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The Utilization of Processing Waste (Chicken Intestines and Shrimp Heads) as Alternative Bait in Blue Swimming Crab Fishing in Betahwalang, Demak, Indonesia

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A B S T R A C T

Pots are one of the fishing gear used to catch blue swimming crabs in Betahwalang Village, Demak Regency. Pots need a bait attractor to lure the blue swimming crab to approach and enter the fishing gear. Pots fishing gear in Betahwalang usually uses fresh fish (one of which is common ponyfish / Leioghnathus sp) as pot bait. Chicken intestines and shrimp heads processing waste are widely found in the Demak Regency. This research aims to analyze the difference in catch and width of crab carapace using different baits (common ponyfish, chicken intestines, shrimp heads). The method used in this research was experimental fishing using 30 units of fishing gear (10 units for each bait). The conclusion of this study is that statistical analysis shows that the type of bait used in the pots significantly affects the catch of blue swimming crabs in Betahwalang Village, Demak Regency This indicates that waste from chicken intestines and shrimp heads can be an alternative bait for catching blue swimming crabs, as the results differ significantly from those caught using fish bait. The carapace width of the caught blue swimming crabs ranged from 85 to 122 mm, with 79% of them measuring ⩾ 100 mm, by the Minister of Marine Affairs and Fisheries Regulation (PERMEN KP) No 7 of 2024

Keywords: Experimental Fishing, PERMEN KP No 7 of 2024, Pots Fishing Gear.

1. Introduction

Pots fishing gear (traps) are passive fishing gear that has a cage-like shape and one or more trap doors Bubu traps require bait to attract blue swimming crabs towards them (Martasuganda, 2008). Widowati et al (2015) states that good bait characteristics include effectiveness in attracting the target, easy availability, and affordability. In the village of Betahwalang, fishermen commonly use inexpensive bait such as discarded fish species like common ponyfish (*Leiognathus equulus*), sardine (*Sardinella gibbose*), and anchovy (*Stolephorus indicus*).

Blue swimming crab (Portunidae) is one of the marine fisheries commodities that has been extensively studied due to its high economic value. Its market extends not only domestically, but also to foreign markets such as countries in the Americas and Europe The entire export-oriented swimming crab production still relies on catches from the sea, including those from Betahwalang Village in Demak Regency (Hamid, 2015; Jayanto et al, 2023)

Blue swimming crab is classified as a scavenger and also exhibits cannibalistic behavior. Cannibalism in blue swimming crabs is generally linked to genetics and lifestyle habits (Susanto et al, 2005; Suharyanto et al, 2008; Jayanto et al, 2023). These cannibalistic tendencies and scavenging behavior are the considerations in this research, to test the use of shrimp head waste, common ponyfish, and chicken intestines as bait. Studies by Putri et al (2013) and Widowati et al (2015) indicate that fresh common ponyfish bait yields more catches of blue swimming crab compared to salted common ponyfish and salted pufferfish. The use of shrimp heads as an alternative bait is considered due to the abundance of shrimp head waste in Demak Regency, while chicken intestines are also a waste product from poultry slaughterhouses.

Research on the differences in bait types for catching blue swimming crab needs to be conducted to find alternative solutions for bait when fresh fish bait availability is scarce due to seasonal influences. This is the reason for choosing alternative bait options by utilizing processing waste such as shrimp heads and chicken intestines, as both of these bait materials have high protein content. The purpose of this research is to determine the differences in blue swimming crab catch results using pots of fishing gear with bait options of common ponyfish, shrimp heads, and chicken intestines, as well as to determine the average width of the captured blue swimming crab carapace

2. Research method

This research was conducted in March 2023 in the Betahwalang waters, Demak Regency, Central Java (6°43'26" - 7°09'43" S and 110°27'58" - 110°48'47" E). In this study, the selected fishing area had a travel time of >90 minutes or a distance of >15 km from the river mouth. Data collection was carried out by accompanying the Betahwalang crab fishermen on 9 trips, with blue swimming crab pots immersion time from 5 pm to 6 am. The pots used in this research a two-door pots with dimensions of 40 cm in length, 30 cm in width, and 20 cm in height. The pot frame is made of galvanized wire with a diameter of 3 mm, and the pot cover material is a multifilament PE net with a mesh size of 30 mm.

The method used in this research is experimental fishing. The number of fold pots used for three different bait treatments (common ponyfish, chicken intestine, and shrimp head) was 30 units, with each treatment using 10 units of traps and a bait weight of 100 g each. The repetitions were conducted 9 times for each setting. The control in this study was common ponyfish bait, as it is commonly used by fishermen in Betahwalang village. The pots were operated in a staggered manner (long line traps), with alternating placement between treatments to provide equal opportunities for each treatment. Further details are presented in Figure 1. The data on the number of catches were analyzed using a one-way analysis of variance (ANOVA). The difference between treatment means was considered significant at 95% SPSS software was used for data analysis.

Two assumptions can be taken, where:

1. H_0: The use of different baits does not affect the number of catches

2. H_1: The use of different baits affects the number of catches

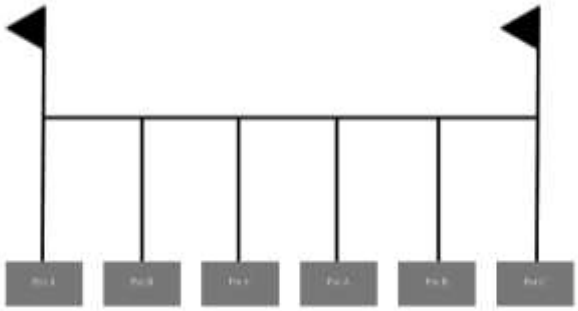

Fig 1 – Placement Bait on the Pots

Information

Pot A: Pot with common pony fish bait

Pot B: Pot with chicken intestine bait

Pot C: Pot with shrimp head bait

3. Result and discussion

The observation results from 9 blue swimming crab fishing grounds showed that the water depth ranged from 15 to 23 meters, with the substrate being sandy mud. Blue swimming crabs are generally caught more frequently on sandy mud substrate compared to clayey mud substrate (Ernawati et al, 2014) The total catch from foldable traps during the study was 100 blue swimming crabs, with 19 caught in pot A, 46 in pot B, and 35 in pot C. The catch data is presented in Figure 2.

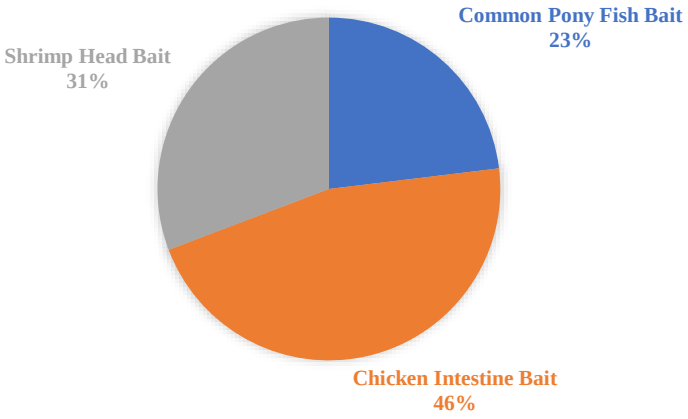

Fig 2 - Composition of Blue Swimming Crab Catch on Different Bait

The capture of blue swimming crab using bait such as common pony fish, chicken intestines, and shrimp heads yields different results. Among these baits, chicken intestines resulted in the highest catch, with 46 individuals. Bait is a crucial component in blue swimming crab capture using pots. The chemical stimuli contained in the bait can influence the catch results. According to Subagio (2004), common ponyfish contain 90% water, 10% protein, and 0.14% oil. Meanwhile, the proximate composition of shrimp heads is 80.15% water, 14.67% protein, 0.93% fat, and 26.4% ash. (Saleh, et al, 2017) Fresh chicken intestines have a protein content of 22.93% (Baihaki et al, 2010). Based on the chemical composition found in all three baits, chicken intestine bait is more appealing to the olfactory senses of blue swimming crab compared to common ponyfish and shrimp heads bait, due to its higher protein content.

One of the factors influencing the interest of blue swimming crabs approaching the bait is the specific scent emitted by the bait. Bait submerged in seawater with high salt content will undergo fermentation, resulting in the breakdown of proteins into peptide amino acids and flavor components (Sainuddin, 2012). The amino acids resulting from protein degradation that can stimulate blue swimming crab's sense of smell are alanine, arginine, proline, glutamate, cysteine, and methionine (Purwanto et al, 2013).

According to the results of the ANOVA test on the total catch of crabs, it is evident that $F_{calculated} > F_{table}$ (8.178 > 2.73), indicating that the use of bait significantly affects the crab catch further Duncan's test at a 95% confidence level shows that chicken intestine bait and shrimp head bait do not differ significantly, while common ponyfish bait differs significantly from chicken intestine and shrimp head bait.

The number of caught blue swimming crabs based on gender obtained during 9 days of research is as follows: 48 male and 52 female. The higher number of female blue swimming crabs compared to male blue swimming crabs may be influenced by the water depth. As the water depth increases, the dominant blue swimming crab obtained are female, while in shallower waters, the dominant blue swimming crab obtained are male (Prasetyo et al 2014). The comparison of the number of caught blue swimming crabs in pots based on different bait is presented in Figure 3.

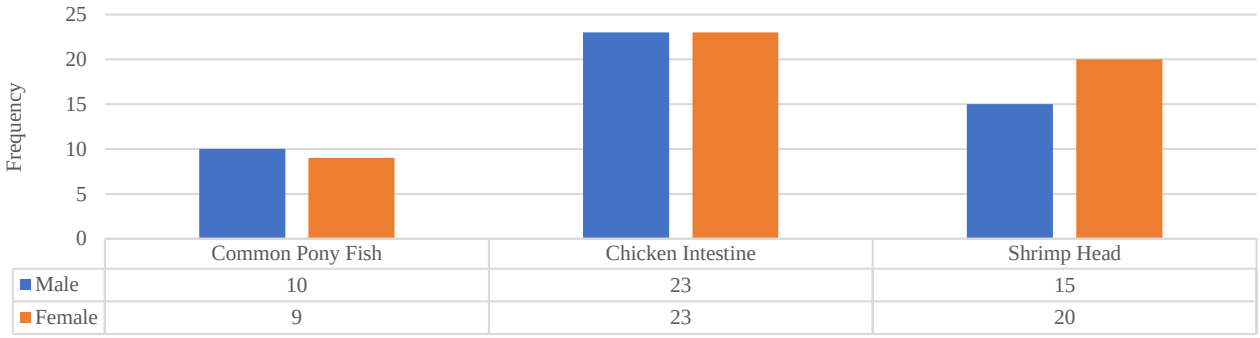

Fig 3 – The capture results of blue swimming crab based on the gender ratio

According to Rahman and Fuad (2020), male blue swimming crabs are only found at depths of <10 m and 10-20 m, while female blue swimming crabs are found at all depths, with the highest numbers at depths >20 m. The fishing area in this study has a water depth between 15-23 m, so the number of female blue swimming crabs in this study is greater than male blue swimming crabs. Similar results were also reported by Adam et al (2006), stating that male blue swimming crabs are dominant in areas up to 14 nautical miles from the coast, while female blue swimming crabs dominate catches in offshore waters Female and male blue swimming crabs spawn in coastal waters. After their eggs mature and appear on their abdomen, mature females (berried eggs females) migrate to open sea with sufficiently high salinity levels (King, 2007).

Blue swimming crab catch sizes in this study mostly have carapace widths above 10 cm. Blue swimming crabs with carapace widths >10 cm can be found every day/repeatedly When compared to the Minister of Marine Affairs and Fisheries Regulation (PERMEN KP) No 7 of 2024, which states that the allowable carapace width for catching and selling crabs is >10 cm, it can be inferred that fishermen can conduct fishing in that fishing area.

The total catch of blue swimming crabs with a carapace width of less than 10 cm in this study was 26 individuals (26%), attributed to the research location being far from the coast (±15 km) According to Hamid et al (2016) and Prasetyo et al (2014), the farther the blue swimming crabs fishing area is from the shore, the fewer small-sized blue swimming crabs are caught.

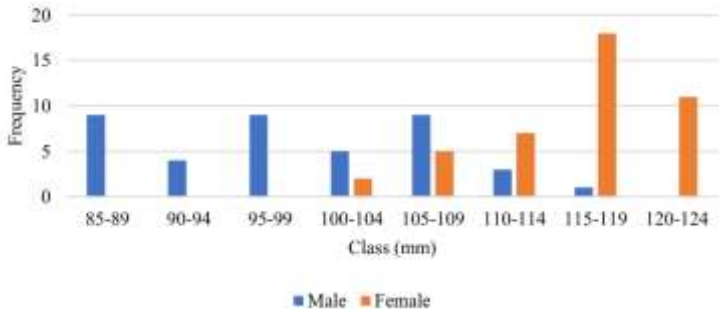

Fig 4 - Distribution of blue swimming crab sizes based on gender

The capture of pots with the catch of blue swimming crabs in this study can be considered environmentally friendly. This is because the average carapace width of the captured blue swimming crabs is 107.8 mm, with an average width of 101.5 mm for male blue swimming crabs and 114 mm for female blue swimming crabs during this research. According to Ernawati et al (2014), the average carapace width of blue swimming crabs when they first matured gonads (Lm) is 107 mm. Munthe and Dimenta (2022) state that the average size of male blue swimming crabs when they first mature gonads is 87.20 mm, while for females it is 103.55 mm. Mature female blue swimming crabs with gonads tend to be found more in the Betahwalang waters during the year cycle in January, April, and August, with carapace width classes of 110–119 mm, and the smallest width class is found in July with carapace sizes of 70–79 mm These mature female gonads are classified as small (<100 mm), which is suspected to be due to their young age..

4. Conclusion

The catch results of male blue swimming crab using common ponyfish bait were 19, using chicken intestine bait were 46, and using shrimp head bait were 35. The total catch of male blue swimming crabs was 49, with an average carapace width of 101.5 mm. The total catch of female blue swimming crabs was 52, with an average carapace width of 114 mm. Statistical analysis shows that using chicken intestine and shrimp head bait significantly outperformed common pony fish bait in catching blue swimming crab in Betahwalang Village, Demak Regency This indicates that chicken intestine and shrimp head can be alternative baits for catching blue swimming crab. The captured carapace width ranged from 85 to 122 mm, with 79% of them being ⩾ 100 mm, complying with the Minister of Marine Affairs and Fisheries Regulation No 7 of 2024.

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