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UDC 639.31

Otong Zenal Arifin, Vitas Atmadi Prakoso, Endang Haris Suhud, and Jojo Subagja (Research Institute for Freshwater Aquaculture and Fisheries Extension)

Growth performance of domesticated asian redtail catfish *Hemibagrus nemurus* fingerlings reared at different stocking densities

Indonesian Aquaculture Journal, 15 (1), 2020, 1-6

Asian redtail catfish *Hemibagrus nemurus* is one of the prospective aquaculture commodities in Indonesia. However, there are still shortcomings in completing the domestication of this species. As such, this study was conducted to observe the growth of Asian redtail catfish at different stocking densities. Fish (body weight (BW) of 21.62 ± 0.57 g) were stocked in nine different floating nets (dimension: 2 m x 2 m x 1 m) inside a concrete pond (40 m x 20 m) with three stocking density treatments (10, 15, and 20 fish/$m^3$). Each treatment consisted of three replicates. Growth data were collected every 30 days during 120 days of rearing period which included weight gain (WG), specific growth rate in body weight ($SGR_{BW}$), average daily growth ($ADG_{BW}$), biomass gain (BG), feed conversion ratio (FCR), and survival rate (SR). Measured water quality parameters during the experiment consisted of temperature, pH, and dissolved oxygen. The results showed that the best growth performance was achieved by fish at the stocking density of 15 fish/$m^3$ compared to that of fish with the stocking density of 10 and 20 fish/$m^3$. The FCR value of fish at the stocking density of 15 fish/$m^3$ was also significantly better than those of 10 fish/$m^3$ and 20 fish/$m^3$ ($P<0.05$). The survival rate in each treatment was not significantly different ($P>0.05$). This study suggests that the optimal stocking density for Asian redtail catfish fingerlings is 15 fish/$m^3$, beyond that value, growth reduction might be expected. Further research is needed to observe its optimal stocking density in different culture systems.

KEYWORDS: Asian redtail catfish; domestication; growth; stocking density

UDC 639.518

Andi Parenrengi, Gunarto, Sulaeman, Andi Tenriulo, and Herlinah (Research Institute for Brackishwater Aquaculture and Fisheries Extension)

Reconfirming the species of mud crab genus scylla (de Haan, 1833) in Balikpapan, East Kalimantan Province, Indonesia based on mitochondrial 16S rRNA

Indonesian Aquaculture Journal, 15 (1), 2020, 7-14

Taxonomy of mud crab species under the genus *Scylla* has been misidentified for several years due to their high morphological similarity. In Indonesia, some reports concerning mud crab have been published with misleading identification results where the species under the genus *Scylla* all named as *Scylla serrata*. The study was conducted to reconfirm the validity of species in the mud crab genus *Scylla* collected from Balikpapan mangrove, East Kalimantan, Indonesia and to analyze the genetic variation of the first generation (G-1) offspring, based on mitochondrial 16S rRNA sequence. The animal test used for species identification was a representative sample of mud crab. Ten of the G-1 crablet were randomly sampled for genetic variation analysis. Fragment of the 16S rRNA gene was isolated by PCR technique and purified for sequencing purpose. The mtDNA sequences were analyzed using Genetyx, BLAST-N, and DnaSP to get a consensus sequence, similarity index, haplotype and sequence diversity, and the number of haplotypes. The results showed that the 16S rRNA gene was successfully isolated with a single band in size of approximately 600 bp. The mud crab morphologically identified as *Scylla tranquebarica* was genetically confirmed as a species of *S. tranquebarica.* High haplotype diversity (0.9254) and low nucleotide diversity (0.1256) were revealed in the G-1 mud crab population, while the number of haplotypes was 7.5.

KEYWORDS: 16S rRNA; genetic variation; mitochondrial DNA; mud crab; species reconfirmation

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Ketut Mahardika, Indah Mastuti, Sudewi, Des Roza, and Zafran (Institute for Mariculture Research and Fisheries Extension)

Effectiveness of a recombinant vaccine based on RNA2 capsid protein against nervous necrosis virus in hybrid grouper

Indonesian Aquaculture Journal, 15 (1), 2020, 15-23

Nervous Necrosis Virus (NNV) is a devastating viral disease in marine aquaculture, causing significant economic losses worldwide, including in Indonesia. The virus mainly infects larvae and juveniles of marine fishes. This study aimed to determine the effectiveness of a recombinant vaccine from betanodavirus coat proteins expressed in *Escherichia coli* fish against NNV infection in hybrid grouper. An RNA2 capsid protein was selected and used as the recombinant vaccine. NNV-RNA2 gene was inserted into the protein expression system vector of pET SUMO and cloned in cells of bacteria *Escherichia coli* strain BL-21. The results of blast homology analysis exhibited that the amino acid sequence of the NNV-RNA2 showed high similarity with *Lates calcarifer* encephalitis viral coat protein gene. *E. coli* expressing NNV-RNA2 protein was inactivated using 0.03% formalin and mechanically inactivated by freeze-thaw and sonication methods. The inactivated recombinant *E. coli* vaccine was then injected intramuscularly into hybrid grouper juveniles (single vaccine). Subsequently, the juveniles were challenged with NNV at 7, 14, and 21 dpv (days post-vaccination). Injection of 0.1 mL sterile PBS served as the control. Single vaccine applications using formalin-inactivated vaccines resulted in higher antibody titers than those of mechanically-inactivated vaccines. Both vaccines were only able to increase antibody titer up to 7 dpv. Therefore, re-vaccination (booster vaccine) was done on day-10 after the first vaccination using a formalin-inactivated vaccine. The booster vaccine could protect hybrid grouper against NNV ($P<0.05$) at four weeks post-vaccination. However, the mortality of vaccinated and control fish was not significantly different ($P>0.05$) after challenged with NNV for six weeks after. This recombinant vaccine has the potential to be developed into a polyvalent vaccine by combining viral and other bacterial vaccines in future research.

KEYWORDS: antibody titer; hybrid grouper; NNV-RNA2; recombinant protein vaccine; RPS

UDC 639.2.091

Sri Nuryati, Fauzan Wahib Alsani, Hasan Nasrullah, Odang Carman, Yuni Puji Hastuti, Eni Kusrini, and Alimuddin (Department of Aquaculture, Faculty of Fisheries and Marine Sciences, IPB University (Bogor Agricultural University)

Immune related genes expression analysis in koi fish after vaccinated with koi herpes virus DNA vaccines

Indonesian Aquaculture Journal, 15 (1), 2020, 25-32

Vaccination is a practical step in preventing diseases caused by koi herpes virus (KHV) in koi fish (*Cyprinus carpio* haematopterus). We have developed two DNA vaccines for KHV named as GP-25 and GP-11 from two local isolates coded as ORF25 and ORF81, respectively. Although both vaccines have been reported to increase survival rates, the evaluation of koi fish immune responses at the molecular level has not been done post-vaccinations. The aim of this research was to determine the effects of koi herpesvirus DNA vaccine on the immune-modulation of koi fish at mRNA level. This recent research used the best vaccine doses of both vaccines determined from our previous study: 7.5 and 12.5 $\mu$g per 100 g fish of GP-11, and 12.5 $\mu$g per 100 g fish of GP-25. The immune gene expression was analyzed using the RT-qPCR method from the fish liver at 0, 1, 7, 14, and 28 days post-vaccination (dpv). The results showed that, in the vaccinated fish, the immune genes viz. tumor necrosis factor a (TNFa), interleukin-1b (IL1b), interferon-g (IFNg), Mx1, immunoglobulin Mu chain (IgM), and major histocompatibility complex (MHC) class I and class II were induced to significant extents. The higher dose vaccination using the GP-11 vaccine showed higher immune gene expression than that of the lower dose. Furthermore, the GP-25 vaccine had induced lower immune responses than the GP-11 vaccine when using the same dose of vaccination, but relatively the same when the half-dose of GP-11 vaccine was used. In conclusion, the GP-11 and GP-25 vaccine provided the immune-modulatory effects on the koi fish immune response after vaccination.

KEYWORDS: DNA vaccine; gene expression; immune response; KHV; koi

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UDC 639.44

Sri Rahayu Setyaningsih, Ravi Fotedar, Roy Melville-Smith, Ishaaq Saputra, Nelson Fernandez, and Subas Adhikari (Fish Quarantine and Inspection Agency Regional Office Makassar)

The effects of transportation on immune modulation of wild and ocean-ranched greenlip abalone (*Haliotis laevigata*)

Indonesian Aquaculture Journal, 15 (1), 2020, 33-41

The effects of live transportation on the immune modulation of wild and ocean-ranched greenlip abalone (*Haliotis laevigata*) were evaluated. Samples of abalone were collected both in autumn and winter in Flinders Bay, Augusta, Western Australia, and land transported for 6 (six) hours. Several immunological parameters were assessed, including survival rate, total haemocyte count, osmoregulatory capacity, phagocytic rate, lactate level, and glucose level. The results indicated that the abalone samples collected in the two seasons showed different physiological responses; the winter samples were more responsive to transportation than the autumn samples. Transportation stress significantly increased total haemocyte count and osmoregulatory capacity of the winter samples, suggesting an immune stimulation. This stress also triggered an immune suppression, causing the phagocytic rate and lysosomal stability to significantly decrease after transportation. Lactate levels in the winter samples decreased significantly after transportation, possibly indicating the transition from a stressed to normal state, during the period of recovery. The constant level of glucose before and after transportation in both seasons showed that it was the least sensitive indicator used in this study. In general, there was no difference in the immune modulation parameters between wild and ranched abalone in either of the seasons sampled. However, in the autumn samples, there were significant differences ($P<0.05$) in haemocyte count and osmoregulatory capacity of the wild and ranched samples collected from all sites. These differences did not form a consistent indicator trend between the sites from the two sample sources. Therefore, the results do not raise any immediate concern that ranched abalone were differently stressed to those from the wild. The results in present study could serve as useful data in developing the live transportation method of greenlip abalone.

KEYWORDS: *greenlip abalone; transportation; sea ranching, immune*

UDC 639.32

Suko Ismi and Darmawan Setia Budi (Institute for Mariculture Research and Fisheries Extension)

Culture performance and economic profitability of cantang hybrid grouper (*Epinephelus fuscoguttatus* f x *Epinephelus lanceolatus* m) fingerlings reared at different initial stocking sizes and nursery periods

Indonesian Aquaculture Journal, 15 (1), 2020, 43-49

High production costs in grouper nursery can be caused by the use of large fingerlings size and long rearing times. The purposes of this study were to evaluate the culture performance and economic profitability of “cantang” hybrid grouper juveniles reared at different initial stocking sizes and nursery periods. This research lasted from September to December 2017 in one of small scale hatcheries in Buleleng, Bali, Indonesia. This study consisted of two experimental treatments; the first treatment was different initial stocking sizes (body weight and total length) of 0.50 ± 0.07 g and 3.0 ± 2.1 cm; 3.50 ± 0.67 g and 5.0 ± 1.9 cm; and 6.10 ± 0.91 g and 7.0 ± 2.3 cm. The second treatment was different nursery periods with the following arrangement: 15, 30, and 45 days (initial body weight and length of 0.54 ± 0.067 g and 3.0 ± 0.09 cm, respectively). The stocking density in all treatments was 1,000 fish reared in a 2 m x 2 m x 1 m concrete tank. The observed culture performance parameters consisted of survival rate (SR, %), daily growth rate (DGR, g/day), and feed conversion ratio (FCR). The calculated economic profitability parameters were net profit, return-on-investment (ROI, %), and return cost ratio (R/C). The highest culture performance was achieved by the juveniles reared using the largest initial stocking size and longest nursery period. This was in contrast with the economic profitability, in which smaller initial stocking size and middle nursery period had resulted in the highest profit. Based on the culture performance and profitability considerations, the suggested combination of initial stocking size and nursery period for cantang fingerlings is 3.0 ± 2.1 cm initial stocking size and 30 days rearing times.

KEYWORDS: growth; production; return; profit, cantang, fingerlings

## *Author index*

# SEND INSTRUCTIONS FOR WRITING AND PUBLISHING ARTICLES OF INDONESIAN AQUACULTURE JOURNAL 2016 (12pt Bold)

**I Nyoman Adiasmara Giri*)#, Ketut Sugama**), Alimuddin***), and Anang Hari Kristanto****)**

*) Research and Development Institute for Mariculture, Gondol

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**KEYWORDS: Author guidelines; research journal; aquaculture; article template**

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tific novelty, and the research problem or hypothesis. At the end of the preliminary assessment purposes should be written the article. In the scientific article format is not allowed their review of the literature as well as in the research report, but expressed in previous literature review (state of the art) to demonstrate the scientific novelty of the article.

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Table 1. Response to selection and final mean body weight of the third generation compared to the control population of the African catfish *Clarias gariepinus* at the end of larval rearing, nursery and grow-out phases

| Phases | Periods (days) | Final mean body weight (g) | | Response to selection | |
|---|---|---|---|---|---|
| | | Third generation | Control | Gram (g) | Percentage (%) |
| Larval rearing | 25 | 0.19 ± 0.10 | 0.19 ± 0.07 | - | - |
| Nursery | 30 | 6.12 ± 2.93 | 5.80 ± 3.50 | - | - |
| Grow-out | 60 | 198.67 ± 82.82 | 165.22 ± 71.09 | 33.45 | 20.24 |

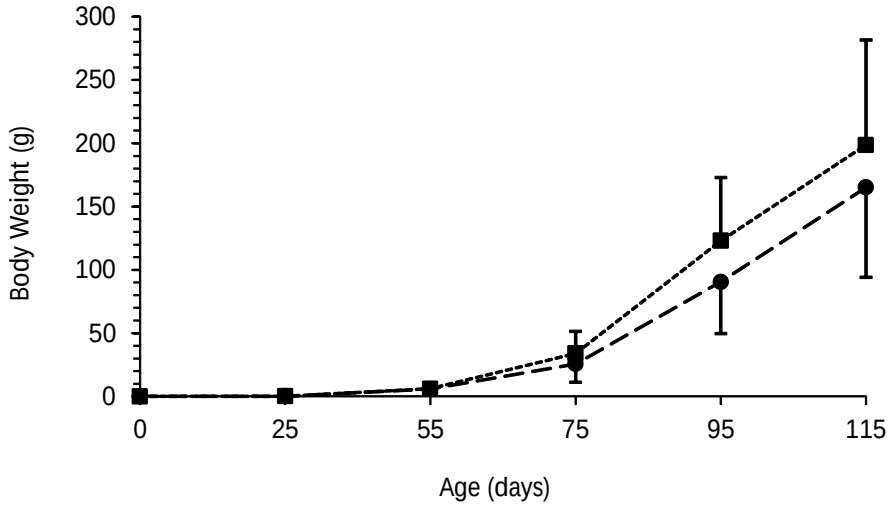


Figure 1. Growth performances based on body weight during 25 days of larval rearing phase, 30 days of nursery phase and 60 days of grow-out phase (based on samplings of 2% populations) of the third generation (■) and control population (●) of the African catfish (*Clarias gariepinus*) genetic improvement program held at Research Institute for Fish Breeding, Sukamandi. Vertical lines represent its each standard deviation

ACKNOWLEDGEMENTS: thanks mainly devoted to research funders. Acknowledgements can also be delivered to the parties that support the implementation of the research and writing of the manuscript.

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$$RPS = \left(1 - \frac{\%\ \text{fish mortality of vaccinated}}{\%\ \text{Fish mortality of control}}\right) x\,100$$

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## 10. Acknowledgements

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Bekker, J.G., Craig, I.K., and Pistorius, P.C. (1999). Modeling and Simulation of Arc Furnace Process. ISIJ International, 39 (1), 23-32.

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