

INDONESIAN AQUACULTURE JOURNAL

p-ISSN 0215-0883
e-ISSN 2502-6577

Volume 17 Number 2, 2022

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UDC 639.31

Nguyen Van Sang, Tran Huu Phuc, Nguyen Thanh Vu, Kasigwa Howard Nelson, Vo Thi Hong Tham, Phim Dang Khoa, and Nguyen Dinh Hung (Research Institute for Aquaculture)

Genetic parameters of field survival in striped catfish (*Pangasianodon hypophthalmus*)

Indonesian Aquaculture Journal, 17(2), 2022, 87-96

Grow-out or field survival (GS) is one of the most important traits of striped catfish. Genetic parameters of GS in generation 4 of the growth selected population of this species were estimated based on the data of 8,004 tagged and stocked and 6,410 harvested fish representing 152 full-sib and half-sib families. The heritability and estimated and realized correlated responses for GS, its phenotypic or genetic correlations with harvest weight (HW) and other growth traits, and direct realized response for HW were calculated. The low and significantly different from zero heritability for GS (0.12 ± 0.05) was estimated. The medium positive and no significant difference from zero genetic correlation between GS and HW was found, 0.41 ± 0.24 . The estimated selection responses with the proposed selection proportion of 13.0% for GS was 8.5% in trait unit. Current and accumulated correlated selection responses for GS were -7.8% and -1.6%, and 25.5% and 47.6%, respectively, by Estimated Breeding Value and Least Square Means estimation methods. In addition to these results, the high heritability and direct estimated and realized responses for HW pose a great potential for applying multi-trait selection, including both GS and HW in G4 and in the long run.

KEYWORDS: field survival; genetic parameters; growth rate; striped catfish

UDC 639.2.091

Fitriyah Husnul Khotimah, Alimuddin, Dinar Tri Soelistyowati, Sri Nuryati, Ketut Sugama, Ahmad Muzaki, Indah Mastuti, Sari Budi Moria Sembiring, Ketut Mahardika, Harton Arfah, and Haryanti (Department of Aquaculture, Faculty of Fisheries and Marine Sciences, IPB University)

Evaluation of resistance and gene expression of barramundi, *Lates calcarifer* post-infection of nervous necrosis virus

Indonesian Aquaculture Journal, 17(2), 2022, 97-106

The most common problem in barramundi *Lates calcarifer* seedling production is the high mortality (>90%) caused by nervous necrosis virus (NNV) infection. This research aims to evaluate the resistance and gene expression of barramundi challenged by NNV. Two populations were used in this study, i.e., Australian, and Situbondo-originated barramundi populations. The immune-related gene expression levels in the liver, head of kidney, and spleen were observed at 48 and 96 hours after post-infection (hpi). Barramundi's survival and blood parameters were evaluated post-NNV infection. The results showed that the highest survival was revealed in Situbondo's barramundi ($42.0 \pm 4.47\%$) compared to Australian barramundi ($20.0 \pm 7.07\%$) and no mortality was observed in the control without NNV infection. The higher survival rate in barramundi from Situbondo was in line with the blood profile. The number of red blood cell from Situbondo barramundi post-NNV infection (ST) at 96 hpi was higher ($P < 0.05$) than Australian barramundi post-NNV infection (AT). The number of white blood cell of ST at 48 hpi was higher ($P < 0.05$) than AT, but started to decrease at 96 hpi in ST barramundi. The total white blood cell in AT barramundi increased from 48 to 192 hpi. TNF α and IL1-b gene expression levels were significantly higher in the liver, head kidney, and spleen of Situbondo compared to Australian barramundi at 48 hpi, while MHCIIa gene expression in Situbondo's was significantly higher compared to Australian barramundi at 96 hpi. These results indicate the important roles of all the genes in the barramundi's immune responses against viral infection. Based on the results of the research, Situbondo's barramundi has the potential to be used as a candidate for generating broodstock of disease-resistant strain.

KEYWORDS: barramundi, viral infection, survival rate, blood parameter, gene expression

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p-ISSN 0215-0883
e-ISSN 2502-6577

Volume 17 Number 2, 2022

Keywords derived from the article. No permission or cost needed to copy the abstract

UDC 639.31

Erma Primanita Hayuningtyas, Eni Kusriani, and Abinawanto (*Research Institute for Ornamental Fish Culture, Ministry of Marine Affairs and Fisheries*)

Isolation and identification of partial growth hormone (GH) mRNA of tiger shovelnose catfish *Pseudoplatystoma fasciatum* (Linnaeus, 1766)

Indonesian Aquaculture Journal, 17(2), 2022, 107-119

The growth of fish is regulated by growth hormones secreted in a limited amount by its pituitary glands. Tiger shovelnose catfish has a relatively faster growth indicating that some growth hormones suspectedly play roles in the process and could be used in improving other farmed fish species. This study aimed to isolate and identify the growth hormone (GH) mRNA gene in Tiger shovelnose catfish (*Pseudoplatystoma fasciatum* Linnaeus, 1766). The sample was isolated from the pituitary, the fish measuring 602 g and 43 cm body length; Total RNA was extracted using the Tri Reagent Kit, followed with cDNA synthesis. The success of the extraction was confirmed by quantification and PCR using the b-actin gene as an internal control. GH mRNA gene was isolated by RT-PCR method, with degenerated primers from seven catfish species sequence data in the NCBI gene bank. The single band from GH gene was cloned and sequenced. Total RNA quantification with a concentration of 227 ng/μL and purity of 1.821. The successful isolation of mRNA from the pituitary gland was confirmed by amplifying the β -actin gene generated at 300 bp. This isolation of the GH mRNA gene had a sequence length of 234 bp. Tiger shovelnose catfish GH gene consists of 17 amino acid residues. The GH gene of Tiger shovelnose catfish was close to that of striped catfish (*P. hypophthalmus*) and Indian catfish (*Clarias batrachus*) with almost similar homology value of 90.6%. Partial GH gene from tiger shovelnose catfish can be used a molecular marker in revealing the role of growth hormone on fish development, fish biology, growth gene expression, selective breeding and other mechanisms related to the aquaculture.

KEYWORDS: degenerate primer; gene expression; pituitary; PsGH; RT-PCR

UDC 639.518

Andi Aliah Hidayani, Yushinta Fujaya, Dody Dh. Trijuno, Muh. Tauhid Umar, Nita Rukminasari, Alimuddin, and Gunarto (Department of Fisheries, Faculty of Marine Science and Fisheries, Hasanuddin University)

Reproductive performance of intraspecific hybrids of blue swimming crab (*Portunus pelagicus*)

Indonesian Aquaculture Journal, 17(2), 2022, 121-130

High exploitation of the blue swimming crab (*Portunus pelagicus*) has significantly reduced its wild populations. The domestication process of this species has been started; however, its breeding program has not yet been successful. Therefore, this study aimed to examine the reproduction performance of intraspecific hybrids of blue swimming crab from Sorong (Papua) and Barru (South Sulawesi), Indonesia. *P. pelagicus* from Sorong has a bigger size, while the crab from Barru has a better reproduction performance, including fecundity and egg diameter. Hybridization was conducted between crabs from Sorong and Barru with different combinations of broodstock, namely: Barru female \times Barru male (BF \times BM); Barru female \times Sorong male (BF \times SM); and Sorong female \times Barru male (SF \times BM). The results showed no significant difference in the fecundity and egg diameter between the three hybridization trials. The number of successfully spawned broodstock from BF \times BM, BF \times SM, and SF \times BM were 3, 3, and 2 broodstock, respectively. Meanwhile, the mean values of egg fecundity from BF \times BM, BF \times SM, and SF \times BM were 117, 109, and 151 eggs/g BW, respectively. Furthermore, the mean values of broodstock fecundity per crab were 7,797 eggs, 10,103 eggs, and 10,605 eggs, while the mean values of egg diameter were 0.58 mm, 0.57 mm, and 0.62 mm, respectively. In conclusion, the intraspecific hybridization was successfully carried out between the Barru and Sorong crab populations showing no differences in the fecundity values and egg diameter between the three crosses. The successful spawning between female crabs from Sorong and male crabs from Barru was higher than that of female crabs from Barru and male crabs from Sorong.

KEYWORDS: egg diameter; fecundity; hybridization; reproduction performance; *Portunus pelagicus*

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p-ISSN 0215-0883
e-ISSN 2502-6577

Volume 17 Number 2, 2022

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UDC 639.043.2

Otie Dylan Soebhakti Hasan, Adang Kasmawijaya, Azam Bachur Zaidy, and Rina (Department of Fisheries Extension, Jakarta Technical University of Fisheries)

Comparison of production performance of striped catfish larvae (*Pangasianodon hypophthalmus*, Sauvage 1878) fed with live and frozen daphnia (*Daphnia magna*)

Indonesian Aquaculture Journal, 17(2), 2022, 131-138

Daphnia magna as a live feed in the maintenance of catfish larvae in the form of frozen feed is still limited. Evaluation of the production performance of catfish larvae using live feed *D. magna* in both live and frozen compared with feeding Tubifex became the objective of this research activity. The experimental design used feed treatment with Tubifex (P1) as a control, live *D. magna* (P2), and frozen *D. magna* (P3) with four experimental replications for 15 days of rearing using a completely randomized design. Twelve aquariums with a water volume of 150 L were used in the experiment. Stripped catfish larvae (1.5 cm TL), as many as 9 fish/L were stocked in each aerated aquarium. The amount of feed given was 15% of the weight of fish biomass with a frequency of 4 times a day and increased every day by 10% from the total feed of the first day. Results of the experiment showed different feeding significantly affected absolute length growth, total biomass, and feed conversion, with the best treatment being Tubifex (P1) with values of 0.6 ± 0.02 cm, 83.93 ± 5.99 g, and 1.31, respectively. The best growth rate of weight and length were obtained on larvae fed Tubifex (P1). The best protein efficiency and retention ratio resulted from frozen *D. magna* feed (P3) treatment of 12.45 and 7.11%, respectively. Live and frozen *D. magna* was not significantly different, so frozen *D. magna* feed can be used as an alternative natural feed with a high level of availability.

KEYWORDS: *Daphnia magna*; stripped catfish; production performance; frozen Daphnia

UDC 639.512

Romi Novriadi, Fira Irawan, Shadiqa Malahayati, Nurul Khotimah, Ofan Bosman, Budi Tanaka, and Jovano Erris Nugroho (Jakarta Technical University of Fisheries)

Effects of microalgae spirulina *Arthrospira platensis* supplementation to the plant-based diet for pacific white shrimp *Litopenaeus vannamei*

Indonesian Aquaculture Journal, 17(2), 2022, 139-145

A sixty-days feeding trial was conducted to evaluate the inclusion effect of spirulina *Arthrospira platensis* meal (SM) in the diet on growth and health condition of juvenile Pacific white shrimp *Litopenaeus vannamei*. Four isonitrogenous and iso-lipidic experimental diets were formulated to contain 0%, 0.2%, 0.4%, and 0.8% SM and fed to the shrimp (average initial weight 0.71 ± 0.1 g, 15 shrimp per tank, n=3). At the end of the growth trial, shrimp were sampled and total haemocyte counts were measured. The growth performances of shrimp were significantly affected by the dietary inclusion of SM, whereas the inclusion of SM provides a better biomass, final body weight (FBW), weight gain (WG) and feed conversion ratio (FCR) compared to the control group. Additionally, the inclusion of SM significantly enhances the total haemocytes count (THC) and lysozyme activity in shrimp compared to control group. Therefore, SM can be considered as the functional ingredients or supplements in diet to improve the growth and health condition of shrimp.

KEYWORDS: Spirulina; *Arthrospira platensis*; growth; health status; *Litopenaeus vannamei*

INDONESIAN AQUACULTURE JOURNAL

p-ISSN 0215-0883
e-ISSN 2502-6577

Volume 17 Number 2, 2022

Keywords derived from the article. No permission or cost needed to copy the abstract

UDC 639.31

Md. Saddam Hossain, Mohammad Moniruzzaman, Mohammad Matiur Rahman, and Zakir Hossain (Department of Fisheries Biology and Genetics, Bangladesh Agricultural University)

Evaluation of polyunsaturated fatty acids and b-glucan containing diet on growth performance and condition factor of pabda catfish, *Ompok pabda* (Hamilton, 1822)

Indonesian Aquaculture Journal, 17(2), 2022, 147-155

A nutritionally balanced diet and selection of appropriate species are important for aquaculture. The present study was conducted to evaluate the effects of polyunsaturated fatty acids (PUFAs) and b-glucan containing diet (PBG) on growth performance, feed utilization, length-weight relationship, and condition factor of Pabda catfish, *Ompok pabda*. In this study, squid extracted phospholipid and mushroom powder were used as the source of PUFAs and b-glucan, respectively, and formulated two isonitrogenous diets such as basal or control (CON) diet and PBG diet with maintaining 30% protein levels. Optimum physicochemical parameters of water such as dissolved oxygen (DO), temperature, and pH were maintained at 6.7 ± 0.5 , $26.5 \pm 2^\circ\text{C}$, and 7.4 ± 0.2 , respectively in each cistern during the study period. The results showed that fish fed with the PBG diet had significantly ($P < 0.01$) higher final body weight, final length gain, food conversion ratio (FCR), specific growth rate (SGR), food conversion efficiency (%), hepato-somatic index (HSI), kidney index (KI), and viscerosomatic index (VSI) than fish fed with the CON diet. The coefficient of determination revealed a significant positive relationship ($R^2 = 0.956$) between the treatment group's length and weight. The PBG diet had a significant ($P < 0.05$) influence on the length-weight relationship and relative condition factor (K) of *O. pabda*. The current study demonstrates that the experimental diet improves growth performance, feed utilization, length-weight relationship, and condition factor of *O. pabda*.

KEYWORDS: feed utilization; hepato-somatic index; length-weight relationship; specific growth rate; nutrition may provide subsidies for a future technological package

UDC 639.3.043

Mukhlisnah Djalil, Alim Isnansetyo, Triyanto, and Tito Arya Nugraha (Master Program in Fisheries Science, Department of Fisheries, Faculty of Agriculture, Universitas Gadjah Mada)

Feed efficiency and growth of catfish (*Clarias* sp.) fed with the addition of immune-boosting fermented earthworms

Indonesian Aquaculture Journal, 17(2), 2022, 157-163

A fermented earthworm (FEW) is reported to be an alternative to an immune-modulator feed additive in catfish. However, the effects on growth and feed efficiency have not been reported yet. The present study aimed to evaluate the effects of fermented earthworms (FEW) on the growth and feed efficiency of catfish (*Clarias* sp.). A feeding trial was conducted in a completely randomized design with five treatments of diet in quadruplicate. The trial was conducted for 78 days. The observed parameters comprised of survival rate (SR), specific growth rate (SGR), feed conversion ratio (FCR), feed efficiency (FE), protein efficiency ratio (PER), and total biomass. The results revealed that the FEW at up to 5% did not affect ($P > 0.05$) the growth rate of catfish, but FEW gave a negative effect on the growth rate ($P > 0.05$) at the addition rate higher than 5%. The highest growth rate was found at the addition rate of 2.5%. FEW also did not affect the survival rate (SR), FCR, PER, and total biomass ($P < 0.05$). This study successfully confirmed that FEW could be used as an alternative to immuno-modulator ingredient without any negative impact on the growth of catfish when FEW was added to the feed at as high as 5%. These findings give a new perspective in utilizing FEW as a functional aqua-feed ingredient to increase immune response without alteration of the fish growth.

KEYWORDS: protein efficiency ratio; aquafeed; fermented worms; catfish; feed conversion ratio

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UDC 639.2.091

Murwantoko, Endang Wijayanti, Sri Agustatik, Harshelly Valianti, Lalla Kumala Yulanda, and Nur Lailatul Firotn Nukmah (Department of Fisheries, Faculty of Agriculture, Universitas Gadjah Mada)

Detection and genotype determination of lymphocystis disease virus infecting orange clownfish, *Amphiprion percula* farmed in Batam, Indonesia

Indonesian Aquaculture Journal, 17(2), 2022, 165-172

The orange clownfish, *Amphiprion percula*, is a popular fish in the global marine ornamental trade. In March 2021, several orange clown fish at Batam Mariculture Development Center exhibited lethargic behavior with wart-like nodules on the fins suggesting a viral disease infection. This study aimed to detect the suspected viral disease agent from the clownfish and determine its genotype based on the major capsid protein gene. The fish tissues with wart-like nodules were collected and fixed in 96% ethanol. The DNA was extracted from the tissues and used as the template for the amplification of the major capsid protein (MCP) and myristylated *membrane protein* (MMP) genes using polymerase chain reaction (PCR). The nucleotide sequences of the PCR products were analyzed for their homology using the Basic Local Alignment Search Tool (BLAST). Multiple alignments of the amino acid sequence of MCP were performed using MEGA-X to determine the genotype. The PCR amplification produced the expected bands for detecting MCP, MMP and DNAPol genes. These results indicated the presence of Lymphocystis disease virus (LCDV), designated as LCDV-Oc-Btm. The sequencing of MCP and MMP genes produced the 1221 and 407 nucleotides, respectively. The BLAST analysis showed the highest identity was obtained with the species of LCDV-1 (LCDV-Sa strain) at 91.04 % and 88.19 % for MCP and MMP, respectively. The UPGMA phylogenetic tree showed LCDV-Oc-Btm differs from the existing genotype and can be assigned as a new genotype. This study concludes that LCDV-Oc-Btm is a novel species of lymphocystis disease virus.

KEYWORD: Genotype; LCDV; MCP; MMP

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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

**) Center for Fisheries Research and Development, Jakarta

***) Bogor Agricultural University, Bogor

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ABSTRACT (12pt Bold)

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

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Indonesian Aquaculture Journal has a p-ISSN 0215-0883; e-ISSN: 2502-6577 with Accreditation Number: 591/AU2/P2MI-LIPI/03/2015 (period April 2015-April 2018). First published in 2006, with the publication frequency of twice a year, in June and December. (<http://ejournal-balitbang.kkp.go.id/index.php/iaj>) is a peer-reviewed Journal Indonesian Aquaculture accept manuscripts or articles in the field of aquaculture various academics and researchers nationally.

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CONCLUSION: The conclusion describes the response of hypotheses and / or research purposes. Conclusions not contain looping of results and discussion, but rather to a summary of the research results.

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 |

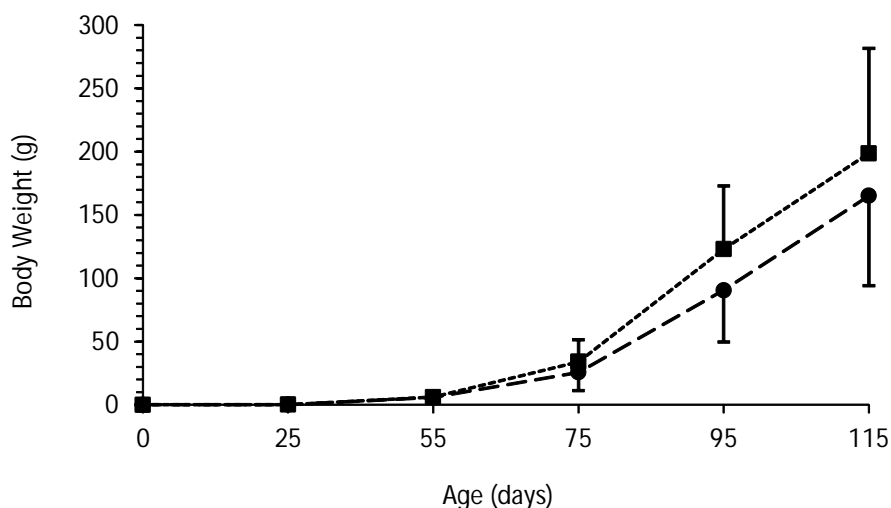


Figure 1. Growth performances based on body weight during 25 days of larval rearing phase, 30 days of nursery phase and 60 days of grow-out phase (based on samplings of 2% populations) of the third generation (■) and control population (●) of the African catfish (*Clarias gariepinus*) genetic improvement 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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Each equation is written centered and numbered columns are written in parentheses and placed at the end of the right margin. Equations should be written using Equation Editor in MS Word or Open Office (Primack, 1983).

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

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10. Acknowledgements

Thanks delivered to the Center for Fisheries Research and Development, which has funded the sustainability of this journal.

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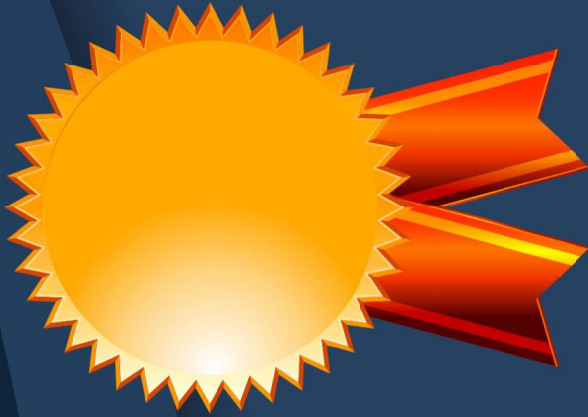
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Petikan dari Keputusan Menteri Riset dan Teknologi/
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Nomor 85/M/KPT/2020
Peringkat Akreditasi Jurnal Ilmiah Periode I Tahun 2020
Nama Jurnal Ilmiah

Indonesian Aquaculture Journal

E-ISSN: 25026577

Penerbit: Pusat Riset Perikanan

Ditetapkan sebagai Jurnal Ilmiah

TERAKREDITASI PERINGKAT 1

Akreditasi Berlaku selama 5 (lima) Tahun, yaitu
Volume 14 Nomor 2 Tahun 2019 sampai Volume 19 Nomor 1 Tahun 2024

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