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Kata kunci bersumber dari artikel. Lembar abstrak dapat dicuplik tanpa izin dan biaya

Edy Barkat Kholidin, Edy Farid W., Sudarmaji, Sirodiana, Moh. Abduh, Adang Saputra, Siti Murniasih, dan Taukhid (Pusat Riset Perikanan, Badan Riset dan Inovasi Nasional))

Performa vaksin ikan 'Trivalen-SA' pascapenyimpanan selama 12 bulan untuk pencegahan ko-infeksi streptococcosis dan *motile Aeromonas septicemia* pada ikan nila (*Oreochromis niloticus*)

*Performance of the 'Trivalen-SA' fish vaccine following a 12-month storage period for the prevention of streptococcosis and motile Aeromonas septicemia co-infection in Tilapia (*Oreochromis niloticus*)*

Jurnal Riset Akuakultur, 19(4), 2024, 277-298

Riset ini bertujuan untuk mengevaluasi efikasi dan keamanan vaksin ikan 'Trivalen-SA' pascapenyimpanan selama 12 bulan untuk pencegahan ko-infeksi streptococcosis dan *motile Aeromonas septicemia* (MAS) pada ikan nila (*Oreochromis niloticus*). Ikan uji yang digunakan adalah ikan nila yang sudah specific pathogen free dengan bobot $8 \pm 1,2$ g. Perlakuan yang diberikan adalah aplikasi vaksin melalui: (1) Injeksi satu dosis (0,1 mL per ekor), (2) Injeksi dua dosis (0,2 mL per ekor), (3) Perendaman dalam larutan vaksin pada konsentrasi 107 CFU mL^{-1} , (4) Injeksi 0,1 mL *phosphate buffered saline* (PBS) sebagai kontrol positif, dan (5) Perendaman dalam air segar selama 30 menit sebagai kontrol negatif. Efikasi vaksin dievaluasi dengan nilai *relative percent survival* (RPS) melalui ujiantang terhadap kedua jenis bakteri infeksi penyusun formula vaksin. Uji keamanan vaksin dilakukan sesuai metode standar pengujian vaksin ikan. Hasil penelitian menunjukkan bahwa vaksin ikan 'Trivalen-SA' pada pengujian ini masih aman dan protektif dengan hasil secara kuantitatif lebih baik karena nilai RPS terhadap infeksi bakteri *Aeromonas hydrophila* berkisar antara 15,79-29,82%; bakteri *Streptococcus agalactiae* (non-hemolitik) antara 25,92-48,15%, dan bakteri *S. agalactiae* (β -hemolitik) antara 18,52-40,75%. Proteksi sinergis terhadap ko-infeksi ketiga jenis atau biotipe bakteri adalah 27,37% untuk injeksi satu dosis; 39,57% untuk injeksi dua dosis, dan 22,54% untuk perendaman. Hasil terbaik berdasarkan kinerja sintasan dan pertambahan bobot tubuh ikan nila dengan nilai RPS mencapai 39,57% apabila diberikan vaksin melalui injeksi dua dosis (0,2 mL per ekor).

KATA KUNCI: ikan nila; pencegahan ko-infeksi; penyimpanan; vaksin ikan

*A study was conducted to determine the efficacy and safety of the 'Trivalen-SA' fish vaccine after 12 months of storage in preventing co-infection by streptococcosis and motile Aeromonas septicemia (MAS) in tilapia (*Oreochromis niloticus*). Specific pathogen-free tilapia with a weight of $8 \pm 1,2$ g were used as the test fish. The treatments included: (1) Injection with a single dose (0.1 mL per fish), (2) Injection with a double dose (0.2 mL per fish), (3) Immersion with the vaccine solution in 107 CFU mL^{-1} , (4) Injection with 0.1 mL phosphate buffered saline (PBS) as a positive control, and (5) Immersion with freshwater for 30 minutes as a negative control. Vaccine efficacy was assessed using relative percent survival (RPS) values obtained from the challenge tests against each bacterial species in the vaccine. Vaccine safety was evaluated according to standard fish vaccine testing protocols. The results showed that the 'Trivalen-SA' vaccine in this study remained safe and effective indicated by RPS value against *Aeromonas hydrophila* ranged from 15.79 to 29.82%, non-hemolytic *Streptococcus agalactiae* ranged from 25.92 to 48.15%, and β -hemolytic *S. agalactiae* ranged from 18.52 to 40.75%. The synergistic protection against co-infection by all three bacterial species or biotypes was 27.37% for the single-dose injection, 39.57% for the double-dose injection, and 22.54% for the immersion method. The best results based on the survival performance and body weight gain of tilapia with an RPS value reached 39.57% when given the vaccine through double-dose injection (0.2 mL per fish).*

KEYWORDS: fish vaccine; prevention of co-infection; storage; tilapia

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The effect of fermented banana stem (*Musa paradisiaca*) in reducing ectoparasite infestation in farmed red tilapia (*Oreochromis niloticus*)

Pengaruh fermentasi batang pisang (*Musa paradisiaca*) dalam mengurangi infestasi ektoparasit pada budidaya ikan nila merah (*Oreochromis niloticus*)

Jurnal Riset Akuakultur, 19(4), 2024, 219-344

Tilapia is a widely farmed freshwater fish due to its fast growth and disease resistance. However, ectoparasite infestations hinder its health and growth. Antibiotics are commonly used to treat these parasites, but their negative effects have led to the search for alternatives, such as banana (*Musa paradisiaca*) stem. This study evaluated the effects of different doses of fermented banana stem on ectoparasite mortality in red tilapia (*Oreochromis niloticus*). The experiment included treatments with fermented banana stem at concentrations of 5 g.L⁻¹, 10 g.L⁻¹, and 15 g.L⁻¹, along with a control group. The fish samples were obtained from a government owned farming pond facility and a fish market with the average sizes of 10.2 ± 3.8 cm and 7.5 ± 1.3 cm, respectively. Farmed tilapia from the market pond had more ectoparasites compared to the fish collected from the government farming facility. The identified parasites were: *Trichodina* sp., *Dactylogyrus* sp., *Gyrodactylus* sp., *Ichthyophthirius multifiliis*, and *Oodinium* sp. The result showed that the fermented banana stem had different effective time in eradicating different ectoparasites ranged from 480-840 s for *Trichodina* sp., followed by 1380-1920 s for *Dactylogyrus* sp., and 2040-2640 s for *Gyrodactylus* sp. At concentrations of 10–15 g.L⁻¹, it significantly accelerated parasite mortality and increased tilapia survival rates by up to 80%. This study concludes that bioactive compounds in fermented banana stem effectively treat ectoparasites disease attacks and improve fish health.

KEYWORDS: banana stem; ectoparasites; survival rate; tannin; tilapia

Ikan nila merupakan salah satu ikan air tawar yang banyak dibudidayakan karena pertumbuhannya yang cepat dan ketahanannya terhadap penyakit. Namun, infestasi ektoparasit dapat menghambat kesehatan dan pertumbuhannya. Antibiotik umumnya digunakan untuk mengobati jenis parasit ini, tetapi dampak negatifnya mendorong pencarian alternatif, seperti batang pisang (*Musa paradisiaca*). Penelitian ini mengevaluasi pengaruh berbagai dosis fermentasi batang pisang terhadap mortalitas ektoparasit pada nila merah (*Oreochromis niloticus*). Percobaan melibatkan perlakuan dengan fermentasi batang pisang pada konsentrasi 5 g.L⁻¹, 10 g.L⁻¹, dan 15 g.L⁻¹, serta kelompok kontrol. Sampel ikan diperoleh dari kolam budidaya milik pemerintah dan pasar ikan, dengan ukuran rata-rata masing-masing 10,2 ± 3,8 cm dan 7,5 ± 1,3 cm. Ikan dari pasar memiliki lebih banyak ektoparasit dibandingkan dengan ikan dari fasilitas pemerintah. Parasit yang teridentifikasi meliputi *Trichodina* sp., *Dactylogyrus* sp., *Gyrodactylus* sp., *Ichthyophthirius multifiliis*, dan *Oodinium* sp.. Hasil penelitian menunjukkan bahwa fermentasi batang pisang memiliki efektivitas waktu berbeda dalam membasmi ektoparasit, berkisar antara 480–840 detik untuk *Trichodina* sp., 1380–1920 detik untuk *Dactylogyrus* sp., dan 2040–2640 detik untuk *Gyrodactylus* sp.. Pada konsentrasi 10–15 g.L⁻¹, fermentasi batang pisang secara signifikan mempercepat kematian parasit dan meningkatkan kelangsungan hidup ikan hingga 80%. Penelitian ini menyimpulkan bahwa senyawa bioaktif dalam batang pisang terfermentasi efektif dalam mengobati serangan penyakit akibat ektoparasit dan meningkatkan kesehatan ikan nila.

KATA KUNCI: batang pisang; ektoparasit; ikan nila; kelulushidupan; tannin

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Effect of different feeding rates of corn cob flour supplemented-feed on the growth of farmed *Osphronemus gouramy*

Pengaruh tingkat pemberian pakan berbeda yang disuplementasi tepung tongkol jagung terhadap pertumbuhan *Osphronemus gouramy* hasil budidaya

Jurnal Riset Akuakultur, 19(4), 2024, 315-329

The rapid growth of aquaculture industry and the limited availability of conventional fish feed have driven the need for alternative feed sources, particularly in intensive fish farming systems. This study, conducted from May 15 to July 5, 2017, in Bengkulu, aimed to determine the optimal feeding rate for gourami (*Osphronemus gouramy*) using artificial fish pellets. A completely randomized design was applied, testing four feeding rates based on fish biomass: D1 (2%), D2 (3%), D3 (4%), and D4 (5%) per day. Gouramis (3.2–3.3 g, 1.1–1.3 cm) were reared in 24 plastic containers (50×30×27 cm³) under controlled water quality conditions. The results showed that a 5% feeding rate (D4) yielded the best outcomes in absolute length (1.97 ± 0.13 cm), specific growth rate ($2.78 \pm 0.17\%$ day⁻¹), feed conversion ratio (3.72 ± 0.11), feed efficiency ($26.85 \pm 0.30\%$), and survival rate (88.89%). Statistical analysis revealed that different feeding rates significantly influenced absolute length, specific growth rate, and feed conversion ratio, while feed efficiency and survival rate remained unaffected. Despite the promising growth performance at higher feeding rates, the high feed conversion ratio and low feed efficiency highlight the need for improved feed formulations. Future research should focus on optimizing corn cobs as a complementary ingredient to enhance feed efficiency, minimize waste, and contribute to sustainable aquaculture. Incorporating corn cob-based feeds could improve waste management and provide economic benefits to fish farmers.

KEYWORDS: corn cob flour; feeding rate; fish feed; gourami; growth

Pesatnya pertumbuhan industri akuakultur dan keterbatasan ketersediaan pakan ikan konvensional mendorong perlunya sumber pakan alternatif, terutama dalam sistem budidaya ikan intensif. Penelitian ini, yang dilaksanakan pada tanggal 15 Mei hingga 5 Juli 2017 di Bengkulu, bertujuan untuk menentukan tingkat pemberian pakan optimal bagi ikan gurami (*Osphronemus gouramy*) menggunakan pakan buatan ikan. Rancangan acak lengkap diterapkan dengan menguji empat tingkat pemberian pakan berdasarkan biomassa ikan: D1 (2%), D2 (3%), D3 (4%), dan D4 (5%) per hari. Ikan gurami (3,2–3,3 g, 1,1–1,3 cm) dipelihara dalam 24 wadah plastik (50×30×27 cm³) dengan kualitas air yang terkontrol. Hasil penelitian menunjukkan bahwa tingkat pemberian pakan 5% (D4) memberikan hasil terbaik dalam hal panjang mutlak ($1,97 \pm 0,13$ cm), laju pertumbuhan spesifik ($2,78 \pm 0,17\%$ hari⁻¹), rasio konversi pakan ($3,72 \pm 0,11$), efisiensi pakan ($26,85 \pm 0,30\%$), dan tingkat kelangsungan hidup (88,89%). Analisis statistik menunjukkan bahwa tingkat pemberian pakan yang berbeda berpengaruh signifikan terhadap panjang mutlak, laju pertumbuhan spesifik, dan rasio konversi pakan, sedangkan efisiensi pakan dan tingkat kelangsungan hidup tidak terpengaruh. Meskipun tingkat pemberian pakan yang lebih tinggi menghasilkan pertumbuhan yang lebih baik, tingginya rasio konversi pakan dan rendahnya efisiensi pakan menunjukkan perlunya perbaikan formulasi pakan. Penelitian lebih lanjut perlu difokuskan pada optimalisasi tongkol jagung sebagai bahan tambahan pakan untuk meningkatkan efisiensi pakan, mengurangi limbah, dan mendukung kegiatan akuakultur berkelanjutan. Penggunaan pakan berbasis tongkol jagung juga dapat membantu pengelolaan limbah serta memberikan manfaat ekonomi bagi pembudidaya ikan.

KATA KUNCI: ikan gurami; pakan ikan; pertumbuhan; tepung tongkol jagung; tingkat pemberian pakan

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Effect of feeding rate reduction on the growth performance and feed utilization of pacific white shrimp reared using biofloc system

Pengaruh pengurangan feeding rate terhadap kinerja pertumbuhan dan pemanfaatan pakan udang vaname yang dipelihara dengan sistem bioflok

Jurnal Riset Akuakultur, 19(4), 2024, 331-343

Biofloc in shrimp aquaculture provides natural food and reduces the reliance on commercial feed. The extent to which biofloc can optimize feeding management is not, however, fully understood. This study aimed to evaluate the effects of reducing feeding rates on the growth performance and feed utilization of Pacific white shrimp (*Litopenaeus vannamei*) reared in a biofloc system. A completely randomized design was used with four treatments: K (standard feeding, clear water), N (standard feeding, biofloc), NA (25% feeding reduction, biofloc), and NB (50% feeding reduction, biofloc). Shrimp were stocked at 40 individuals per tank and fed commercial feed containing 40% protein over a 30-day period. Results showed that shrimp in the NA treatment (25% feed reduction with biofloc) had the highest final weight (8.66 ± 0.03 g), biomass (306.13 ± 14.27 g), and weight gain (5.74 ± 0.25 g) compared to other treatments ($P < 0.05$). NA also exhibited a higher specific growth rate (3.63 ± 0.27 %/day) than K and NB. Feed utilization improved with a lower feed conversion ratio and higher protein retention in the NA group. This study highlights that a 25% feeding rate reduction in biofloc systems optimizes shrimp growth and feed utilization. Future research should explore long-term sustainability, biofloc composition variations, and technological integration for scaling up efficient and environmentally sustainable shrimp farming operations.

KEYWORDS: feed; feeding rate; growth, shrimp

*Penggunaan bioflok dalam budidaya udang memberikan makanan alami dan mengurangi ketergantungan pada pakan komersial. Namun, sejauh mana bioflok dapat mengoptimalkan manajemen pakan belum sepenuhnya dipahami. Penelitian ini bertujuan untuk mengevaluasi efek pengurangan laju pemberian pakan terhadap kinerja pertumbuhan dan pemanfaatan pakan udang vaname (*Litopenaeus vannamei*) yang dibudidayakan dalam sistem bioflok. Desain penelitian menggunakan rancangan acak lengkap (RAL) dengan empat perlakuan, yaitu: K (pemberian pakan standar, air jernih), N (pemberian pakan standar, bioflok), NA (pengurangan pakan 25%, bioflok), dan NB (pengurangan pakan 50%, bioflok). Udang ditempatkan sebanyak 40 individu per tangki dan diberi pakan komersial yang mengandung 40% protein selama 30 hari. Hasil menunjukkan bahwa udang pada perlakuan NA (pengurangan pakan 25% dengan bioflok) memiliki berat akhir tertinggi ($8,66 \pm 0,03$ g), biomassa ($306,13 \pm 14,27$ g), dan kenaikan berat ($5,74 \pm 0,25$ g) dibandingkan perlakuan lainnya ($P < 0,05$). NA juga menunjukkan tingkat pertumbuhan spesifik yang lebih tinggi ($3,63 \pm 0,27$ %/hari) dibandingkan K dan NB. Pemanfaatan pakan meningkat dengan rasio konversi pakan yang lebih rendah dan retensi protein yang lebih tinggi pada kelompok NA. Penelitian ini menunjukkan bahwa pengurangan feeding rate pakan sebesar 25% dalam sistem bioflok mengoptimalkan pertumbuhan udang dan pemanfaatan pakan. Penelitian di masa depan harus mengeksplorasi keberlanjutan jangka panjang, variasi komposisi bioflok, dan integrasi teknologi untuk meningkatkan praktik budidaya udang yang efisien dan ramah lingkungan.*

KATA KUNCI: feeding rate; pakan; pertumbuhan; udang vaname

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Ekstrak kulit bawang merah (*Allium ascalonicum*) sebagai antibakteri untuk pengobatan udang vaname yang diinfeksi *Vibrio parahaemolyticus*

*Shallot (*Allium ascalonicum*) peel extract as an antibacterial treatment for Pacific white shrimp infected with *Vibrio parahaemolyticus**

Jurnal Riset Akuakultur, 19(4), 2024, 345-364

Penyakit *early mortality syndrome* atau *acute hepato pancreatic necrosis disease* yang disebabkan oleh bakteri patogen *Vibrio parahaemolyticus* menyebabkan kematian massal pada budidaya udang. Penelitian ini bertujuan untuk mendapatkan dosis efektif dari ekstrak kulit bawang merah sebagai upaya pengobatan pada udang vaname yang diinfeksi *V. parahaemolyticus* R^f (resisten rifampisin 50 µg mL⁻¹). Penelitian ini menggunakan rancangan acak lengkap yang terdiri dari lima perlakuan dan tiga ulangan yaitu K- (kontrol negatif), K+ (kontrol positif), KBM6,25 (ekstrak kulit bawang merah 6,25% pakan), KBM12,5 (ekstrak kulit bawang merah 12,5% pakan), dan KBM25 (ekstrak kulit bawang merah 25% pakan). Metode ekstraksi menggunakan *microwave assisted extraction* (MAE) dengan perbandingan 1:10 (50 g serbuk kulit bawang merah : 500 mL etanol absolut). Penelitian ini menggunakan udang vaname ukuran 3,41 ± 0,73 g per ekor yang diinfeksi terlebih dahulu dengan bakteri *V. parahaemolyticus* R^f. Pengobatan dilakukan dengan metode *dipping* sesuai dengan perlakuan selama 10 menit, dikembalikan ke wadah dan dipelihara selama 14 hari. Hasil uji sensitivitas tertinggi dihasilkan oleh dosis ekstrak 25% yaitu 11,47 mm. Hasil penelitian menunjukkan bahwa pemberian ekstrak kulit bawang merah dosis 6,25% menghasilkan *total haemocyte count*, *differential haemocyte count*, aktivitas fagositik, penurunan jumlah bakteri *V. parahaemolyticus* R^f, kelangsungan hidup, dan rasio pemberian pakan yang signifikan berbeda dibanding kontrol positif. Pemberian ekstrak kulit bawang merah pada dosis 6,25-25% mampu memulihkan kondisi udang pascainfeksi dalam waktu 14 hari dengan dosis terbaik didapatkan pada 6,25%..

KATA KUNCI: fitobiotik; kulit bawang merah; penyembuhan; udang vaname; *Vibrio parahaemolyticus*

*Early mortality syndrome or acute hepatopancreatic necrosis disease, caused by the pathogenic bacterium *Vibrio parahaemolyticus*, leads to mass mortality in shrimp farming. This study aims to determine the effective dose of shallot peel extract as a treatment for Pacific white shrimp infected with *V. parahaemolyticus* R^f (rifampicin-resistant at 50 µg mL⁻¹). A completely randomized design was used, consisting of five treatments with three replicates: K- (negative control), K+ (positive control), KBM6.25 (6.25% shallot peel extract in feed), KBM12.5 (12.5% shallot peel extract in feed), and KBM25 (25% shallot peel extract in feed). The extraction method employed microwave-assisted extraction with a ratio of 1:10 (50 g of shallot peel powder to 500 mL of absolute ethanol). The study used Pacific white shrimp with an average size of 3.41 ± 0.73 g per individual, which were first infected with *V. parahaemolyticus* R^f. The treatment was applied through a dipping method for 10 minutes, followed by a 14-day maintenance period. The highest sensitivity test results were observed at a 25% extract dose, producing a 11.47 mm inhibition zone. The results indicated that administering a 6.25% shallot peel extract significantly improved total haemocyte count, differential haemocyte count, phagocytic activity, reduction of *V. parahaemolyticus* R^f bacterial count, survival rate, and feed conversion ratio compared to the positive control. The administration of shallot peel extract at doses ranging from 6.25% to 25% successfully restored post-infection shrimp conditions within 14 days, with the optimal dose determined to be 6.25%.*

KEYWORDS: Pacific white shrimp; phytobiotic; recovery; shallot peel; *Vibrio parahaemolyticus*

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Pengaruh tingkat dan frekuensi pemberian pakan terhadap kinerja pertumbuhan dan pemanfaatan pakan pada pemeliharaan benih ikan gurami (*Osphronemus gouramy*)

The effects of feeding rate and frequency on growth performance and feed utilization in the rearing of giant gourami (Osphronemus gouramy) fry

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Pakan komersial menyumbang hingga 85% dari biaya produksi dalam pembenihan ikan gurami, dengan kenaikan harga yang berdampak pada efisiensi produksi. Optimalisasi *feeding rate* (FR) dan *feeding frequency* (FF) sangat penting dalam pengelolaan pakan. Penelitian ini menganalisis pengaruh kombinasi FR dan FF terhadap kinerja pertumbuhan dan pemanfaatan pakan pada benih ikan gurami. Rancangan acak lengkap faktorial digunakan dengan dua tingkat FR (3% dan 6%) serta tiga tingkat FF (1, 2, dan 3 kali per hari), menghasilkan enam kombinasi perlakuan dengan tiga ulangan. Ikan gurami ($0,81 \pm 0,02$ g; $3,79 \pm 0,17$ cm) dipelihara selama 60 hari dalam unit dengan volume 20 L dengan kepadatan 1 ekor L^{-1} dan pergantian air yang seragam. Hasil penelitian menunjukkan bahwa kombinasi FR 6% dengan FF tiga kali per hari menghasilkan kinerja pertumbuhan terbaik, dengan bobot akhir (5,74 g), laju pertumbuhan spesifik ($3,25\%$ hari $^{-1}$), pertambahan bobot harian (82,17 mg hari $^{-1}$), koefisien pertumbuhan termal (4,74), dan faktor kondisi (1,91). Kombinasi FR 6% dengan FF dua kali per hari menghasilkan panjang akhir (6,96 cm), biomassa akhir (113,75 g), hasil bersih (4,87 g L^{-1}), total konsumsi pakan (120,07 g), dan tingkat kelangsungan hidup (100%) tertinggi. Rasio konversi pakan terbaik (0,83) dan efisiensi pakan tertinggi (82,46%) ditemukan pada FR 3% dengan FF tiga kali per hari, meskipun tidak meningkatkan pertumbuhan. Secara keseluruhan, FR 6% dengan FF tiga kali per hari merupakan kombinasi paling efektif untuk mengoptimalkan pertumbuhan dan pemanfaatan pakan (rasio konversi pakan 1,05; efisiensi pakan 81,87%) dan direkomendasikan dalam manajemen pembenihan ikan gurami.

KATA KUNCI: benih ikan gurami; feeding frequency; feeding rate; kinerja pertumbuhan; pemanfaatan pakan

Commercial feed accounts for up to 85% of production costs in giant gourami hatcheries, with rising prices impacting production efficiency. Optimizing feeding rate (FR) and feeding frequency (FF) is crucial for managing feed use. This study analyzed effects of different FR and FF combinations on growth performance and feed utilization in giant gourami fry. A factorial completely randomized design was used with two FR (3% and 6%) and three FF levels (1, 2, and 3 times per day), totaling six treatment combinations with three replicates. Giant gourami (0.81 ± 0.02 g, 3.79 ± 0.17 cm) were reared for 60 days in 20 L units at a density of 1 fish L^{-1} , with uniform water exchange. Results showed that FR 6% with FF three times per day yielded the best growth performance, with final weight (5.74 g), specific growth rate (3.25% day $^{-1}$), daily weight gain (82.17 mg day $^{-1}$), thermal growth coefficient (4.74), and condition factor (1.91). The FR 6% with FF twice per day combination resulted in the highest final length (6.96 cm), biomass (113.75 g), net yield (4.87 g L^{-1}), total feed consumption (120.07 g), and survival rate (100%). The best feed conversion ratio (0.83) and feed efficiency (82.46%) were observed in FR 3% with FF three times per day, though it did not enhance growth. Overall, FR 6% with FF three times per day was the most effective for optimizing growth and feed utilization (feed conversion ratio 1.05; feed efficiency 81.87%) and is recommended for giant gourami hatchery management.

KEYWORDS: feed utilization; feeding frequency; feeding rate; giant gourami fry; growth performance

Indeks Pengarang

Author Index

	A		R	
Abduh, Moh.	277	Ramadhani, Dian Eka	345	
Azrita	365		S	
	D	Saputra, Adang	277	
Djauhari, Ricky	331	Saputri, Rika Ani	345	
	F	Sari, Yolania Anita	299	
Farid W., Edy	277	Sihombing, Mika Azarya		
Firdaus, Rahmat	365	Sirodiana	277	
Firman	315	Sudarmaji	277	
Firnaeni, Tata		Syandri, Hafrijal	365	
	H		T	
Harijono, Teguh	331	Tangguda, Sartika	331	
Hartini, Sri	315	Tantulo, Uras	331	
	K	Taukhid	277	
Kaborang, Yasinta Ega	331		U	
Kholidin, Edy Barkat	277	Utami, Diah Ayu Satyari	331	
Kusmiatun, Anik	331		W	
	M	Wahjuningrum, Dinamella	345	
Murniasih, Siti	277	Widanarni	345	
	P	Windarto, Seto	299	
Pangestuti, Novia Dwi	299		Y	
Praditya, Aisyah Febri	299	Yanadea, Elvira Clara	299	
Putra, Narendra Rhayszha M.	299	Yulfiperius	315	

AUTHOR GUIDELINES OF JURNAL RISET AKUAKULTUR FOR WRITING FORMAT AND PUBLICATION PROCESS

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ABSTRACT

Abstract is written in bahasa and English using 12-point Times New Roman single space with justified alignment. English abstract is followed by the English version of the title which is typed using bold capitalized each word letters. Abstract must not exceed than 250 words and contains the brief outline of the problem statement and aims of the study, brief methodology, the main findings or results, and conclusion.

KEYWORDS: author guidelines; Jurnal Riset Akuakultur; publication process; writing format

ABSTRAK: *Panduan Format Penulisan Jurnal Riset Akuakultur (Terjemahan dari Judul Artikel yang ditulis dalam Bahasa Indonesia Maksimal 20 Kata)*

Abstrak ditulis dalam bahasa Indonesia dan Inggris menggunakan font Times New Roman 12 spasi satu dengan rata kiri dan kanan. Abstrak bahasa Inggris diikuti dengan judul naskah versi bahasa Inggris yang diketik tebal dengan huruf pertama kapital pada setiap kata. Abstrak tidak boleh lebih dari 250 kata dan berisi ringkasan masalah dan tujuan penelitian, metodologi singkat, temuan utama atau hasil penelitian, dan kesimpulan.

KATA KUNCI: *format penulisan; Jurnal Riset Akuakultur; petunjuk penulisan; proses publikasi*

INTRODUCTION

Introduction must be concise and at least has several components including an adequate background related to the research, problem statement, some literature review from previous studies, the research gap, and the aims of the study. Introduction is written using double space line, single column, 12-point Times New Roman with justified alignment. Text citation of references uses author-date style according to APA 7th Edition and multiple references are listed in alphabetical order separated by semicolon among references to differentiate citations, e.g. (Smith & Jones, 2016; Williams, 2014). Use “and” when giving a citation in sentences and “&” for parentheses, e.g. Smith and Jones (2016) or (Smith & Jones, 2016).

MATERIALS AND METHODS

This section presents a clear and concise research procedures for others to be able to replicate the study. The use of subsections is allowed to explain some different continued-procedures. This section also provides ethical clearance statement for the research which applies an experiment on animals or human. The materials and equipment used must be mentioned with their specifications consisting of the trademark, supplier or manufacture name, and region or country. This section also covers a brief narration about data analysis. Methods that have been published should be summarized and completed with in-text-citation. Modified methods should be clearly described its modification from the previous cited methods. Use the international system of units (SI) or SI-derived units to express unit of measurements. Minus index is suggested being used rather than using slash (/), e.g.: mg L⁻¹, g L⁻¹, not mg/L or g/L. This section is typed in 12-point Times New Roman, double space line, a single column with justified alignment.

RESULTS AND DISCUSSION

Results and discussion must be combined in one section. The statement of the results can be summarized from the data appeared in the figures and tables. Discussion should explore the significance of the results or comparison to previous studies and represent the causal factors why and how the results were taken place, do not re-express the mentioned data in figures and tables in the form of sentences within results. Figures and tables can be placed in this section completed with cross-reference of the figures or tables stated in the text. This section is written in 12-point Times New Roman, double space line, a single column format with justified alignment.

Tables and figures must be placed within the main text, those can be placed in sections of materials and methods or results and discussion (if applicable). The preparation of tables can follow the guidance below:

1. Provide an editable form of tables, do not place any tables in the form of images.
2. The titles of tables should be consecutively numbered using Arabic numerals, please cite the tables in the text or give cross-reference of tables in the text.
3. The titles of tables are written in both in bahasa and English for the manuscript written

in bahasa, or only in English for the manuscript in English. Type the title using 12-point Times New Roman, single space with sentence case letters in justified alignment, and give hanging indent for the second and consecutive lines of the table title.

4. The body of the table is typed in 10-point Times New Roman, single space with left alignment, only column headings are typed in bold.
5. Please provide bahasa and English versions of any text in the body of the table for the manuscript submitted in bahasa, use italic font to type the English version of the text, while all the text in the table body of the manuscript submitted in English is only provided in English.
6. Use single horizontal lines to separate column heading and to indicate the end of the table, other horizontal lines are not needed. Vertical lines should not be used in the tables.
7. Capitalize only the first letter of the first word in each column and row entry.
8. All abbreviations and symbols or any statistical explanation and used literatures in the table body must be described in footnotes placed below the table and written in 10-point Times New Roman, single space in justified alignment.

An example of table format can be seen below.

Table 1. Average of survival rate, absolute weight growth, absolute length growth, and daily growth rate Asian redtail catfish fry fed different percentages of fermented sago dregs and anchovy head meal feed.

<i>Treatments</i>	<i>SR (%)</i>	<i>AWG (g)</i>	<i>ALG (cm)</i>	<i>DGR (% day⁻¹)</i>
P1	56,67 ± 22,5	0,12 ± 0,01 ^b	1,47 ± 0,39	0,57 ± 0,06 ^b
P2	58,33 ± 10,4	0,11 ± 0,01 ^b	1,42 ± 0,54	0,56 ± 0,03 ^b
P3	75,00 ± 10,0	0,16 ± 0,01 ^c	1,54 ± 0,17	0,78 ± 0,06 ^c
P4	66,67 ± 25,6	0,07 ± 0,00 ^a	1,20 ± 0,07	0,32 ± 0,01 ^a

Note: Values with different superscript letters in the same column indicate significantly different results ($P < 0,05$). P1 = Feeding with percentages of 6%, P2 = 8%, P3 = 10 %, P4 = 12% from body weight of fish fry. SR = survival rate; AWG = absolute weight growth; ALG = absolute length growth; DGR = daily growth rate.

The preparation of figures should refer the guidance below:

1. Figures should be provided in either vector art formats (Illustrator, EPS, WMF, FreeHand, CorelDraw, PowerPoint, Excel, etc.) or bitmap formats (Photoshop, TIFF, GIF, JPEG, etc.). Bitmap images should be of 300 dpi resolution. Provide an editable form of charts, not as images.

2. The titles of figures should be consecutively numbered using Arabic numerals, please cite the figures in the text or give cross-reference of figures in the text.
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5. Capitalize only the first letter of the first word in any text contained in the figure body.
6. All abbreviations and symbols or any statistical explanation and used literatures in the figure body must be described in footnotes placed below the figure title and written in 10-point Times New Roman, single space in justified alignment.

An example of figure format is presented below.

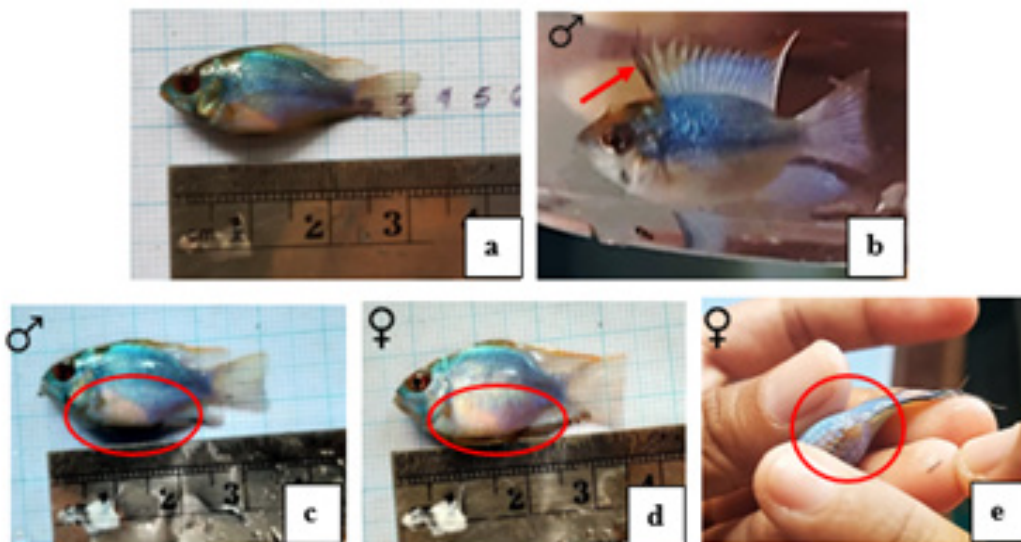


Figure 1. Visual observations of gonad matured ramirezi broodstock: (a) research start (b) ramirezi male at the end of the research with a black elongated front dorsal fin (c) ramirezi male with a bluer body and belly (d) ramirezi female with a pink belly (e) prominent and yellow urogenital.

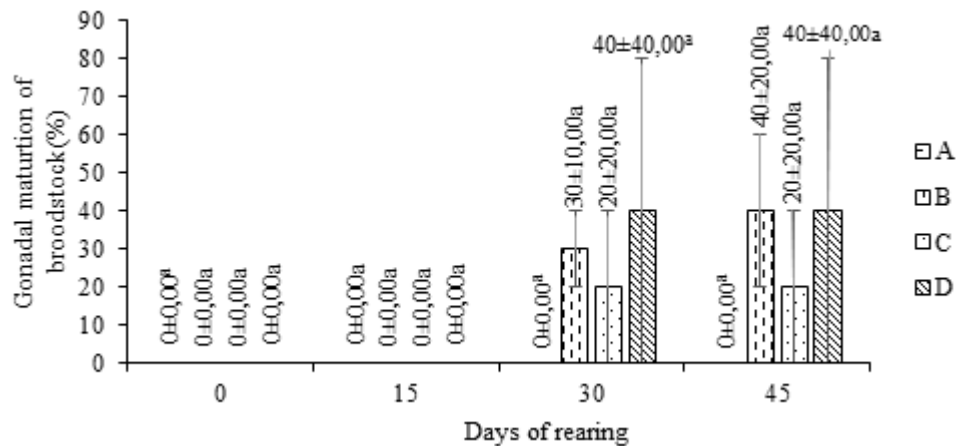


Figure 2. Accumulation percentage of gonadal mature ramirezi broodstock after treatments (combined ratio of artificial feed to bloodworms (*Chironomus* sp.): (A) 3:0, (B) 0:3, (C) 2:1, and (D) 1:2)) on day 0 to day 45

Note: The results presented are based on data normalization. Different superscripts in the same days of rearing indicate significant differences at a confidence level of 95% ($P < 0.05$).

CONCLUSION

Conclusions must summarize the results and answers the research questions or aims. Conclusions should be combined with the summary of the discussions which explains why or how the highlighted results obtained. This section is written in 12-point Times New Roman, double space line, a single column format with justified alignment.

ACKNOWLEDGMENTS

This section is used to acknowledge any institutions or individuals that provide funding sources or help during the study. The research which was funded by a research grant must mention the name of research grant and its detail such the funding organization and associated grant number (if applicable). This section is written in 12-point Times New Roman, double space line, a single column format with justified alignment.

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SERTIFIKAT

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