# The Influence Analysis Of Differrently Constructed Folded Traps And Types Of Baits To Catch Crabs [Portunus Pelagicus, (Linnaeus,1758)] In Rembang Sea Waters

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# THE INFLUENCE ANALYSIS OF DIFFERRENTLY CONSTRUCTED FOLDED TRAPS AND TYPES OF BAITS TO CATCH CRABS [*Portunus pelagicus*, (Linnaeus,1758)] IN REMBANG SEA WATERS

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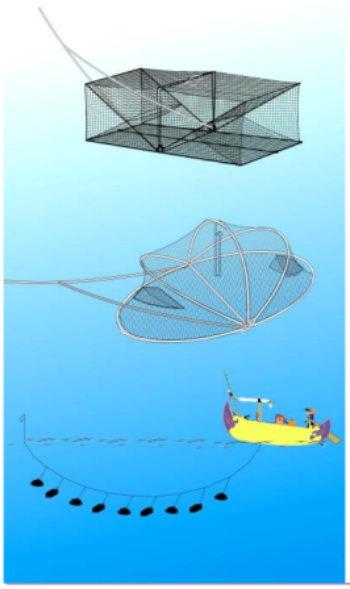

**Abstract**

Blue Swimming Crab [*Portunus pelagicus* (Linnaeus,1758)] is one of the fishery commodities which is prospective to be exported, highly nutritious, commercial, and wholly valuable. In Kabongan lor village, Rembang, Central Java, Indonesia the fishing gear used to catch crabs is folded trap. Kabongan lor village has a small scale of captured marine resources, so it needs to be utilized further. Because of its large potency, a research need to be conducted to improve the haul. Different trap construction and type of baits is one important factor to improve it. This study was aimed to analyze the influence of the dome-folded traps construction and box-folded traps (control), and the influence of fermented mackerel, fresh mackerel, and puffer fish's head as baits over the crabs in Rembang waters. The method applied is field experiment with six repetitions and two variables in a treatment. The data was analyzed using normality test, homogeneity test, and ANOVA test using SPSS program ver 20.00. The results showed that dome-folded traps gained more crabs compared to box-folded traps (control). Dome-folded traps gained 3 230 g of crabs, while box-folded traps gained 1 620 g. Meanwhile, the use of fresh mackerel as baits gained better crabs than fermented mackerel and puffer fish's head (control). According to this research known that the captured crabs in which consume; fresh mackerel baits got 1 890 g of crabs, fermented mackerel got 1 500 g and 1 460 g for puffer fish's head. The results of ANOVA test show the differences of folded traps construction with F sig value as much as 0.022 shows that Ho is accepted; while that with F sig value as much as 0.686 shows that the Ho is denied. Based on these results known that the different folded traps construction does affect to the amount of captured crabs while the differences of baits type do not.

*Keywords :* Baits, box-folded traps, dome-folded traps



## 1.0 INTRODUCTION

Crab (blue swimming crabs) is a high nutritional value marine biota, which is also exploited as export commodities because of its expensive selling value. All of its parts can be used, including crab meat for canned crab, crab shells or skin as a cosmetics ingredients as well as several other industries [1]. Crab fishing activity can be carried out by various types of fishing gear that had been worked, especially from group net (*klitik* net, trammel net, gill net, various trawl: *cantrang*, *dogol*, trawl). But, those methods are not safe for the environment (less selective) and also the quality of their catch is relatively low (usually dead and damaged). From the aspect of marine resources existence, those methods bring about a bad impact

because almost all of the caught resources usually get wasted. Especially for crab, because crab is a bycatch that is often futile and valueless although they are present in a large number. Inspite of that, the method used to catch fish usually does harm to the ecosystem as its habitat and the crab population will became quickly spoiled [2].

According to Ameriyani [3], Rembang is a district located in the North Coast of Central Java Province, with an area of approximately 1 014 km$^2$ with a coastline of 63 km. Thirty percent of apex district area is a coastal region covering an area of 355.95 km$^2$. The position of Rembang district which is close to the sea should have give benefits because it has a high marine resources potential. But in fact, most people in this area still lack prosperity.

Fisheries production in Kabongan Lor village, Rembang, covers a small-scale fisheries utilization, which mean that the further development of its marine resources is still low. For that reason, the high potency of Rembang's marine resources should be suitable for small-scale fishermen, but it still needs further research to improve the crabs production. Kennely and Craig [4] state that some factors that affect the catch quantity are the forms of traps, baits, competition among traps, soaking time and the position of the traps in the waters. There are several factors that affect the catch quantity For that reason, research in changes in construction and type of bait used is one of the efforts made to improve the quantity of caught crab in Kabongan Lor village, Rembang.

Zarochman [5] states that one important consideration in constructing traps is medium height traps with a ratio value of circle's area height/diameter of the traps base 0.35 to 0.4 and a dome-shaped appearance is one of a stable. Traps resilience used for longer period, require a synthetic mesh materials and the traps construction tend to curl. The traps construction used dome-shaped fold which is engineered from the Balai Besar Penangkapan Ikan (Fishing Technology Center), Semarang. The construction of a dome-type folding trap uses technology that will be piloted with the usual folding box traps used by the fishermen. Trap is a passive fishing gear so it takes a decoy which can catch the targeted fish [6]. Baits used in this study are fresh and fermented long-jawed mackarel fish, and salted pufferfish head. Mackarel baits fermented using rice and salt for seven days is expected to have a pungent aroma that can attract crabs.

The purpose of this study was to analyze the influence of folding box traps constructions and folding dome traps to catch crabs [*Portunus pelagicus* (Linnaeus, 1758)] and analyze the influence of the bait type to catch crabs (*P. pelagicus*) in the waters of Rembang. This research was conducted in September 2014 in the sea waters of Rembang, Central Java.

## 2.0 MATERIAL AND METHOD

The material used in this study was the crabs catching unit using box fold trap and dome fold trap in Rembang sea waters. The construction of box fold trap and dome fold trap can be seen in the Figure 1 and Figure 2.

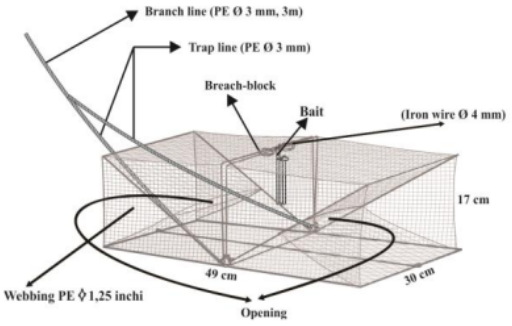


**Figure 1** Construction of box fold trap

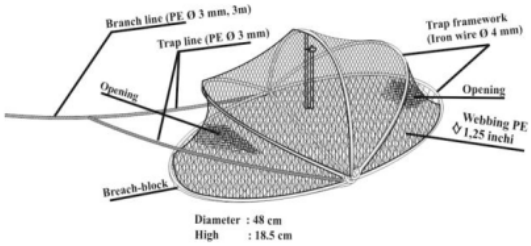


**Figure 2** Construction of dome fold trap

The method used in this research was an experimental method of fishing. Experimental research is a research that is done by holding the object manipulation of study as well as their control. According to Supranto [7], the experimental method is the effort of collecting the data in a way that makes it possible to obtain a clear conclusion primarily on the truth of a hypothesis which includes causality by controlling the one or more variables affecting the undesirable object.

The number of trap that used on this study is 100 pieces, with detail box fold trap 50 pieces and dome fold trap 50 pieces. Box and dome fold trap are arranged in a criss-cross sequence and tagged with different numbers. Fishing operation is six times.

The type of bait used is puffer fish's head, fresh mackarel and fermented mackarel. Installation of bait on the trap was performed alternately. The type of data obtained was fish species, number, and size (length and weight). The data was analyzed using

normality test, homogeneity test, and ANOVA test using SPSS program ver 20.00.

Fishing operation stages are described below:

- Preparation phase
- The local search phase arrest
- Phase immersion traps (immersing)
- Phase removal of traps (hauling)

## 3.0 RESULTS AND DISCUSSION

Crab is a major target in the arrest on the operation of folding traps. Unfortunately folding traps catches not only crab in general, but also another biota It is because every species can be attracted by the bait contained in traps. The list of the caught biota using six treatments can be seen in Table 1.

**Table 1** List of biota caught in the overall treatment (in the tail)

| Spesies | Box traps (B1) | | | Dome traps (B2) | | |
|---|---|---|---|---|---|---|
| | U1 | U2 | U3 | U1 | U2 | U3 |
| Crab | 4 | 5 | 7 | 9 | 9 | 10 |
| Snapper | - | - | - | 1 | - | - |
| Shrimp | - | - | - | 1 | - | - |
| Kembung | 2 | - | - | - | - | - |
| Cuttlefish | - | - | - | - | 1 | - |
| Mantis | - | - | - | - | - | 1 |
| Total | 6 | 5 | 7 | 11 | 10 | 11 |

Based on the Table 1 the dominant species caught by traps is crab (*Portunus pelagicus*) with total amount of 44 crab (88 %). There are five species caught that are not included in a crab family during the operation of the traps; those are two long-jawed mackarel fish (4 %), snapper, shrimp, squid and mantis shrimp each type as many as one piece (2 %). Four species caught were demersal species and one pelagic species.

### 3.1 Total Catch and Weight (g) of Blue Swimming Crab (*P. pelagicus*) Based on the Different Construction of Trap

Total catches from the box and dome trap operation for six repetitions are 44 crab. Crabs that was caught by using box trap (control) and dome traps by ignoring the type of bait as presented in Table 2.

**Table 2** Total catch of crab based on the different trap construction

| Deuteronomy to | Box traps | Dome traps |
|---|---|---|
| | Number of crab | |
| 1 | 2 | 7 |
| 2 | 4 | 3 |
| 3 | 1 | 7 |
| 4 | 1 | 1 |
| 5 | 6 | 6 |
| 6 | 2 | 4 |
| Total | 16 | 28 |

Based on the Table 2, shows that the dome trap can catch more crabs than box trap. Folding dome traps caught 28 crab (64 %) in total, while the folding dome boxes traps caught 16 crab (36 %) in total. The total weight of the crabs which caught by using box traps (control) and dome traps (without looking the type of bait) can be seen in the Table 3.

**Table 3** Total weight (gram) of crab based on the different trap construction

| Deuteronomy to | Box traps | Dome traps |
|---|---|---|
| | Weight (g) | |
| 1 | 280 | 990 |
| 2 | 380 | 350 |
| 3 | 180 | 860 |
| 4 | 70 | 180 |
| 5 | 530 | 530 |
| 6 | 180 | 320 |
| Total | 1620 | 3230 |

Total weight of crab from the dome and box traps operation for six repetitions were 4 850 g. Based on Table 3, shows that dome traps catch more crab than box trap. Dome traps caught about 3 230 g (70 %), while the box traps caught 1 620 g (30 %).

### 3.2 Total Catch and Weight (g) of Blue Swimming Crab (*P. pelagicus*) Based on the Different Construction of Bait

The total crabs caught using salted pufferfish head bait (control) as chief, fresh and fermented long-jawed mackarel fish (ignore the used construction traps) can be seen in Table 4.

Total catches from the traps operation using salted pufferfish head, fresh and fermented long-jawed mackarel fish for six repetitions is 44 units. Based on the Table 4, fresh long-jawed mackarel bait got more crabs than the other two. The total amount of species caught by fresh long-jawed mackarel fish bait is 17 crab (38 %), those caught by fermented pufferfish bait is 14 crab (33 %), while those caught by salted pufferfish head is 13 crab (29 %).

**Table 4** Total catch of crab based on the different type of bait

| Deuteronomy to | Salted Pufferfish head | Fish fermented | Fresh fish |
|---|---|---|---|
| | Number of crab | | |
| 1 | 3 | 3 | 3 |
| 2 | 2 | 2 | 3 |
| 3 | 2 | 3 | 3 |
| 4 | 1 | 0 | 1 |
| 5 | 4 | 4 | 4 |
| 6 | 1 | 2 | 3 |
| Total | 13 | 14 | 17 |

The total weight of crabs that caught by using salted pufferfish head bait (control), fresh and fermented

long-jawed mackarel bait (ignore used traps construction) can be seen in Table 5.

**Table 5** Total weight of crab based on the different type of bait

| Deuteronomy to | Salted Pufferfish head | Fish fermented | Fresh fish |
|---|---|---|---|
| | Weight (g) | | |
| 1 | 360 | 400 | 510 |
| 2 | 210 | 200 | 320 |
| 3 | 250 | 360 | 430 |
| 4 | 180 | 0 | 70 |
| 5 | 390 | 360 | 310 |
| 6 | 70 | 180 | 250 |
| Total | 1 460 | 1 500 | 1 890 |

The total caught units weight from the operation of folding traps using salted pufferfish head bait, fresh and fermented long-jawed mackarel bait for six repetitions were 4 850 g. Based on the Table 5, fresh long-jawed mackarel bait got more crabs than fermented long-jawed mackarel head bait and salted pufferfish head bait. The total weight caught by fresh long-jawed mackarel bait was 1 890 g (39 %), the weight caught by fermented long-jawed mackarel bait was 1 500 g (31 %) while the weight caught by salted pufferfish was 1 460 g (30 %). The weight of each crab caught during the study can be seen in Figure 3.

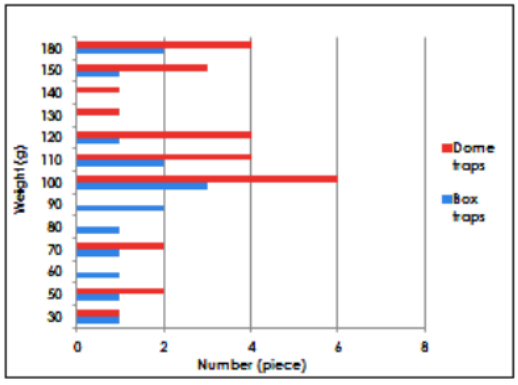


**Figure 3** Weight distribution of crabs in dome and box traps

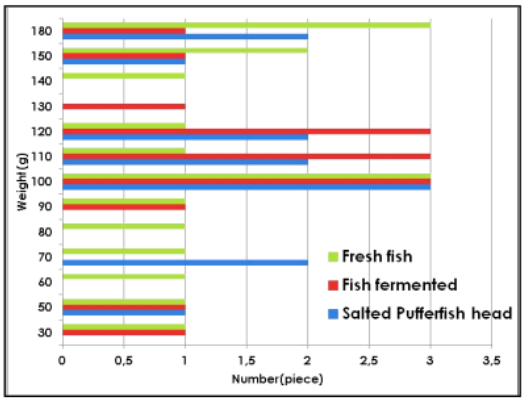


**Figure 4** Distribution of crab's weight on salted pufferfih head bait, fermented and fresh long-jawed mackarel bait

Dome folding trap got more crab than box trap. Figure 3 shows that the weight of the caught ranged between 30 g and 180 g each. The crab weight that were caught in dome traps were between 30 g and 180 g each, the amount of weight of lots of crabs caught was between 100 g and 180 g while the amount of weight a little crab caught was between 30 g and 70 g. In the box trap the crab weight were between 30 g and 180 g each, and the amount of weight that a lot of crabs caught between 90 g, 110 g and 180 g, while the amount of a little crab weight caught between 30 g and 80 g and 120 g and 150 g.

Long-jawed mackerel fish bait can be attracted and got more crabs than over femented long-jawed mackerel fish bait and salted pufferfish head bait. Based on the Figure 4 shown that the weight of crabs that were caught by fresh long-jawed mackerel bait were between 30 g and 180 g each, the amount of weight that a lot of crabs caught between 100 g and 180 g while the amount of weight a little crab caught between 30 g and 90 g. The crab weight caught by fermented long-jawed mackerel fish were 30 g and 180 g each, the amount of weight that a lot of crabs caught between 100 g and 120 g while the amount of weight a little crab caught between 30 g and 90 g; 130 g and 180 g. The crab weight that were caught by salted puffer fish head bait were 50 g and 180 g each, the amount of crabs weight that were trapped was 100 g while the amount of little crabs weight caught were between 50 g and 70 g; 110 g and 180 g.

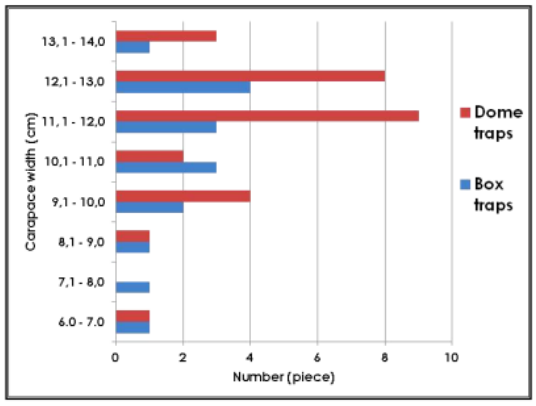


**Figure 5** Distribution of carapace width of crabs in dome and box traps

Carapace width of caught crab during this research ranged from 6.9 cm to 13.5 cm, while the length of the carapace ranges from 3.1 cm to 7.6 cm. Dome trap got more crabs with bigger size than box traps. Based on the Figure 5 the width of the caught crab carapace in the dome trap ranged from 11.1 mm to 12.0 cm while the width of crab carapace caught in dome traps ranged from 6.0 mm to 9.0 cm. Carapace width of crabs that were caught in box traps ranged from 12.1 mm to 13.0 cm while the crab carapace width caught in the box trap ranged from 6.0 cm to 9.0 cm and 13.1 cm to 14.0 cm.

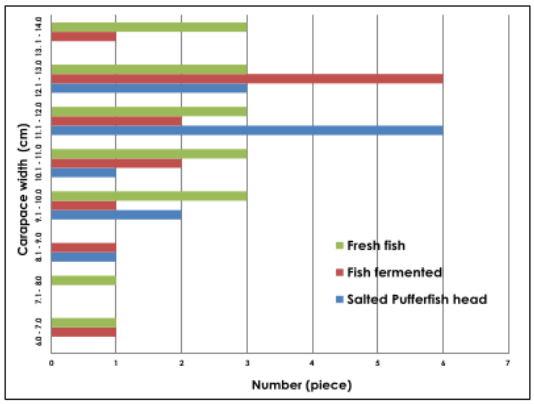


**Figure 6** Distribution of carapace width of crabs was caught on bait fresh fish, fish fermented, and salted pufferfish head

Fresh long-jawed mackerel fish can get a bigger size crab than fermented long-jawed mackerel fish bait and salted pufferfish head bait do. Figure 6 shows that trap that use fresh long-jawed mackarel bait can catch crabs with bigger carapace width of 9.1 cm to 14 cm and the fewer have carapace width of 6.0 cm to 8.0 cm. Dome traps that use fermented long-jawed mackarel fish caught crabs which have a carapace width of 12.1 cm to 13.0 cm while the less caught crabs have a carapace width of 8.1 cm to 10.0 cm. Dome traps that use salted puffer fish head bait caught crabs that have a carapace width of 11.1 cm to 12.0 cm while the less caught crabs have a carapace width of 10.0 cm to 11.0 cm.

### 3.3 The Effect of Different Trap Construction and Type of Bait to the Crab Catch

The effect of different construction of folding trap and type of bait to the catch can be seen in Figure 7. Based on the graphic comparison in Figure 7 it can be seen that the use of dome traps catch more units than the box traps do. Dome traps caught 28 crab, 9 crab in dome traps that using salted pufferfish head bait, 9 crab units in dome traps that using fermented long-jawed mackarel fish bait, and 10 crab in dome traps that using fresh long-jawed mackarel fish bait. The box traps caught 16 crab; four crab in dome traps that using salted puffer fish head bait, five crab in dome traps that using fermented long-jawed mackarel fish bait, and seven crab in dome traps using fresh long-jawed mackarel fish bait.

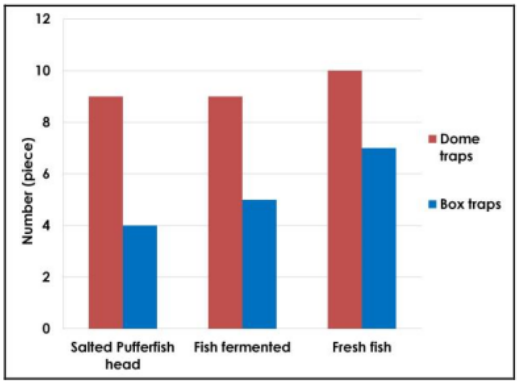


**Figure 7** Total catch of crab based on differences trap construction and types of bait

### 3.4 The Effect of Different Trap Construction and Type of Bait than Weight (g) of Catch

The effect of different folding dome construction and type of bait to against the weight (g) can be seen in Figure 8.

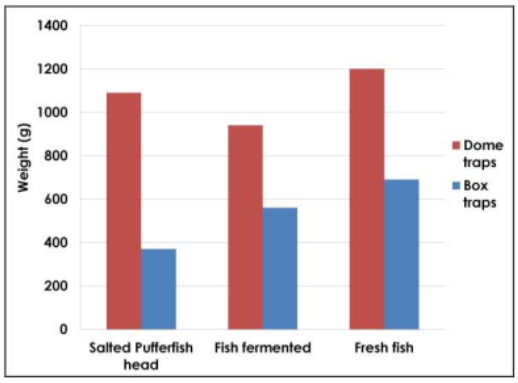


**Figure 8** Total weight of crab catch based on different trap construction and types of bait

Based on the comparison of the two graphs in Figure 8 shows that the use of fresh long-jawed mackarel fish bait can caught more units than fermented long-jawed mackarel fish bait and salted puffer fish head bait which are 1 890 g, 1 500 g, and 1 460 g; 1 200 g, 940 g, and 1 090 g; and 690 g, 560 g, and 370 g respectively.

### 3.5 Catch Analysis

The obtained data analyzed by some statistical tests. From the caught crabs data, analysis calculation had been done by using variance analysis (ANOVA), before tested by ANOVA, first the normality data was tested. Normality test data was using SPSS 20.0, and by Kolmogorov-Smirnov test. The statistical analysis of the results obtained to draw the conclusion that the proposed hypothesis by comparing the calculated F from each source uniformity with F table the test level (α) of 0.05 in the deviation of each source uniformity and deviation of error (Error), Decision-making of variance (ANOVA), namely:
Sig > α (0.05) $H_o$ accepted
Sig < α (0.05) $H_o$ rejected

### 3.6 Normality Test

Based on the data that has been tested using the One Sample Kolmogorov-Smirnov Test from the existed hypothesis that there is significant value Kolmogorov Smirnov showed, known that the folding box traps (B1) gives the value of the Kolmogorov Smirnov 0.051. This value is above the 5 % significance level = 0.05, then Ho is accepted, means that folding box traps (B1) has a normal data distribution. Similarly, the significance value of folding dome traps(B2) = 0.163, salted pufferfish head bait (U1) = 0.123, fermented long-jawed mackarel fish bait (U2) = 0.094 and fresh long-jawed mackarel fish bait (U3) = 0.937 also had a different value which is higher than the significance level which mean that it has a normal distribution of data or normal distribution.

### 3.7 Homogeneity Test

Based on the data that have been tested using the Test of homogeneity Variances (ANOVA) with the criteria test, $H_o$ is rejected if the sig < α, showed a Levene significant value for folding box traps (B1), folding dome traps (B2), the salted pufferfish head (U1), fermented log-jawed mackarel fish bait (U2) and fresh long-jawed mackarel bait (U3) = 0.061, it can be concluded that all the tested data is homogeneous due to the significant value of sig > α.

### 3.8 The Effect of Different Trap Construction to the Amount of Crabs (*P. pelagicus*)

Based on the results that have been tested using two-way ANOVA on the different traps construction [folding box traps (B1) and traps folding dome (B2)] in sig = 0.022, which mean that Ho is rejected and it can be concluded that the use of different construction of folding traps did affected the total amount of the caught crab.

Puspito [8], states that the dome-shaped trap is more effective at catching crabs compared to a truncated pyramid-shaped beam traps. The trap construction in accordance with the behavior of crab will make it easier to get in and trapped. Dome trap shaped has more catch rate because the crab is easier to entrance and get trapped [1].

### 3.9 The Effect of Different Types of Bait in the Total Amount of Caught Crabs (*P. pelagicus*)

Based on the results that have been tested using two-way ANOVA test on different types of bait used salted pufferfish head (U1), fermented long-jawed mackarel head (U2) and fresh long-jawed mackarel (U3)] analyzed that sig = 0.686, showed that Ho is accepted and it can be concluded that the use of different types of bait does not affect the catch crabs. Crabs are scavengers and also like to eat animals that had been rotted. Fresh long-jawed mackerel is one of crab favorite food, especially when it has been rotted, while fermented long-jawed mackarel and salted pufferfish head that has been rotted is the crab craze. Those baits provide stimuli that makes crab so attracted, so that we can conclude the better bait, statistically, because of the differences in the caught crabs were significant. According to the differences of the used bait types, it has no effect on the amount of the caught crabs due to the natural behavior of small crab which is a scavenger (scavenger), as scavengers, crabs easily caught by the baited traps [9].

### 3.10 The Effect of Different Trap Construction and Type of Bait to the Crab (*P. pelagicus*) Catch

Folding traps used in this study is the folding boxes and folding dome traps, the use of these folding trap is to compare the effect of different construction folding box traps (control) which is used by fishermen in

Kabongan Lor, Rembang. The results were the use of folding dome traps got more and better crabs than folding box traps and the statistical analysis data shows that the differences between the folding traps construction affect the number of caught crabs. Dome trap has a construction which is in accordance with the behavior of a moving crab where the dome has a construction that are not too high with a ratio value of height / diameter circular base area of 0.38 traps.

According to Puspito [8], in its movement, crabs are easier to crawl over the sloping angle because it moves by relying on a sharp toe to creep, it is similar to a research where the forms of the dome traps only have a wall in the form of an arch that allows the crabs to creep compared to box trap whose walls are straight and squared shaped. Dome trap got more crabs with a bigger size than the box trap did. The ideal mouth in animal traps that is it can allow the animal to easily enter and prevent it to escape [10]. The dimensions and the doorway into the dome trap, measuring 22 cm with an inclination of 30° entrance approach so as to prevent crab escape and make it easy to fit in while the dimensions and the track entrance to the trap box measuring 29 cm with a slope of entrance approaching 40°.

According Zarochman *et al.* [11] the construction of folding side door dome shape trap is ideal for catching moving targetted crabs. The targetted crabs attracted and can easily reach the bait because of its strategic place which is in the middle of the door traps. The entrance tracks come into the trap ramped 30° with a slope approaching the slope of the track entrance of the preferred small crab traps and other types of crab. Bait used in this study are three types of bait; salted pufferfish head lures as control, fermented long-jawed mackarel fish, and fresh long-jawed mackarel fish bait. Based on research fresh long-jawed mackarel fish bait can attract and caught more crabs than fermented long-jawed mackarel fish bait and salted pufferfish head bait but based on the statistic test, there is no effect on different types of bait to catch crab because of the differences were not significant.

Fresh fish contains 73.91 % of water and also 22.01 % protein content [12], fermented fish contains 53.94 % of water and 20.15 % protein content [12], where anchovies have water content only as much as 41.32 % [13] and 33.44 % protein content. The higher water content causes the chemical containment in fresh long-jawed mackarel fish bait decomposes faster in the water. This what makes the catch quantity on fresh long-jawed mackerel bait bigger than fermented long-jawed mackarel head and salted pufferfish head. According to Stoner (2004) in reference [14] in most cases, it would be interested if fish bait through chemical cues in advance if it could not be detected by the olfactory organ so that more dominant role for vision organ. Velocity dispersion of the chemical constituents present in the feed can be influenced by the water content of the feed. The higher the water content of the feed, the faster the velocity dispersion of the chemical constituents present in the feed.

Grasso and Basil in reference [15] state that Crustaceans (Decapods) still can find the source of the baits' smell although it has been disrupted by the current and turbulence distribution. But it depends on its distance and time. They can sense it by using an external antenna equipped with chemical and mechanical sensors. The larger-size crabs will have a longer external antenna so that it can detect the chemical containment in the baits better than the smaller one. That is what makes a larger baby-crab caught in the trap using fresh long-jawed mackerel fish as bait instead of fermented mackerel lures and salted pufferfish head.

## 4.0 CONCLUSION

The difference construction of folding traps in this study affected the caught crabs (*Portunus pelagicus;* Linnaeus,1758) quantity, with folding dome traps collecting more crabs. Different types of bait in this study had no effect on the catches crabs (*P. pelagicus*) where salted pufferfish head bait, fermented fish and long-jawed mackarel fresh fish. Long-jawed mackarel fresh fish get different catches with significant differences.

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