The effect of bait types on the catch of foldable dome fishing pots operated in Tuban regency

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The effect of bait types on the catch of foldable dome fishing pots operated in Tuban regency

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Abstract. Foldable dome fishing pots are commonly used by fishermen in Tuban regency. A concern regarding that gear is the availability of trash fish as the common bait. Alternatively, chicken innard produced from local poultry industry could be used to substitute the bait due to its abundance. The purpose of this study was to compare the effect trash fish and chicken innard on the catch of the foldable dome fishing pots. The study was conducted in 10 days experimental fishing in October-December 2018 in Socorejo Village, Jenu District, Tuban regency, East Java, using 60 units of pots. The bait was placed in the middle of the pot. The catch were grouped based on types of bait. The length (cm), width (cm) and weight (gr) were measured for each type of fish or crab caught in the pots. Data were analyzed using t-test. The total catch of pots during the study consisted of octopus, fish, swimming crabs, other crabs, shellfish, snails and shrimp. The t-test shows that there is no significant effect between different baits on the catch of foldable dome fishing pots.

Keywords: bait, experimental fishing, fishing pot, swimmer crab, Tuban

1. Introduction

Fishermen in Tuban, a regency located at the northern coast of Java, usually fish around some fish shelters and fish aggregating devices (FADs) using small boats. The fishing ground is within 5 miles from the nearest coastline with the depth is less than 20 m. The primary target species is demersal fish which is also the target for other gear such as drag nets, trawl, gill nets, fishing rod, clamp, and harming (KEPMEN KP No. 6. 2010). The potency of demersal fish in Tuban regency is 2,156.92 tonnes per year (Agency Statistic of East Java 2018).

Foldable dome fishing pot is the most popular gear to catch crabs. The fishermen firstly used this gear in the early of 2000s (Ferdiansyah et al 2017). The gear is mostly used by fishermen from the northern coast of Java island. Dome fishing pot (figure 1) is one type of the foldable pot which has been introduced by Balai Besar Penangkapan Ikan Semarang (BBPPI Semarang). This gear is more stable when deployed in deeper sea and easier to be lifted.
One of the critical factors in pot fishing is bait. The bait is used to attract the fish around the pot and to lead them entering the fishing pot (Iskandar 2013). There are various types of bait which can be used, but in general, they can be classified into two groups, i.e. natural and artificial baits. Fishermen in Tuban usually use trash fish as natural bait which is mainly pony fish (Leignathidae). The pony fish has been classified as overexploited (Abbad 2016) since its abundance is decreasing. The supply of fish bait also fluctuates due to a seasonal pattern (Wiyono and Kartawijaya 2012). This problem has to be overcome to maintain crab fishing.

![Figure 1](image1.png)

Figure 1. Construction of foldable dome fishing pot.
Source: (a) Hafinuddin and Edwarsyah (2017), (b) personal documentation (2018).

Therefore, finding bait which is available throughout the year, easy to obtain and affordable is a necessity. One of the possible alternatives is bait made of livestock waste, such as chicken innard and skin. The number chicken in Tuban Regency in 2017 was 13,697,425, with the average weight is 1.5 kg (Agency Statistics of East Java 2018). If the weight of rooster’s and hen’s innard is 14.2% and 9.8% respectively, the total innard stock will be 2,917 tonnes for roosters and 2,013 tonnes for hens. This potency has not been utilized by local people, especially fishermen, who operate fishing pots. Hence before introducing the substitution, it is required to examine if baits made of chicken innards are comparable to the conventional fish bait in crabs fishing using pot.

2. Materials and methods
This research was conducted in the Java Sea, to be exact in the water of Socorejo village, Jenu district, Tuban Regency (figure 2). Fieldwork was carried out in October to December 2018.

2.1. Materials
Equipment and tools used in this research were weighing scale up to 1000 gram, a ruler, a measuring board, plastic bags, stationery, datasheets, a fish identification book, software SPSS 23, a global positioning system (GPS), buckets, 60 units of foldable dome fishing pots, and a fishing boat. The materials used in this research were two types of baits, i.e. trash fish and chicken innards.

2.2. Methods
The experiment was conducted to compare the crabs caught through fishing operations using trash fish and chicken innards as baits. Sixty fishing pots were divided into two groups of 30 pots: group one was filled with trash fish and group two used chicken innards. The pot arrangement can be seen in figure 3. These pots were operated in 10 fishing trips (one deployment per day per trip). Pots were set at 06.00 AM, and lifted in the following day at about 06.00 a.m. The location of the deployment was recorded using a GPS.
Figure 2. The research location in the sea of Java, Socorejo Village, Jenu District, Tuban Regency, East Java.

Figure 3. Fishing pot installation plan. (A) Sign flag (plastics), (B) pole, (C) buoy, (D) Ballast (Styrofoam), (E) fishing pot rope (2 m), (F) fishing pot among rope (14 m), (G) mainline (31 m), (H) fishing pot with 1st treatment (trash fish), (I) fishing pot with 2nd treatment (chicken innards).

The catch were grouped according to the types of bait. The length (cm), width (cm) and weight (gr) of catch from each pot were measured. Subsequently, those data were processed and analyzed using SPSS. T-test was applied to identify the effect of bait on the catch (number of fish, weight and catch rate). The hypotheses for data analysis were as follows:

H₀: There is no significant difference in the catch between pots using different bait types
H₁: There is a significant difference in the catch between pots using different bait types
If the calculated t value < 0.025 then $H_0$ is rejected; then the calculated t value > 0.025 then $H_0$ is accepted.

3. Results and discussion

3.1 Results
The ten days of fishing operation resulted in 490 marine organisms with a total weight of 8,915 gr consisting of 7 types of catch, i.e. squids, fish, swimming crabs, other crabs, shells, snails and shrimps (figure 4 and figure 5). The major catch was snails (215 organisms, 1664.1 g) and swimming crabs (206 organisms, 5301.6 g). Figure 6 shows that fishing pots with trash fish were more productive in catching swimming crabs and snails than the ones with chicken innards. However, the result of the T-test did not show any significant effect of bait types on the total catch. The calculated t values for the amount of catch (organisms) and weight (g) were 0.18 and 0.13, respectively, which were less than the t-table, i.e., 2.101. These outputs were different from a study conducted by Perdana et al (2016) who concluded that chicken innard was more effective than the fresh fish baits.

Figure 4. Composition of catch based on the number of species. (octopus), (fish), (crab), (swimmer crab), (shellfish), (snails), (shrimp).

Figure 5. Composition of catch types based on the weight of species. (octopus), (fish), (crab), (swimmer crab), (shellfish), (snails), (shrimp).
Since the bait may release chemical attractant to the fish, fish with the olfactory organ is likely to be more attracted. Some fish hunt and identify their foods or prey by functioning their smell sensor while other species strongly depend on the touch sensor. Fish may react to the attractants when the chemical materials had distributed by current (Bateson 2009). The amino acid is part of protein which can stimulate the fish's sensory organ and encourage the fish to grab baits. Amino acids that can stimulate fish's olfactory organs are alanine, arginine, proline, glutamate, cysteine, and methionine (Fitri 2011). The chicken's intestine contains a high glutamic amino acid, which allows chicken innards to attract fish and crab attention through their olfactory organs (Hartadi et al 1993). However, this study shows that there is no difference between the two baits. The operation of a fishing pot in one night affected the protein content of each bait because it is soluble in the water. The water content in chicken innards is high enough, hence the rancid odour is quickly generated and properly distributed in the water (Fakhrurrozi 2011). The variation of the catch was caused by migration of fish, variety size in population, and the selection of the spots for gear deployment (Perdana et al 2016). In addition to the fish attractiveness in the bait, fish that enter into the pot was close to the initial location where they receive stimulation (Alim 2016).

Fishing pot is an eco-friendly fishing gear because its operation does not damage the environment and produce less by-catch. The targeted catch of foldable fishing pot is crab, as the result of this study shows that crab is predominant catch after snails. The crab is mainly Portunus pelagicus type, while the snail is Nassarius dorsatus, which are commonly found in Indonesia (Carpenter and Niem 1998). Snails can be trapped easily with or without entering the mouth of the pot because their sizes are the same as the mesh size of the net used to construct the pot.

The weight of swimming crab caught during the research ranged from 1-300 g per species. Specifically, the swimming crab from the fishing pots with chicken innards varied from 1-140 g per species with the average was 15,973 g. Meanwhile, the other tested pots produced the swimming crabs from 2-300 g species with the average was 22,717 g. The average weight of the swimming crab is shown in figure 7. The differences between chicken innards and trash fish as bait do not affect the total catches of swimming crab, as the t-test analysis showed that the T calculation < t table (1.167 < 2.101).

Ernawati et al (2017) argued that the spawning of P. pelagicus was peaked on September, October and November. Reproduction period is occurring in several months, therefore the average of crabs collected in this study is light-weighted and small in size. The largest carapace found during experimental fishing was as wide as 15cm. Legally, the minimum size of P. pelagicus which is allowed to be caught is 12.7 cm.
mm when it reaches 12 months old, and it typically occurs between April-September. During October-March, when the crabs reach 15-20 months old, their number will significantly decrease due to migration. Generally, crabs seasons occur between January and May.

The catch collected from foldable dome fishing pots consist of octopus (1 species, 60 g), fish (59 species, 1,373 g), swimming crabs (206 species, 5,297 g), other crabs (6 species, 362 g), shellfish (1 species, 90 g), snails (215 species, 1,664 g), and shrimp (2 species, 70 g). The total catch using trash fish as bait was 312 species (5,615.6 g), while using chicken innards was 178 species (3,243.7 g). The catch of fishing pots was predominantly snails (*N. dorsatus*) and swimming crab (*P. pelagicus*). To conclude the use of different baits had no significant effect on the total catch of the foldable dome fishing pot. However, trash fish is still cheaper and easier compared to chicken innards as bait. Therefore, further research is needed to test the use of other baits as trash fish has now been overexploited.

**Figure 7.** Average weight of crabs based on the type of bait.

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