spiny lobster as seafood and hemocyte materials from pre-adult to adult phase.

2. Materials and Methods

Dual function of mariculture of two species spiny lobster for seafood and hemocyte production. Scalloped spiny lobster and pronghorn spiny lobster with total number of 500 individuals. Pre-adult phase of 300 individual of scalloped spiny lobster and 200 individuals of pronghorn spiny lobster with body weight between 111.6±3.06 g was bought from lobster dealer at Krui, south coast of Lampung Province, Indonesia. Spiny lobsters cultured for six months in floating net cages with location at 105o25'29'' E-105o29'31" S.

Each cage with dimensions 3 x 3 x 3 m, used for 50 individuals. Fresh mangrove snail (*Telescopium telescopium*) meat at feeding rate 10% of body weight with two times feeding schedule at daily and night. Grading and selection conducted every month after net change. Body weight measured after 4.5 months culture period until 6 months (adult phase). Body weight of spiny lobster sampled every two weeks with all individual measured with digital balance (accuracy 1g). Grouping of spiny lobster based on body weight to prevent cannibalism and late growth rate due to feed competition and later judged for fast growth and slow growth. Slow growth is explained adult spiny lobster but with low body weight. Control of grow-out of spiny lobsters' short line in Figure 1.

Adult spiny lobster sedated with sea water 17^{o}C were chilled with ice for 20 minutes. Spiny lobster hemocyte were taken within ten individual per cage with random sampling after grading and selection. Syringe 1 ml and tubes 1.5 ml washed with anticoagulant 10% trisodium citrate and hemocyte taken from ventral body parts of spiny lobster with injection. Hemocyte kept in ice box before stored in refrigerator. Body weight of spiny lobster among cages compared between two species of spiny lobster and growth types that found within cultured period. Volume of hemocyte from individual measured to compared per cage between species and growth types (Figure 1).

Figure 1. Production control of two species of scalloped spiny lobster (*Panulirus homarus*) and pronghorn spiny lobster (*P. penicillatus*) in floating cages for seafood and hemocyte productions.

3. Results

Results showed two growth types founded from scalloped spiny lobster and pronghorn spiny lobster *i.e.* fast growth and slow growth (Figure 2). Two groups of fast growth were found from scalloped spiny lobster and this phenomenon showed new finding about level of growth in spiny lobster (dark blue compared to yellow colors, Figure 2). Scalloped spiny lobster with fast growth higher in amount of individual compared to pronghorn spiny lobster but number of individuals of slow growth between two spiny lobster species also

ISSN: 1001-0920
Volume 38, Issue 03, July, 2023

similar.

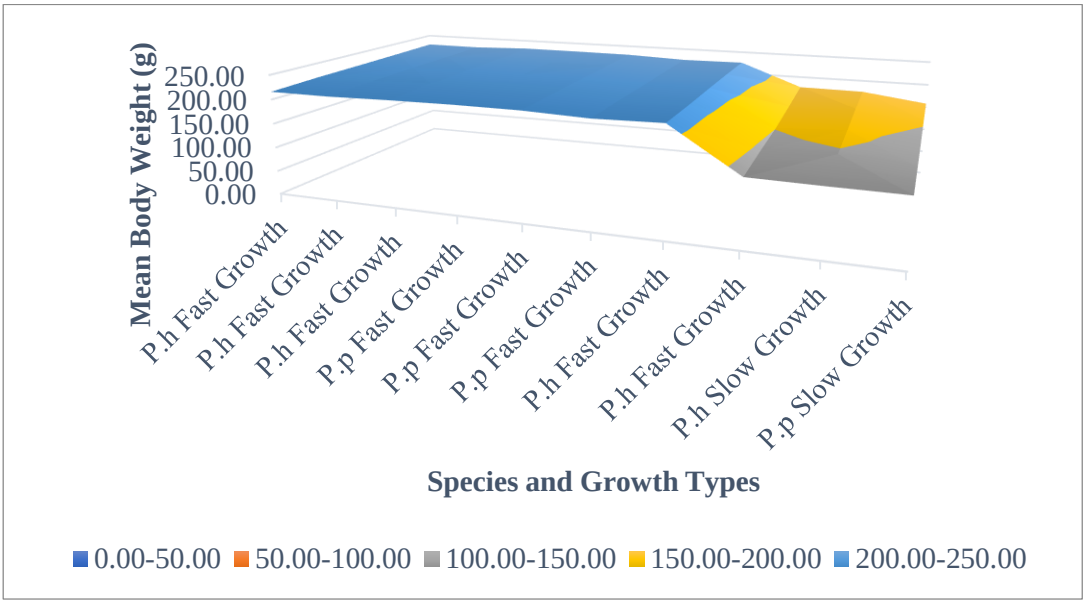

Figure 2. Body weight of two species of scalloped spiny lobster (*Panulirus homarus*) (P.h) and pronghorn spiny lobster (*P. penicillatus*) (P.p) with two types of growth *i.e.* fast and slow growth. Scalloped spiny lobster showed high fast growth in total individuals compared to pronghorn spiny lobster.

Hemocyte volume yield from two species of spiny lobster were different (Figure 3). Fast growth and slow growth stocks of scalloped spiny lobster produce high volume of hemocyte. In contrast, pronghorn spiny lobster fast growth and slow growth produced low volume of hemocyte and showed hemocyte production is not body weight dependent.

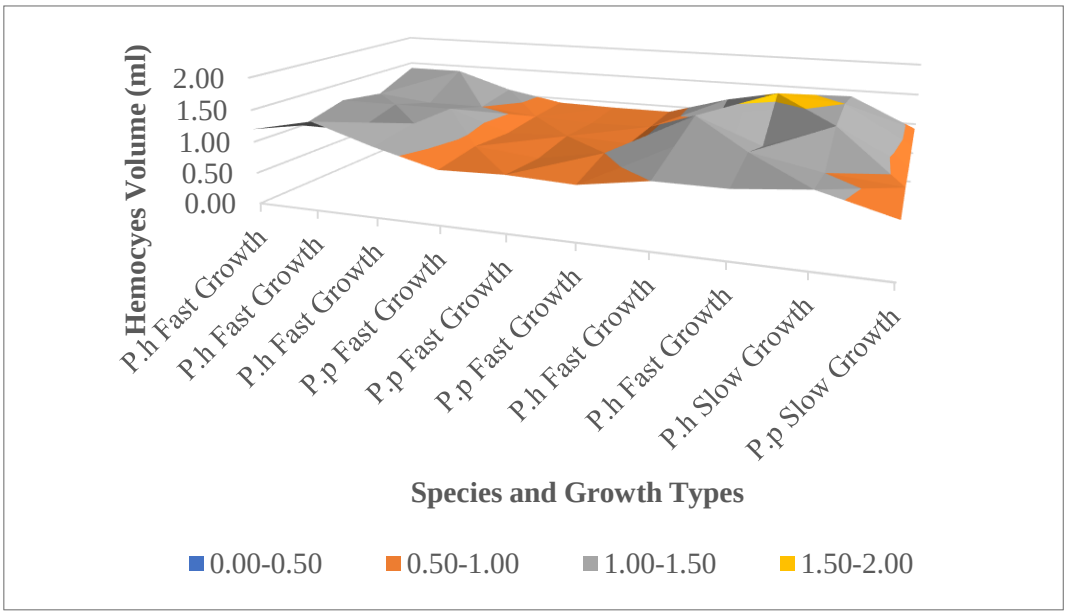

Figure 3. Hemocyte volume comparison yield from two species of spiny lobster and growth types. Scalloped spiny lobster (*Panulirus homarus*) (P.h) with fast and slow growth produce high hemocyte consistently. In contrast, pronghorn spiny lobster (*P. penicillatus*) (P.p) within fast and slow growth types produces limited hemocyte.

4. Discussions

Sustainability of spiny lobster aquaculture may constantly supported seafood for human consumption [19]. Many attempts were use to enhance spiny lobster production. For example, usefulness of floating cages, even with simply and relativity un expensive materials can use in remote areas with abundantly pre-adult spiny lobster, juvenile and puerulus resources [20], [21]. Importance also fed and feeding management in spiny lobster production [22], in term of practical diets compared between artificial or fresh feed that may applied [23- 25], farmer can choose due to cost production.

In term of crustacean aquaculture, fast growth in short period of time always be targeted [26]. Scalloped spiny lobster has been recognized as fast growth spiny lobster in particular for male and reproduction dependent [27] in communal environment [28]. In addition to seafood production, large sized spiny lobsters are needed to produce hemocyte to obtain a large volume of hemocyte. Based on this study, scalloped spiny lobster with resulted fast growth and optimal size can be used as optimum hemocyte producer compared to pronghorn spiny lobster. The results of this study were complete by showing that scalloped spiny lobster is ideal for producing large sizes and large volumes of hemocyte. This fact also duly that scalloped spiny lobster suitable may use as animal model for hemocyte production that able to use for clotting system [29], [30] that in advance useful for microbial endotoxin screening [31].

5. Conclusions

Grow-out control of two species of spiny lobster from pre-adult to adult has double impact for seafood and hemocyte productions. Two species of spiny lobster grow distinctly i.e. fast growth and slow growth. Fast growth of scalloped spiny lobster produces more volume of hemocyte compared to slow growth but not for pronghorn spiny lobster that is no different between body weight.

6. Acknowledgements

HETI Project Universitas Lampung supported this research with Letter of Agreement The Implementation of Research Innovation and Collaboration No 9947/UN26/HK.01.03/2022 date November 1st 2022 with titled “Development on Spiny Lobster (*Panulirus homarus*) Blood Production and Application for Endo-toxin and Antibiotics Resistant Bacteria Selection”.

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