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Survival and Long Transport Time of Freshwater Lobster (*Cherax quadricarinatus*)

Kelangsungan Hidup dan Lama Transportasi Benih Lobster Air Tawar (Cherax quadricarinatus)

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Abstract

This research aims to determine the use of rice straw as a packaging medium for the survival, growth, induction, and sedation of lobster seeds transported for 6, 9, and 12 hours using the Completely Randomized Design (CRD) method. The research preparation includes preparing the maintenance medium, filling medium, and test animals (adaptation for 7 days after arrival and fasting for 24 hours). The main research involves acclimating lobster seeds using temperature manipulation for approximately 5 minutes, with transport media temperatures ranging from 10º to 12º, and then maintaining them for 28 days. The research results indicate survival, growth, induction, and sedation time differences. The fastest induction time occurred in the treatment with a 9-hour transport duration, lasting 4.14 minutes. The fastest sedation time occurred in the 6-hour transport duration, lasting 1.56 minutes. Post-transport survival is highest after 6 hours and 9 hours of treatment, which is 95%. The best post-maintenance survival is found after 6 hours of transportation, at 91%, while the treatments at 9 and 12 hours yield 86% and 76% results, respectively. This research indicates that straw can be utilized as a filling medium for up to 12 hours.

Keywords: Dry Transportation, Survival, Induction, Sedative

Abstrak

Penelitian ini bertujuan untuk mengetahui penggunaan jerami padi sebagai media
pengemasan terhadap kelangsungan hidup, pertumbuhan, induksi dan sedative pada benih lobster yang di trasportasikan selama 6,9,12 jam dengan menggunakan metode Rancangan Acak Lengkap (RAL). Persiapan penelitan meliputi persiapan media pemeliharaan, persiapan media pengisi dan persiapan hewan uji (adaptasi selama 7 hari setelah di datangkan dan pemuasaan selama 24 jam). Penalitian utama meliputi pemingsanaan benih lobster dengan menggunakan rekayasa suhu selama ±5 menit, dengan suhu pada media pengiriman berkisar 10-12º dan di lakukan pemeliharaan selama 28 hari . Hasil penelitian menunjukan bahwa terjadi perbedaan terhadap kelangsungan hidup, pertumbuhan, waktu induksi dan waktu sedatif. Waktu induksi tercepat tercepat yaitu pada perlakuan dengan lama trasportasi selama 9 jam yaitu selama 4.14 menit. Lama waktu sedative tercepat terjadi pada lama waktu transportasi selama 6 jam yaitu selama 1.56 menit. Kelangsungan hidup pasca transportasi tertinggi terdapat pada perlakuan selama 6 jam dan 9 jam yaitu 95. Kelangsungan hidup pasca pemeliharaan terbaik terdapat pada perlakuan selama 6 jam transportasi yaitu sebanyak 91% sedangakan padaa perlakuan 9 serta 12 jam mendapatkan hasil 86% dan 76% . Hasil penelitian ini menunjukan

bahwa penggunaan jerami pada dapat digunakan sebagai media pengisi hingga 12 jam.

Kata kunci: Transportasi Kering,Kelangsungan Hidup, Induksi, Sedative

1. Introduction

Crayfish (*Cherax quadricarinatus*) is one type of lobster that has the potential to be developed as a cultivated organism, and this is also by (Djunaidi et al., 2015) state that lobster is included as one of the leading commodities. This is due to the high demand both at home and abroad. The high demand for lobster cannot be matched by cultivation, which is still tiny, especially in some areas. Therefore, simple technology is needed to distribute seeds to these areas. Poor handling of seed transportation can result in seed quality that will decrease until post-transportation death (Syafarani et al., 2020)

Transportation in fish is divided into two, namely, using a wet system and a dry system. The use of a wet system in fisheries transportation has several fatal weaknesses, namely the media in the form of water used during shipping, which provides a large enough load and volume during transportation. Saputri et al. (2019) another thing with transportation using a dry system is that these problems can be dealt with using ringgan media and shipping using a wet system. Shipping using a dry system also has several disadvantages, including increased physical activity during transportation, which causes damage and decreases the quality and survival rate of the lobster. So, shipping media that can maintain temperature for a long time is required.

2. Material and Method

2.1. Time and Place

This research was conducted in January 2024 for 28 days in Potanga village, Boliyohuto sub-district, Gorontalo district, Gorontalo. The test animals used in this study were crayfish with a length of 4-5 cm and a weight of 2-3 g, as many as 63 tails (Taqwa & Yulian, 2014).

2.2. Methods

The method taken in this study is an experimental method using a completely randomized design consisting of three treatments and three replicates. The treatments used are as follows:

Treatment A: Shipping using straw for 6 hours
Treatment B: Shipping using straw for 9 hours
Treatment C: Shipping using a straw for 12 hours.

2.3. Procedures

2.3.1. Preparation of shipping media

The straw that will be used is first dried in the sun so that it can be used for a long time; when it is about to be used, the straw is soaked first for 6-9 hours at the average temperature; it aims to increase water absorption after that 45 before using the straw is soaked at a temperature of 10-11°C it seeks to keep the lobster in an unconscious condition when transferred to the shipping medium (Purnomo et al., 2022).

2.3.2. Stunning

The lobster to be used is first stunned, utilizing the shock method and inserted into water, which has a temperature ranging from 10-11°C, so the lobster is unconscious. When the lobster has collapsed, the packaging process will be carried out (Winarno, 2017).

2.3.3. Transportation and Awareness

The Styrofoam box is filled with soaked rice straw, with a height of 5 cm, after which the lobster is inserted into the straw. This aims to prevent the lobster from experiencing too much shock during transportation at the top of the 0.2 g ice cube, and the placement is attempted so as not to touch the lobster (Putri et al., 2021)

2.3.4. Maintenance of Crayfish Seeds after Transportation

Post-transportation crayfish seed maintenance aims to determine the effect of using rice straw for different lengths of time on the survival and growth of crayfish. This maintenance is carried out for 28 days in a pool with a separator installed. Feeding the crayfish twice, namely in the morning and at night, with a 25% to 75% ratio. This is because crayfish are nocturnal.

2.4. Parameter Observed

2.4.1. Absolute Weight Growth

The absolute weight growth rate is calculated using the Everhart and Rounsefell formula in Hadijah (2015), namely:

$$Wm = Wt\text{-}Wo$$

Description:

Wm : Absolute weight growth (g)
Wt : Final average weight (g)
Wo : Initial average weight (g)

2.4.2. Absolute Length Growth

Length growth rate is calculated using the formula (Akbar et al., 2020), namely:

$$\mathrm{Pm} = Pt - Po$$

Description:

Pm : Absolute Length Growth (cm)
Pt : Final Average Length (cm)
Po : Initial Average Length (cm)

2.4.3. Survival Rate

Survival Rate (SR) is the percentage of fish seeds that are still alive from the beginning to the end of maintenance. The survival rate can be calculated by the percentage of fish that live at the end of the maintenance period and the number of fish at the time of initial stocking before maintenance. Calculation of survival as follows Imran et al. (2023):

$$SR = \frac{Nt}{No} \times 100\ \%$$

Description:

SR : Percentage of Survival (%)
Nt : Total final fish population (Tails)
No. : Total initial fish population (Tails)

2.4.4. Induction Time

Induction time is observing the lobster's behaviour in everyday conditions until it faints (Ismandar & Dewantoro, 2020).

2.4.5. Sedative Time

Induction time is the time to observe the behaviour of lobsters under normal conditions until fainting (Ewita et al., 2023).

3. Result and Discussion

3.1. Weight and Length Growth

The results of the study of the weight growth of crayfish for 28 days can be seen in the following Figure 1.

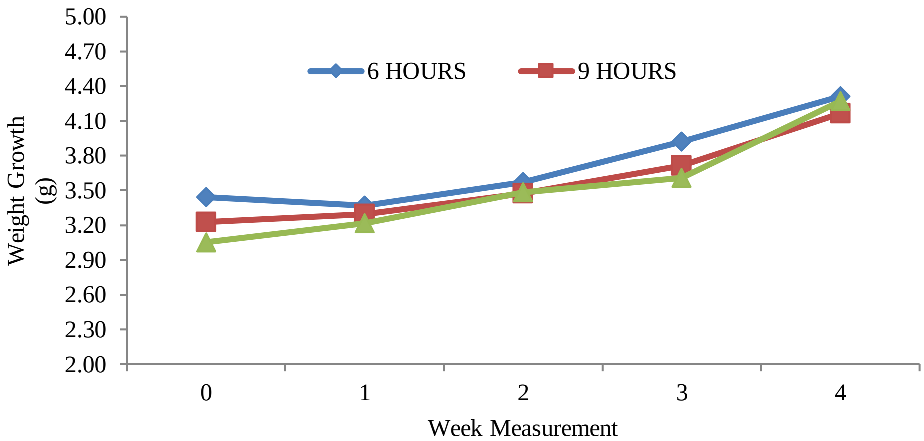

Figure 1. Weight growth graph

Figure 1 shows that treatment A (delivery for 6 hours) has the highest weight growth of 1.11 g while treatment C (delivery for 12) and B (Delivery for 9 hours) have a weight growth difference that is not too different, namely 1.08 and 1.0 g. Various lengths of delivery using straw media utilization did not have a significant effect on crayfish weight growth. This is thought to be due to the lack of feed utilization and protein content in the feed, which is the opinion of (Trisnasari et al., 2015). The composition of the feed renews the feed utilization in crayfish. The higher the protein content in a feed, the higher the level or rate of growth the fish possesses. This is the opinion (Mulyana et al., 2019) that the standard protein needs in optimal lobster seeds range from 35-40%. The greater the need for lobsters will decrease, but according to Junardi & Febrina (2022), in 100 g of bean sprouts, there are only 2.7 g of protein and 0.2 fat, resulting in lobster growth not in optimal conditions. The research results on the length growth of freshwater lobster for 28 days can be seen in Figure 2.

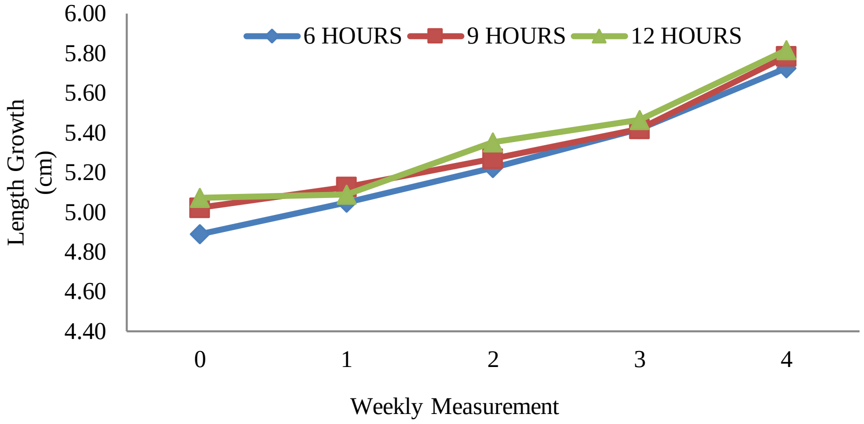

Figure 2. Length growth graph

Figure 2 shows that treatment A (delivery for 6 hours) has the highest weight growth of 0.84 cm while treatment C (delivery for 12) and B (Delivery for 9 hours) have differences in weight growth that are not too different, namely 0.76 and 0.74 cm. This is influenced by the length of transportation time that causes the lobster to experience stress; the longer the transportation time, the more lobsters experience post-transportation stress. Stress in lobsters can be characterized by a lack of movement in the lobster and even more likely to be silent (Nur et al., 2023).

3.2. Survival Rate

Survival is the percentage of the number of fish that live and can survive during the maintenance period. (Fahruddin et al., 2022). Data from the study's results obtained from the survival percentage can be seen in Figure 3.

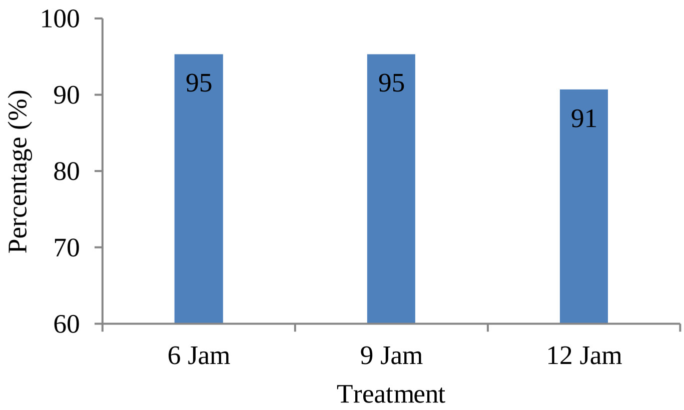

Figure 3. Length growth graph

The high survival level in treatments A (shipping for 6 hours) and B (shipping for 8 hours) is because, in this treatment, the length of time for shipping is still relatively short, so the survival rate of lobsters transported in this treatment has the highest survival rate. This follows the statement that transportation time greatly affects the survival rate of crayfish due to the high damage to the gills when the transportation time is too long.

The condition of lobsters also causes lobster mortality after transportation. Some lobsters experience stress, which is marked by the lack of movement in the lobster, which results in the lobster's decreased appetite. This factor triggers high cannibalism, and moulting failure occurs; this is by what is conveyed by Nur et al. (2023) that the survival rate of lobsters is high, that the survival rate of lobsters after transportation is also relatively more vulnerable to attack by other crayfish.

Survival is the percentage of the number of fish that live and can survive during the maintenance period. (Fahruddin et al., 2022). Data from the study's results obtained from the survival percentage can be seen in Figure 4.

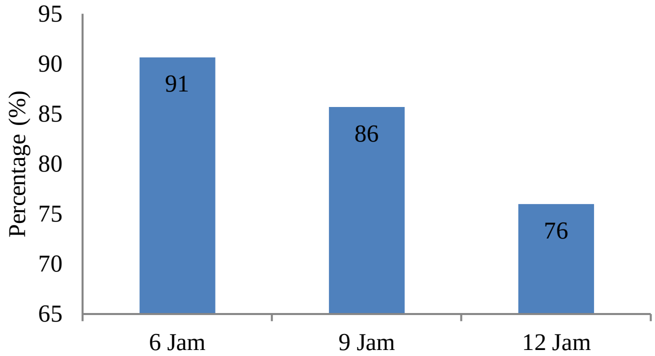

Figure 4. Length growth graph

Figure 4 shows that treatment A (delivery for 6 hours) has the highest survival rate of 91%, treatment B (delivery for 9 hours) has a survival rate of 86%, and treatment C (delivery for 8 hours) has a survival rate with the smallest percentage of 76%. The high survival rate in treatment A (shipping for 6 hours) is because the length of time for shipping is relatively short, so the survival rate of lobsters transported in this treatment has the highest survival rate. This is by the statement (Nur et al., 2023) that transportation time dramatically affects the survival rate of crayfish. This is due to the high damage to the gills when the transportation time is too long.

Lobster mortality is also caused by the condition of the lobster after transportation; some lobsters experience stress, which is marked by a lack of movement in the lobster and a decrease in appetite (O'Sullivan et al., 2015). This factor triggers high cannibalism, and moulting failure occurs; this is by what is conveyed (Arifin & Supriyono, 2014) that the survival rate of crayfish after transportation is also relatively more vulnerable to attack by other crayfish; this is also written Alapján, (2016), that when the lobster's skin changes and has a weak physique, the lobster cannot reach the shelter as a place of protection, so it becomes a victim of cannibalism of other lobsters.

3.3. Induction Time

The calculation of the induction time starts when the crayfish is put into water with a temperature of 10-12 °C until the crayfish is entirely unconscious (Taqwa & Yulian, 2014); the length of the crayfish can be seen in Figure 5.

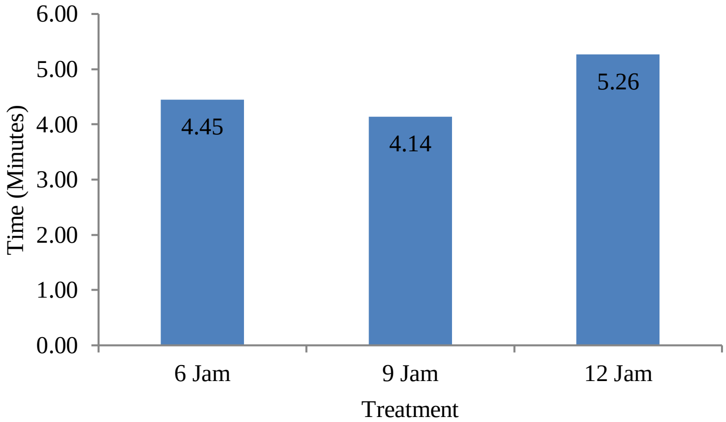

Figure 5. Induction time graph

Based on the picture above, each treatment has a different length of induction time. Treatment C (length of delivery time 12) has the longest induction time, 5.26 minutes, followed by treatment A (length of delivery time 6), 4.45 minutes, and treatment B, which has the shortest induction time of about 4.15 minutes. Factors that can increase the mortality ratio in lobsters are the transportation process, which is often caused by stress, which generally arises due to panic. Anaesthetic ingredients suitable for use in fish should have a fainting time of fewer than 3 minutes and can make the fish return to fitness and consciousness. This is because fish that experience a stunning time of more than 3 minutes will experience excessive stress that causes the fish to die (Ewita et al., 2023).

The difference in induction time that occurs in crayfish seeds is due to several factors, the first of which is temperature; this is to the opinion of Ismandar et al. (2020) that the lower the temperature of anaesthesia, the less time the induction takes. Shrimp anaesthetized at a temperature of 13 has an induction time of 203, while shrimp anaesthetized at a temperature of 15 has an induction time of 341 seconds. This is because at lower temperatures, shrimp experience hypoxia or low ability to take oxygen to accelerate the time of fainting. In addition to temperature, the protective skin's thickness affects the induction time length. This aligns with the statement of Ewita et al. (2023) that the immortilization process can affect blood viscosity in lobsters. If the temperature in the media becomes cold immediately, it will have an impact on body temperature and also on blood temperature. The colder the blood temperature is, the higher the viscosity level of the virgin will increase and cause blood flow to slow down.

3.4. Sedative Time

Sedative time is when the fish is unconscious until it regains consciousness after transportation. The results of the sedative time in this study can be seen in Figure 6.

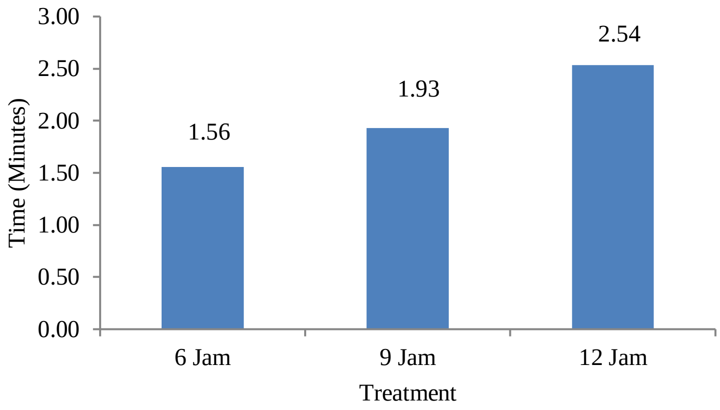

Figure 6. Sedative time graph

Based on Figure 6, it can be seen that each treatment has a different sedative time. The treatment that has the longest sedative time is treatment C (12 hours transportation time), with a sedative time of 3.54 minutes, followed by treatment B (9 hours transportation time) with a sedative time of 4.45 and treatment A (12 hours transportation time) has the shortest sedative time of about 4.15 minutes. The difference in sedative time in crayfish seeds occurs due to several things, but in this study, the length of time for recovery in crayfish seeds is caused by the size of the delivery. The longer the delivery time, the longer the time the crayfish needs to return to normal conditions; this follows the opinion of (Taqwa & Yulian, 2014), who wrote that transportation in indigenous crayfish seeds is the leading cause of sedation that transportation of crayfish broodstock for 24 hours has a less seductive time than lobsters transported for 48 and 72 hours. Besides that, the size of the lobster's body also affects the length of time consciousness; the more significant the body size, the faster the lobster returns to normal conditions.

3.5. Water Quality

Water quality supports aquaculture's success, especially in freshwater crayfish cultivation. In conditions that do not match the optimal conditions, fish cannot grow optimally, and this is because, in this condition, the fish will use more feed that is used to adapt, so that growth is not optimal.

Table 1. Water quality parameters

Parameter	0	1	2	3	4
Temperature	26.3	26.5	27.4	26.7	27.1
pH	7.3	6.8	7.3	7.1	6.9
Do	5.10	5.40	5.10	5.30	5.50

Based on the table above, the water quality in the research is still at an average level. In this study, the temperature obtained ranged from 26-28º in the range of \this crayfish enters optimal conditions for growth. According to Fahruddin et al. (2022), the temperature in the water medium has a very big influence, especially on survival, morphological growth, reproductive cycle, behaviour, moulting and body metabolism; this is following the opinion of Nugraha et al. (2022) when the temperature is low, the metabolic process in the lobster body will also be low, and vice versa. The higher the temperature, the higher the metabolic process will also be.

The pH value is an essential indicator of water quality. The pH value during the research was 6.8-7.1, which is the appropriate pH to support the growth of crayfish, which ranges from 7 to 8. When the pH is above or below this range, crayfish will experience stress. The dissolved oxygen content in the water during the study can be said to be very good, namely in the range of 5.10 - 5.50 mg/L; this is following the opinion of Boyd (1982), which explains that the optimum value of dissolved oxygen content for crayfish cultivation is above 5 mg/L. Even so, the dissolved oxygen content of 4 mg/L can still provide good survival and growth for crayfish (Faiz et al., 2021).

4. Conclusions

Post-transport survival is highest after 6 hours and 9 hours of treatment, which is 95%. The best post-maintenance survival is found after 6 hours of transportation, at 91%, while the treatments at 9 and 12 hours yield 86% and 76% results, respectively. This research indicates that straw can be utilized as a filling medium for up to 12 hours.

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