

THE EFFECT OF THE SOAKING PERIOD IN NATURAL FEED TANKS of *Chaetoceros* sp. ON THE GROWTH AND VIABILITY OF PEARL CLASS (*Pinctada maxima*) SEEDS

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ABSTRACT

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Pearl oysters are a marine aquaculture commodity with high economic value. However, there are still many obstacles in pearl oyster cultivation activities, such as the need for quality seeds. This study aims to determine the effect of immersing pearl seeds in natural feed tanks of *Chaetocheros* sp. with different immersion periods on the growth and survival rate of pearl oyster (*Pinctada maxima*) seeds. The method used in this study is an experimental method using a completely randomized design (CRD), with 5 treatments and 3 replications, namely A (control/without immersion), B (0.5 hours), C (1 hour), D (1, 5 Hours) and E (2 Hours). The results showed that soaking the seeds in natural feed tanks had a significant effect on the growth of the shell (dorsal-ventral) of the pearl oyster *Pinctada maxima* ($p < 0.05$). The highest growth was achieved in the 2-hour immersion period with an absolute growth value of 1.67 mm, a relative growth of 68.49% from the initial size, and a daily specific growth rate of 3.31% per day. This method must be tested on larger pearl oyster seeds and using other natural feed species and various natural mixes (multi-species).

INTRODUCTION

Shell pearl is one commodity cultivation fishery sea that has marked economical tall where pearls, meat, and shell have been marked sell because they could make as ingredient craft hands and materials for cosmetics (Kotta, 2015)

There are several constraints in the activity cultivation of oyster pearls, like deficiency seeds and processing feed. Seeding pearls is one step to solving the problem of deficiency availability. However, thus, in activity production, seed constraints mainly encounter slow growth and rate enough death tall (Anwar *et al.*, 2004)

One reason for slow growth and rate pass life is no fulfillment of full feed for seed shell pearl in tub maintenance. In activities like hatchery shell pearl, a critical aspect for supporting success is the method of gift feed.

Method gift feed made During this different for each House seeding. Density low feed raises competition space and food so that growth decreases. Besides that, if the feed live given in total high-density so will raise problems new as DO decreases the consequence decomposition of body dead feed and the amount of settled dirt consequence of low Genre current because weak aeration could trigger change condition environment Becomes not optimal, so hinder growth and survival life seed pearl.

One possible solution is immersion seed pearl. During periods of specific tub feed, experience outside from gift feed daily. Suppose the seed is soaked in the feed so the seed will get the opportunity to filter the food in a manner maximum so that suspected could give effect improvement growth and survival life from shell pearl the Besides that, Immersion in tub feed experience proven could improve the spawning process (Kotta, 2015).

In the larval and seed stages, the need for food experiences height and use of feed experience phytoplankton and zooplankton are expected could support the growth and survival life of cultivated organisms, especially in weak phases. The type of feed naturally often used is *Chaetoceros* sp.

Chaetoceros sp. is known to have some superiority, like being easier to eat by seed because of the size of small cells, p this resulted in the seed more easily absorbing and digesting feed and, in the end, expedited the process of absorption and metabolism because sufficient energy supply from the feed as well as level continuity life seed will better (Taufiq et al., 2007).

Calculation results in larval survival (Tarigan *et al.*, 2019), the highest observed with gift feed type microalgae in which the number of larvae survives average life of 102 ± 121.7 larvae. *Chaetoceros*, as one microalga many used as feed because they have advantages that are quickly growing under conditions and suitable environments, as well as content sufficient nutrition high. Where is the protein content of *Chaetoceros* sp. reached 35%, 6.9% fat, 6.6% carbohydrates, and levels ash 28% (Inanstyo and Kurniastuty, 1995 in Yulianto, 2016) because the availability of feed Becomes a very supportive factor in enhancement growth and value pass life seed pearl so through immersion seed in tub feed experience with period immersion different expected could Becomes solution for obtaining seed quality pearls.

METHODOLOGY

Time and Place

Research conducted for 16 days counted from 25 September to 10 October 2021. The research was conducted at the Coastal Aquaculture Development Center (BPBPP) , Gili Genting village , Sekotong district, West Lombok regency .

Tools and Materials

Tools used in study this is Maintenance tanks , Containers Plastic , Thermometer , DO meter , Refractometer , Wooden stand , Microscope , Haemocytometer , Tweezers , Pipette , Sieve , Glass measuring , Container , Blower , Aerator hose , Collector , Weights , Rapia rope , Handcounter , Sample bottles , Cover glass , pH meter , millimeter block , and materials used is Pearl oyster seeds , Sea water , Fresh water , *Chaetocheros sp .* , Alcohol , Fertilizers , Silicates, HCL , Sodium hypochlorine , Sodium thiosulfate .

Study this use method experiment with 5 treatments and 3 replications treatment tested that is period immersion seed in immortal feed natural, that is A (control / without immersion), B (0.5 hours), C (1 hour), D (1.5 hours) and E (2 hours).

Immersion seed in feed experience use 12 container tubs with 10 Liter capacity. Container used is container plastic and placed in a dark place, the feed used is feed experience type phytoplankton from species *Chaetoceros* sp. pan culture experience done for 3 days before ready for used. Seed used is results hatchery Sekotong Beach Aquaculture Development Center (BPBPP) with seed age of 60 days.

Implementation of the research begins with sampling the initial size of the seed with using 3 collectors and taking 5 tails / collectors so that obtained as many as 15 tails seed . Measurement using the micrometer below microscopy, growth measurement done with measurement dorsal ventral.

Density sampling seed aim for knowing total beginning collector seeds study before he did immersion, sampling done with using 3 collectors that is count manually with hand counter. Calculation results then averaged Becomes density beginning research.

Immersion seed pearl done 1 time a day for 16 days, the natural feed used to soak pearl oyster seeds is using the type *Chaetocheros* sp. Natural feed density used in soaking ie 2,000,000 cells / ml with a volume of 1 liter.

For get density feed, then done with observation under microscope especially first, then feed naturally obtained he said ready given as treatment immersion. The dilution in the immersion media can be calculated using formula Rizky *et al.*, (2019) .

$$V1 \times N1 = V2 \times N2$$

Evidence :

V1 = Volume stock *Chaetoceros* sp. that needed (mL),

V2 = iVolume culture (mL)

N1 = Dense livestock *Chaetoceros* sp. (sel /m L)

N2 = Density population *Chaetoceros* sp. which wanted (cells /m L)

Observation of water quality is carried out every p 8 days in the maintenance tub i.e. in the morning, afternoon, and evening. The water quality parameters observed were: temperature measured using a stem thermometer or alcohol thermometer, DO was measured using a DO meter and salinity was measured using a refractometer .

Observation size done at the beginning research and end research. Seeds attached to the collector are carefully removed using tweezers to avoid damaging the pearl shells. Seed collection is carried out randomly as many as 3 tails on 1 collector so that 9 heads / treatment was obtained or 45 samples seeds , seeds then measured in millimeters block .

Observation density collector seeds done same with observation size seed at the beginning and at the end research. Calculation method collector density done look at the calculations beginning but on calculations end used all treatment units that is a total of 15 treatment units.

The main parameters to be tested in this study are the effect of the immersion period on growth and survival rates. Parameters observed include growth absolute (mm), relative growth (%) and rate growth Specific daily (% per day). Growth absolute counted with the formula according to Effendi (1979) in Kotta (2017) are :

$$P = Pt - Po$$

Description :

P = Growth length (mm)

Pt = Final length (mm)

Po = initial length (mm)

Growth (RGR) and rate growth Specific (SGR) is calculated use formula Mukhlis *et al* (2017) , namely :

$$RGR = ((Lt - L0) / L0) \times 100\%$$

Description :

RGR = relative growth rate (%),

L0 = long beginning

Lt = long end

$$SGR = ((Lt/L0)^{1/t} - 1) \times 100 \%$$

Description :

SGR = Specific growth rate (% per day)

L0 = long beginning

Lt = long end

T = length of period observations (days)

Survival rate is the number of individuals who remain alive according to a unit of time or the percentage of individuals who live to the total number of individuals. The survival of mussel seeds is calculated using the formula :

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

Information :

SR = survival (%)

Nt = number of population at the end of rearing (individuals)

No = total population at the start of rearing (individuals)

Growth and survival data were analyzed in a manner quantitative _ use analysis print ANOVA variance at 95% level. If results state different real, then further test is carried out with the BNT test. While the water quality data is analyzed in a manner descriptive.

RISULT

Growth Absolute (mm)

Analysis results measurement growth absolute (dorsal ventral) seeds shell obtained pearls in study this in a manner general immersion in feed experience gives the average rate growth seed shell pearl more period high immersion for 2 hours compared with seed shell with period immersion below, results growth shell seed shell pearl this achieved for 16 days treatment. On soaking 2 hours, long seed (dorsal ventral) shell shell develops with increase average length of 1.67 mm (Table 1).

Table 1. Growth Data Absolute (mm)

Treatment	Test			Average(mm)
	1	2	3	
A (Control)	0.89	0.56	0.89	0.78
B (Immersion 0.5 hours)	1.23	0.56	0.89	0.89
C (Immersion 1 hour)	1.56	1.56	1.23	1.45
D (Immersion 1.5 hours)	1.56	1.89	1.23	1.56
E (Immersion 2 hours)	1.56	1.56	1.89	1.67

Analysis results diversity growth absolute (dorsal-ventral) shells pearl (*P. maxima*)

exhibits period immersion give significant effect (F count 7.39 > F table 3.48) (Table 2). BNT analysis results show that growth absolute observed best shown in treatment immersion E ie period immersion for 2 hours showing exists significant difference with treatment A (Control) and treatment B (0.5 hour immersion) however no different real with treatment C (1 hour immersion), and D (1.5 hour immersion) (Figure 1.)

Table 2. Analysis diversity Growth Absolute (mm)

<i>standard diversity</i>	<i>Db</i>	<i>JK</i>	<i>KT</i>	<i>F count</i>	<i>F table</i>
Treatment	4	1.97	0.49	7,39	3.48
Error	10	0.67	0.07		
Total	14	2.64			

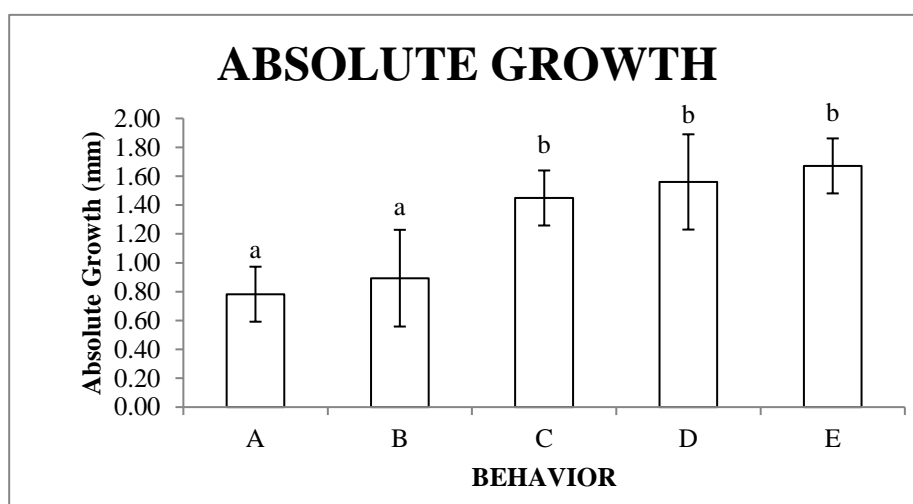


Figure 1. Graph growth absolute long seed (dorsal ventral) shell.

Description: A (Control), B (0.5 hour immersion), C (1 hour immersion), D (1.5 hour immersion), and E (2 hour immersion). The vertical line shows standard deviation.

Relative Growth (%)

Analysis results growth relatively (%) long the dorsal-ventral shell of the seed shell-soaked pearls in tub feed with different period show that increase long shell highest achieved in period immersion longest that is for 2 hours delivers average size after maintained for 16 days of 68.49% of size early (table 3).

Table 3. Growth data relative (%)

Treatment	Test			Average(%)
	1	2	3	
A (Control)	36,6	23,0	36,6	32,06
B (Immersion 0.5 hours)	50,3	23,0	36,6	36,61
C (Immersion 1 hour)	63,9	63,9	50,3	59,38
D (Immersion 1.5 hours)	63,9	77,6	50,3	63,93
E (Immersion 2 hours)	63,9	63,9	77,6	68,49

Analysis relative growth (%) of seeds shell pearl show that period immersion in tub feed experience give significant effect (F count 7.39 > F table 3.48) (table 4). BNT analysis results

show that increase highest dorsal-ventral length achieved in treatment immersion E (2 hours immersion) showed significant difference with treatment A (Control) and treatment B (0.5 hour immersion) however no different significant with C, and D (Figure 2). Table 4. Analysis diversity Growth Relative (%)

	<i>standard</i>	<i>db</i>	<i>JK</i>	<i>KT</i>	<i>F count</i>	<i>F table</i>
<i>diversity</i>						
Treatment	4		3309.54	827,39	7,39	3.48
Error	10		1119.77	111.98		
Total	14		4429.32			

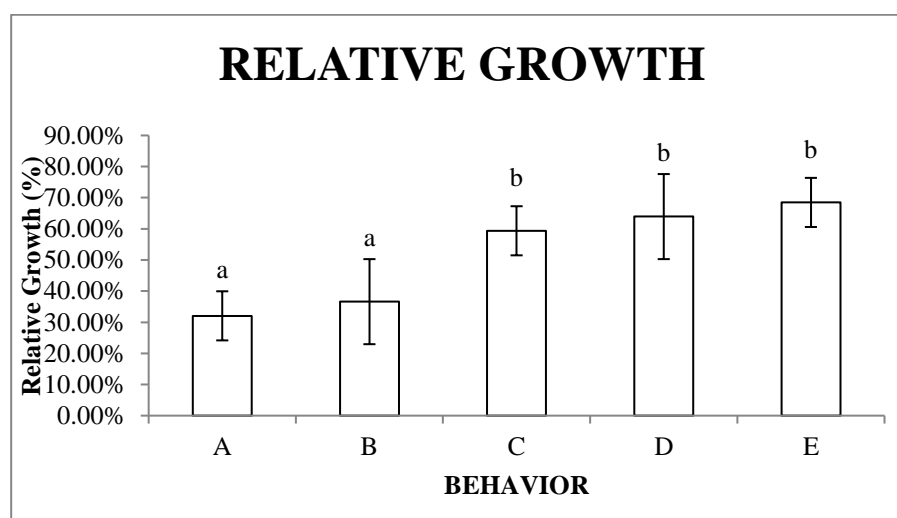


Figure 2. Graph growth relatively long seed (dorsal ventral) shell shell pearl.

Description : A (Control), B (0.5 hour immersion), C (1 hour immersion), D (1.5 hour immersion), and E (2 hour immersion). The vertical line shows standard deviation.

Fast growth specific Daily (% per day)

Analysis results rate growth Specific daily (% per day) length Dorsal-ventral shell of the seed shell soaked pearls _ in tub feed experience with different period _ show that increase long shell highest achieved in Period immersion for 2 hours with increase average size of 3.31% per day (Table 5).

Table 5. Growth data Specific daily (% per day)

Treatment	Test			Average (% per day)
	1	2	3	
A (Control)	1.97	1.30	1.97	1.75
B (Immersion 0.5 hours)	2.58	1.30	1.97	1.95
C (Immersion 1 hour)	3,14	3,14	2.58	2.95
D (Immersion 1.5 hours)	3,14	3.65	2.58	3,12
E (Immersion 2 hours)	3,14	3,14	3.65	3,31

Analysis diversity rate Specific daily seed shell (*Pinctada maxima*) shows that period immersion in tub feed influential significant ($F \text{ count } 7.39 > F \text{ table } 3.48$) (Table 6). BNT results (Figure 8) show that increase dorsal-ventral length with treatment E (soaking 2 hours) is

different significant with treatment A (control) and treatment B (0.5 hour immersion), however no different real with treatment C(1 hour), D(1.5 hours) (Figure 3).

Table 6. Analyst diversity rate growth Specific daily (% per day)

<i>standard diversity</i>	<i>db</i>	<i>JK</i>	<i>KT</i>	<i>F count</i>	<i>F table</i>
Treatment	4	6.160614	1.540153	7.392893	3.47805
Error	10	2.083289	0.208329		
Total	14	8,243903			

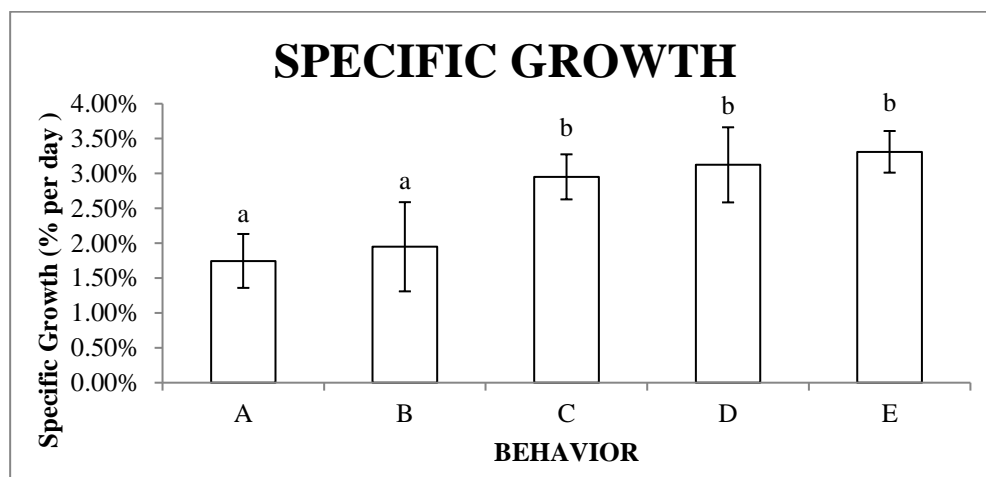


Figure 3. Graph growth Specific daily long shell (dorsal ventral) of the clam pearl.

Description : A (Control), B (0.5 hour immersion), C (1 hour immersion), D (1.5 hour immersion), and E (2 hour immersion). The vertical line shows standard deviation.

Survival Rate Life (%)

Based on results analysis level continuity live (Appendix 5) seeds shell soaked pearls _ in tub feed experience showing that treatment A (control) gave mark continuity life 89.39%, treatment B 90.02%, treatment C 90.26%, treatment D 90.66% and treatment E 91.45% (Table 7).

Table 7. Survival data live (%)

Treatment	Test			Average (%)
	1	2	3	
A (Control)	99.29	77,43	91.45	89.39
B (Immersion 0.5 hours)	89.79	96,91	83,37	90.02
C (Immersion 1 hour)	93,11	97,86	79,81	90,26
D (Immersion 1.5 hours)	88.36	95.72	87,89	90.66
E (Immersion 2 hours)	85.75	99.05	89.55	91.45

Level continuity life seed pearl with immersion in feed natural , period different immersion no give real difference significant to level continuity life seed shell *Pinctada maxima* . Analysis level continuity live (%) seeds shell pearl (*Pinctada maxima*) exhibits that period immersion no significant (F count 0.027 <F table 3.48) (Table 8 and Figure 4).

Table 8. Analysis diversity level continuity live (%).

<i>standard diversity</i>	<i>db</i>	<i>JK</i>	<i>KT</i>	<i>F count</i>	<i>F table</i>
Treatment	4	7.011169	1.752792	0.027196	3.47805
Error	10	644.5085	64.45085		
Total	14	651.5197			

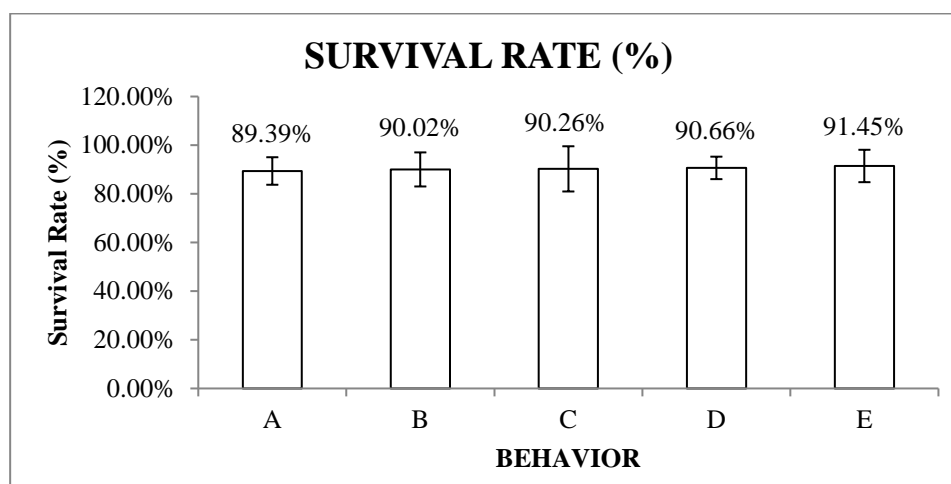


Figure 4. Graph level continuity live (%) seeds shell soaked pearls _ in tub feed natural . Description : A (Control), B (0.5 hour immersion), C (1 hour immersion), D (1.5 hour immersion), and E (2 hour immersion). The vertical line shows standard deviation .

Water quality

The measurement results of water quality parameters such as water temperature , salinity , oxygen dissolved and water pH for 16 days maintenance in tub maintenance where mark water temperature range Among 26.7-27.5 °C , salinity 34-35 ppt, oxygen dissolved 5.1-5.6 mg/L, and the pH value ranged between 7.4-7.9 (Table 9). Assess the quality of this water still belong in good quality _ for life shell pearl .

Table 9. Water quality data

Parameter	range	Average	Tolerance
Temperature (°C)	26.7-27.5	27,24	27-31 °C (Kotta, 2017)
Salinity (ppt)	34-35	34,66	24-36 ppt (Hamza, 2015)
DO (mg/l)	5,1-5,6	5,27	4.3-6.3 mg/l (Fathurrahman , 2013)
pH	7,4-7,9	7,6	7-8.2 (Rosanawita et al, 2017)

DISCUSSION

Results data measurement growth in a manner whole with immersion seed give different results real (significant) to growth long absolute, relative growth, and rate growth

Specific daily. The results of research that has done showing the longer the period immersion so growth the more increase, p this caused because immersion in tub feed influential live to growth seed shell pearl, growth shell pearl determined in a manner directly by availability feed naturally exist around them (Hastuti et al, 2018). Immersion seed in tub feed suspected could Fulfill availability feed and raise consumption feed naturally exist in tub immersion so that could trigger good growth. According to Femy *et al* (2017) sum food is factor main in function metabolic, physiological, growth and survival life shell pearl. This is also explained by Nardiyanto (2017) that success growth shell puppies shell pearl influenced by factors availability feed enough natural (*phytoplankton*). this could seen in Figure 6. Graph growth absolute. Where is the growth seed shell soaked pearls in feed naturally highest in treatment E with period immersion for 2 hours.

Based on results analysis obtained that growth long shell shell soaked pearls in tub feed experience *Chaetoceros* sp. give influence growth significant shell Among treatment. Where treatment E is different real with treatments A and B, however no different real with treatment C and D (Figure 6), p this suspected because total absorbed feed more much in treatment E, In research this density feed naturally used 2,000,000 cells /ml with a volume of 1 liter. Density feed used suspected capable give discretion for shell for absorb feed, based on density data feed end (Appendix 7) shows total feed far decrease from total beginning feed , waste feed that has counted as much as 745,500 cells / ml. According to Sulistyani *et al* (2005) that speed filtration shell pearl *Pinctada maxima* reached 1.63 l /hour. This proves with give discretion absorption feed with density unity time on the shells pearl suspected capable give opportunity absorption feed in a manner maximum.

Maximum absorption from shell pearl this no regardless from size suitable feed with aperture his mouth. Shell pearl basically no do selection to type the food however selecting the food based on size, size suitable food with aperture mouth and inclined more small more easy and likeable shell pearls (Anwar et al, 2004). *Chaetocheros* sp. made as feed main because have size not enough than 10 microns. Size the is suitable size with size filtration shell pearl (Astriwana *et al*, 2008). Jam that, *Chaetoceros* sp. also capable support growth shell shell pearl, Taufik (2010) stated that *Chaetoceros* sp. capable support growth shell shell pearl that is with give biota protection from factor external ie influence silicates (SiO-4).

There are other factors that can influence growth shell shell that is content nutrition in food, feed experience *Chaetoceros* sp. as feed used have content sufficient nutrition for support growth seed shell pearl. Isnanstyo and Kurniastuty (1995) explain that content the nutrients present in *Chaetoceros* sp. reached 35% for protein and 6.6% for carbohydrates. Growth this condition is also affected season, where study this takes place from September to with month October which is month happening season hot. Enhancement water temperature that occurs in the season hot could trigger oyster pearl grow with well (Oceanic and Maritime Service Aceh Province, 2015).

Based on results measurement relative growth of clams pearl show that treatment E (immersion for 2 hours) gave the highest average relative growth (%) ie of 68.49% (Figure 7) Besides that, speed growth Specific daily (% per day) also describes rate growth Specific highest obtained in treatment E (immersion for 2 hours) ie of 3.31% per day, (Figure 8). this data show growth seed relatively stable clams matter this suspected because fulfillment supply food, which is the case this could describe no happening competition obtain food. Taufiq *et al* (2007), rate growth shell could determined one of them because competition get space and food. Besides it's a seed shell pearls too utilise feed (*Chaetoceros* sp.) which feed

this easy caught by the seeds shell pearl, Sudirman *et al* (2013) convenience shell pearl in utilise *Chaetoceros* sp. as food during the maintenance period that is easy caught because small size and motionless active. Besides that, condition environment in good range, shells pearl with condition normal environment capable develop optimally. Condition environment maintenance or condition still water quality belong in optimal conditions for life shell pearls, pH value ranges between 7.4-7.9 (Appendix 6). As for the range tolerance shell to pH was in the range of 7-8.2 (Rosnawati *et al.*, 2017). Kafuku T and Ikenoue (1992) in Fathurrahman (2013) explains that sea water surface generally has a pH between 6.0-8.5 while the pH for cultivation sea according to raw seawater quality _ is 7 - 8.5.

Continuity life is one of the main parameters in successful cultivation process , nalai continuity life no easy for maintained especially again supporting parameter conditions must in accordance with necessity from shell pearl that own , especially in the provision feed and control maintenance media quality . Results data study in a manner whole with immersion in tub feed experience give no results _ different real (no significant) to level continuity life seed shell pearls (Appendix 5). Continuity life related with deep water quality which cultivation can influence success , media water used minimal cultivation adjusted with water quality in nature as well as still capable for tolerated organism when used (Kotta, 2016) .

Based on level continuity life seed shell pearl During study that is range Among 89.39%-91.45% (Figure 9) where still belong in level continuity good life. Tomatala (2014) states that percentage of SR in clams pearl reach 90% . said to belong to SR maximum . SR enough good range of 45-65% (Wardana et al., 2015)., while SR is included in category low is not enough of 10% (Wardana et al., 2014).

Survival rate the good life on research this suspected because seed shell pearl already stick with ok. According to Ahmad *et al* (2018) explains that mark The survival rate (SR) obtained is very good, p this occur due to spat attached with good on the attachment media (collector). Besides that, value continuity life this is impact from immersion seed in tub feed *Caetoceros* sp. which one can Fulfill need food for seed. Feed experience compared to with feed artificial content nutrition enough high and more complete so very good, use feed experience *Chaetoceros* sp. on research this because appropriate content for growth and survival life shell pearl , where *Chaetoceros* protein content sp. reached 35%, carbohydrates 6.6% and fat 6.9%, meanwhile rate ash reached 28% (Inanstyo and Kurniastuty , 1995). Sudirman *et al* (2013) stated that use of 100% *Chaetoceros* sp. give level continuity good lif because size and content proper nutrition for shell pearl .

Measurement Water quality is carried out on the parameters of water temperature , water salinity , DO (oxygen dissolved) and the pH of the water. Measurement results temperature During maintenance still in range good water quality (Appendix 6). Water temperature range Among 26.7-27.5 o C with an average of 27.24 o C which is mark temperature in accordance for growth and survival life seed shell pearl. According to Kotta (2017) that good water temperature for growth and survival life oyster pearl range between 27-31°C. matter this is also explained by Astriwana *et al* (2008) where temperature 25.6-27.5 o C in tub maintenance Fulfill condition for continuity life oysters _ oxygen levels dissolved (DO) present During study range between 5.1-5.6 mg/l, according to Fathurrahman (2013) oxygen dissolved in the waters Sekotong, West Nusa Tenggara averaged 4.3 mg/l and 6.3 mg/l and belong good range for continuity life shell pearl. Salinity and pH are one factor urgent in activity cultivation shell pearl, results measurement salinity During study range between 34-35 ppt, and a pH value of 7.4-7.9 (Appendix 6) value this optimal for support

success growth and improve mark continuity life seed shell pearls, p this in accordance with opinion Rosanawita *et al* (2017) where proper water pH conditions for activity mind range between 7-8.2. Temporary mark proper salinity for activity cultivation range between 24-36 ppt (Hamzah, 2015).

CONCLUSION

Conclusions that can be taken from study this is period immersion seed shell pearl *Pinctada maxima* deep tub feed experience *Chaetoceros* sp. give significant influence. On plantations C, D and E are different significant to treatment A and B at rate growth shell (Dorsal-Ventral) is good of growth parameters long absolute, relative growth, and rate growth specific. Temporary period immersion seed shell pearl in tub feed experience no influential significant to level continuity life seed shell pearl *Pinctada maxima*.

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