University of Muhammadiyah Malang, Indonesia
e-ISSN 2622-4836 Vol.... No...., (Bulan) (tahun). pp.
Indonesian Journal of Tropical Aquatic
Journal homepage: http://ejournal.umm.ac.id/index.php/ijota

The effect of adding CaO : $MgSO_4$ with different ratios on the growth of vaname shrimp production in freshwater media

Andre Rachmat Scabra[1,a,*], Nanda Diniarti[1,b], Iin Artiningsihi[1,c]

[1] Aquaculture Study Program, Faculty of Agriculture, University of Mataram, Indonesia.
[a] andrescabra@unram.ac.id [b] nanda _unram@yahoo.co.id [c] iinarti3384@gmail.com
[*] Corresponding author

ARTICLE INFO

Keywords:
Vannamei Shrimp
Environment
CaO
$MgSO_4$
moulting

ABSTRACT

Vannamei shrimp (*Litopenaeus vannamei*) is a fishery product that has high economic value. The nature of vaname shrimp that is able to adapt to a wide salinity, causes maintenance to be carried out in low salinity media . The maintenance of vaname shrimp in freshwater media can be a solution to increase the production of vaname shrimp. There are several obstacles in the maintenance of vannamei shrimp in freshwater media including : namely the concentration of dissolved minerals in fresh water is very low so that absorption from the environment cannot be used to fulfill the metabolic needs of freshwater organisms , therefore mineral additions are needed to meet the metabolic needs of freshwater organisms such as CaO and $MgSO_4$. The purpose of this study was to determine the effect of CaO and $MgSO_4$ on growth and to determine the optimal dose of CaO and $MgSO_4$. The results of this study are the highest survival rate at P3 with a yield of 70.33%, a specific growth rate of 3.33%, a specific length growth rate of 8.56%, an FCR of 1.66, a calcium content of 31,143 and a magnesium content of 28.92, temperature ranged from 27-30 C, pH 7.9 – 8.3, DO 4.1-6.8 mg/L, salinity 0 ppt, ammonia 0.1 mg/L, and alkalinity 118-140 Conclusions from this study namely the addition of minerals CaO and $MgSO_4$ can affect the growth of white shrimp and the best dose is 80 ppm CaO and 40 ppm $MgSO_4$.

1. Introduction

Vannamei shrimp (*Litopenaeus vannamei*) is a fishery product that has high economic value. Indonesia is the third largest shrimp exporter in the world market. One of the biota that has become an export attraction is the vanamei shrimp, which contributes up to 85% of total exports (Suprino *et al.,* 2018) . Vannamei shrimp production is mostly done because these shrimp have specific characteristics, such as being able to adapt to an environment with low temperatures, being resistant to disease and being able to live in different salinity ranges (Suprino et al., 2018) .

Vannamei shrimp have *euryhaline* properties , which can live in media with salinity between 0.5-40 ppt . The nature of vaname shrimp that is able to adapt to a wide salinity, causes maintenance to be carried out in low salinity media . The euryhaline property of vanamei shrimp has not been used properly. This is indicated by the maintenance of vanamei shrimp which is still widely cultivated in the area around the coast . KKP (2020) states that the potential of Indonesia's territory that can be utilized in the field of aquaculture consists of marine, coastal, and freshwater land areas. In order to take advantage of this potential, one of the opportunities that can be developed is the cultivation of vanamei shrimp in freshwater media (Muhammad Ghufron et al., 2021) . In addition to vaname shrimp, biota that can be developed to be cultivated in low-salinity media, namely eel, Scabra, (2020) stated that eels when reared prefer a low-salinity environment.

shrimp maintenance i in fresh water media can be a solution to increase production yields. Scabra *et al.,* (2021) The cultivation of vaname shrimp in fresh water has several positive values, including in terms of technology being able to reduce the risk of shrimp contracting viral and bacterial diseases. Constraints on the maintenance of vannamei shrimp in freshwater media include : i.e. the concentration of dissolved minerals in fresh water is so low that absorption from the environment cannot be used to fulfill the metabolic needs of freshwater organisms (Lall 2002). The function of minerals is to be a major part of the exoskeleton, balance osmotic pressure, a major part of tissue structure, play a role in central nervous transmission and muscle contraction, be a component of enzymes, vitamins, hormones, pigments, cofactors in metabolism, catalysts and enzyme activity (Davis and Gatlin) III, 1991; Zainuddin *et al* , 2010). Therefore , it is necessary to add macro minerals to the shrimp rearing media.

The macro mineral elements are : phosphorus , calcium , sulfur, potassium , chlorine , sodium, and magnesium. While the micro mineral elements are iron, zinc, selenium, manganese, copper, iodine, cobalt, silicon, nickel and fluorine. (Roy & Boyd, 2006) .

In order to develop the cultivation of vanamei shrimp in freshwater culture media, it is important to conduct research on the effect of giving calcium in the form of CaO: $_{MgSO4}$ with different doses on the growth of whitewater shrimp production in freshwater media .

The purpose of this study was to analyze the effect of adding lime CaO : $MgSO_4$ with different doses on the growth of whitewater vanamei shrimp cultured in freshwater media and to determine the appropriate dose of CaO : $MgSO_4$ in freshwater vanamei shrimp culture.

2. Materials and methods

Only crucial techniques are described. The referenced methods must be completed with the citation, if the method is modified, please state the modification. The used equipment must be specified with the trademark and type, materials used must be shown with the supplier name and the country.

2.1 Material

The equipment used in this study included containers, aeration equipment, refractometers, siphon hoses, thermometers, DO meters, pH meters, plastic buckets, analytical scales, rulers, scissors, jars, stationery, cellphone cameras. The materials used in this study were shrimp with PL 10, sea water, fresh water, shrimp feed, CaO lime and $MgSO_{4\ lime}$.

2.2 Method

This research was conducted by experimental method using Completely Randomized Design (CRD). The aspect studied is how the effect of adding lime CaO and $MgSO_4$ with different doses in the maintenance container with 5 treatments and 3 replications, so that 15 trials were obtained.
Treatment 1 : Seawater (30 ppt)
Treatment 2: 80 ppm Ca O (0 ppt)
Treatment 3 : 80 ppm Ca O + 4 0 ppm $MgSO_4$
Treatment 4 : 80 ppm CaO + 80 ppm $MgSO_4$
Treatment 5 : 8 0 ppm CaO + 120 ppm $MgSO_4$

3.4 Research Procedure

a . Research Container Preparation

The maintenance container used is a container of 15 units with a capacity of 40 liters . maintenance containers are cleaned under running water. Furthermore, the containers are placed in accordance with the predetermined position then each container is filled with as much as 20 liters of fresh water and equipped with one aeration for each container as a supply of oxygen into the water, then labeled according to the treatment.

b . Test Animal Preparation

Vannamei shrimp larvae used as test animals were obtained from Bali . The larvae used were shrimp larvae in the PL 10 phase with a total of 10,000 tails. Prior to the research, the test animals were acclimatized and fasted for 24 hours. Salinity acclimatization is done by decreasing the salinity gradually. After being fasted, feeding is done little by little to prevent shrimp stress and death. Shrimp at the start of the study were already PL 20.

c. Preparation of solutions and administration of calcium CaO and $MgSO_4$

CaO and $MgSO_4$ before being put into the maintenance container, CaO and $MgSO_4$ first dissolved in a 150 L bucket as many as 3 pieces adjusted to the number of experiments. Before being put into a bucket filled with water, CaO and $MgSO_4$ weighed first. For treatment (1) using sea water, for treatment (2) 80 ppm CaO, added CaO as much as 12 grams, treatment (3) 80 ppm CaO + 40 $MgSO_4$ added CaO as much as 12 grams and 6 grams of $MgSO_4$. For treatment (4) 8 0 ppm CaO + 8 0 ppm $MgSO_4$ as much as 12 grams of CaO and 12 grams of $MgSO_4$ and for treatment (5) 8 0 ppm CaO + 12 0 ppm $MgSO_4$, added 12 grams of CaO and 18 grams of $MgSO_4$. Before being put into a 150 L bucket, the water in the bucket is taken sufficiently using a 3 liter bucket for each treatment and CaO and $MgSO_4$ The weighed ones were placed in each 3 liter bucket and then aerated for 24 hours before being poured into a 150 L bucket. After being dissolved into a 150 L bucket, ketapang leaves were added so that the pH of the solution when it was put into the culture container remained normal, Scabra *et al. ,* (2021) stated that *Terminalia catappa ketapang leaf* is one of the natural ingredients that can maintain pH stability in waters.

d. Test animal acclimatization

Before stocking the maintenance container, the climate process is carried out first in shrimp larvae. Shrimp larvae are placed in a temporary rearing container in the form of a tub filled with seawater. The acclimatization was carried out in the form of decreasing salinity levels to 0 ppt. The decrease in salinity was carried out for 10 days slowly where every day it was reduced by 10%. The purpose of this acclimatization is to familiarize the vaname shrimp larvae to live at 0 ppt salinity, and to prevent stress from the sudden drop in salinity which will result in death . To reduce the level of salinity to the desired salinity is done by adding fresh water. So the reservoir is filled with sea water and added with fresh water, after everything is well mixed, the amount of salinity is measured, during the 10 day span, for example, 1 bucket of water is removed and then 1 bucket of fresh water is added to the reservoir until the salinity is 2 ppm, the salinity is 0 after being moved. to the container with the treated water provided. One way to reduce salinity is to refer to the formula of (Rahim, Tuiyo, & Hasim, 2015) in (Hasim et al., 2019) with the following formula:

$$V_2 = \frac{V_1 (S_1 - S_n)}{S_n + S_2}$$

Information:

Sn = desired salinity (ppt)

Seawater Salinity (ppt)

Freshwater Salinity (ppt)

V1= Volume of sea water (m l)

V2= Volume of water container (m l)

e. Feeding

Feeding of shrimp is carried out with a frequency of 5 times a day, namely at 07.00, 11.00, 15.00, 19.00, and 23.00 at 10 % of the shrimp body weight. The feed given is in the form of pellets with crumble size.

f. Water Change and Siphoning

Siphoning is done before giving feed in the morning, then the culture container is filled again with water that has been added with calcium CaO and MgSO4 which has been dissolved first.

Water changes are carried out every 10 days. The water used in the water change process is water that has added calcium CaO and MgSO4 which has been dissolved for 24 hours. Water replacement is done by adding water to the amount of water that was wasted during siphoning.

3.5. Research Parameters

3.5.1 **Survival rate**

The survival rate (SR) of tilapia was calculated using the Effendi (1997) formula in (Prawira et al., 2014) as follows:

$$SR : \frac{Nt}{No} x\ 100\ \%$$

Where: SR = Fish survival rate (%)
No = Number of fish at the beginning of the study (tails)
Nt = Number of fish at the end of the study (tails).

3.5.2 **Specific weight growth rate**

Specific Weight Growth Rate (SGR)

The specific growth rate is % of the difference between the final weight and the initial weight then divided by the length of maintenance time. According to Zenneveld et al., (1991) in (Prawira et al., 2014) the formula that can be used to determine the specific growth rate is :

$$LPBS = \frac{InWt - InWo}{t} x\ 100\%$$

LPBS = Growth rate of specific weight (%/day), Wo = Average weight of seeds at the beginning of the study (g), Wt = Average weight of seeds on day t (g), T = Length of maintenance (days).

3.5.3 **Specific length growth rate**

Daily specific length growth rate

$$LPPS = \frac{LnLt - LnLo}{t} x\ 100\%$$

Information:
LPPS = Specific growth rate (%/day)
Wt = Average length shrimp at the end of the study (g)
Wow = The average length of the shrimp at the beginning of the study (g)
T = maintenance time (days)

3.5.4 **Food conversion ratio (FCR)**

Feed Conversion Ratio (FCR) that is, the ratio between the amount of feed consumed served with the resulting prawn meat . FCR was calculated 3 times during the study. Calculation of feed conversion is carried out using the Effendi (1997) formula in (Ihsanudin et al., 2014) , as follows:

FCR = F / (Wt + D) Wo)

Note: FCR : Feed conversion ratio Wt : Final fish weight (grams) Wo : Initial fish weight (grams) F : Feed given (grams) D : Weight of dead fish during rearing (grams).

3.5.5 **Calcium and magnesium levels in water**

The tool used to measure the levels of calcium and magnesium in the body of white shrimp is the *Atomic Absorption Spechtrophometer* (AAS). How to determine the levels of calcium and magnesium in water, namely:

a. A sample of 1 g was weighed and then put into a 100 ml Erlenmeyer.
b. Added 5 ml of HNO_3 , then allowed to stand for one hour in an acidic room and then left overnight.
c. Dropped 2-3 drops of $HClO_4$ and concentrated HNO_3 with a ratio of 2: 1 while continuously heated until the color changes from brown to yellow until the solution is clear.
d. Cool the sample then add 2 ml of distilled water and 0.6 ml of concentrated HCl, then heated again for 15 minutes until dissolved.
e. Put into a 100 ml volumetric flask.
f. The digested sample was filtered using Whatman filter paper number 42 and 1 ml was taken and then diluted to 100 ml.
g. A sample of 0.1 ml of dilution was taken and then 4.9 ml of distilled water and 0.05 ml of chloride solution were added.
h. The sample was mixed with a vortex and then centrifuged at 2000 rpm for 10 minutes.
i. The results of the AAS atomization flame were read at a wavelength of 422.7 nm. The absorbance that has been read is then converted to a standard curve so that the concentration of calcium and magnesium in the sample is obtained.

Calcium and magnesium in the body are calculated based on the following formula:

▯ : _ ______

▯

Information:
a = concentration of sample solution (mg l-1)
b = concentration of blank solution (mg l-1)
V = Extract volume (ml)

FP = Dilution factor
W = Sample weight (ml)

3.5.6 Water quality

The water quality that will be measured during the research is DO, temperature, pH, and Ammonia. DO, temperature, and pH measurements were carried out in all research experiments with the frequency of measuring water quality 3 times during the study, namely at the beginning, middle and end and for ammonia measurements carried out in all research experiments with a measurement frequency of 3 times during the study at the beginning, middle and end.

Table. 3 Water Quality

No	Name	Unit	Measuring instrument	Optimal Value

1	Temperature	°C	Thermometer	26 – 30 (Suwarsih, M. 2016).
2	pH	-	PH meter	7.5 – 8.5 (Multazam, AE 2017).
3.	Dissolved Oxygen	mg/l	DO meter	4 - 8 (Purnamasari, I. 2017)
4.	Salinity	g/l	refractometer	20 – 31 (Syukri, M. 2016).
5	Alkalinity	Mg/l	titrimetric	100-150 (Scabra et al., 2021)
6	Ca levels	Mg/l	AAS	80 (Juniarti, 2021)
7	Mg level	Mg/l	AAS	30 (Atmawinata, 2015)

2.3 Data Analysis

The effect of treatment on observation parameters was analyzed using analysis of variance (ANOVA). If the test results between treatments are significantly different, Duncan's further test will be carried out with a 95% confidence level.

3. Results and Discussion

3.1. Result 1

3.1.1 Survival Rate

The results of the ratio of C aO: M g SO 4 with different doses on the growth of shrimp production vanamei on media fresh water for 45 days showed that the average survival rate obtained ranged from 60% -83.33% as can be seen in Figure 4.

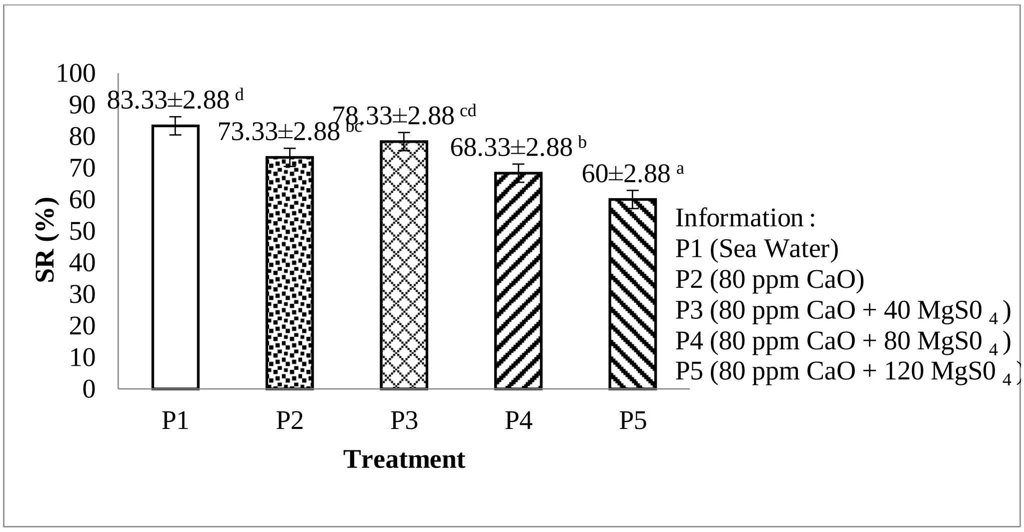

Figure 4. Survival rate of freshwater vaname shrimp

Based on the data homogeneity test, the survival rate value has homogeneous data (P>0.05), therefore the data tabulation can be continued with ANOVA analysis. The results of the analysis showed significantly different results (P <0.05) so that further tests were carried out using Duncan . Duncan test results showed that P1 was significantly different from all treatments (P> 0.05) . P3 was not significantly different from P2 (P>0.05), P2 was not significantly different from P4 (P>0.05) and P5 was significantly different. The highest survival rate was found in treatment P1 with an average value of 83.33%, the highest value in maintenance using fresh water, namely treatment P3 with an average value of 78.33%, followed by P2 with an average value of 73.33% and P4 with an average value of 68.33 % and the lowest value is in the P5 treatment with an average value of 60%.

In the treatment using fresh water, the highest treatment was found in P3 which was 78.33%. This indicates that the addition of calcium oxide, magnesium and sulfur affects the growth and survival of white vaname shrimp. Minerals make up the majority of seawater salts, so the addition of CaO, Mg and SO4 in fresh water for vaname shrimp rearing, serves as a substitute for the mineral needs of shrimp whose natural habitat is in seawater. Since fresh water has very little mineral content compared to sea water, the addition of these minerals plays an important role in the success of basal metabolism and shrimp growth. In addition to being obtained from food, shrimp actively utilize minerals from water, including maintenance media for moulting. Low mineral levels such as MgSO4 affect the process of failed moulting, while mineral levels both calcium, magnesium and sulfur that are too high will affect the rate of mineral uptake that exceeds the shrimp's ability limit which causes shrimp growth to stagnate.

In his life, white vaname shrimp will molt and the problem that occurs as a result of the molting process is the emergence of cannibalism of vaname shrimp. In the process, the molting vaname shrimp will produce an attractant, a chemical substance that is released from the molting shrimp body. The pungent fishy aroma of the attractant can arouse the appetite of other shrimp. Vannamei shrimp are cannibals, when molting the shrimp's body becomes soft so it is vulnerable to attack (eaten) by other shrimp. This is in line with the opinion of Aziz, (2014) which states that when molting, the shrimp body is very vulnerable to attack by other shrimp. Apart from the fact that the skin has not yet hardened, the shrimp at the time of molting also secretes a liquid that contains amino acids, enzymes and organic compounds that stimulate the appetite of the shrimp so that they are susceptible to cannibalism which affects the viability of the white vaname shrimp.

3.1.2 Specific Weight Growth Rate

The results of the ratio of C aO: M g SO 4 with different doses on the growth of shrimp production vanamei on media fresh water for 45 days showed that the average specific weight growth rate obtained ranged from 10.64-11.09% as can be seen in Figure 5.

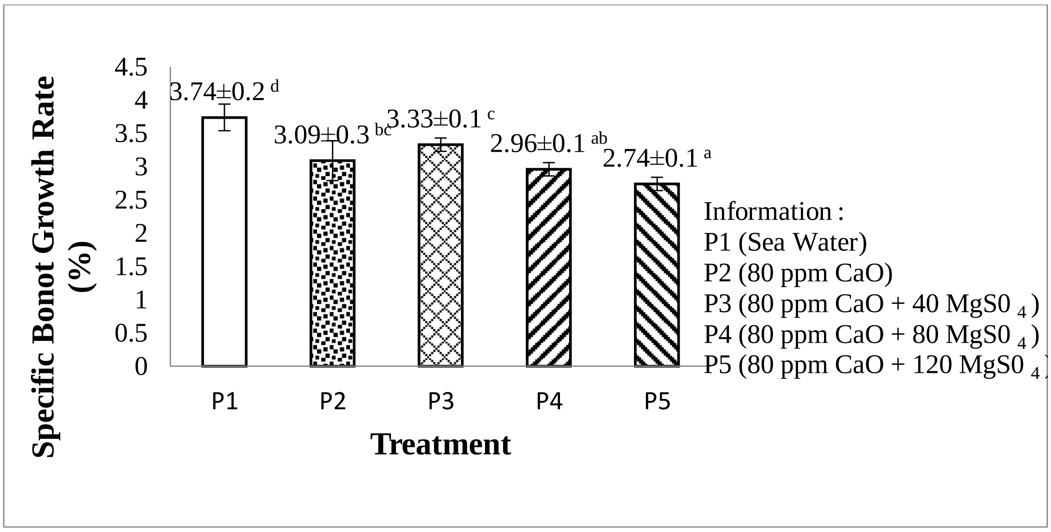

Figure 5. Specific weight growth rate of freshwater vaname shrimp

Based on the homogeneity test of the tabulated data , the value of the specific weight growth rate has homogeneous data (P>0.05), therefore the data can be continued with ANOVA analysis. The results of the analysis showed significantly different results (P <0.05) so that further tests could be carried out using Duncan . Duncan test results showed that P1 was significantly different from all treatments (p<0.05), P3 was not significantly different from P2 (P>0.05) but significantly different from P4 and P5 (P<0.05), P2 was not significantly different from P4 (P> 0.05) and significantly different from P5 (P<0.05). P4 was not significantly different from P5 (P>0.05). The specific weight growth rate was found in the P1 (Control) treatment using sea water with an average value of 3.74%, while the highest fresh water medium was found in P3 with an average value of 3.33%, followed by P2 with an average value of 3.09%, then P4 with an average value of 2.96% and the lowest value is found in P5 with an average value of 2.74%.

In the treatment using fresh water, the highest treatment was found in P3 which had a yield of 3.33 % . It is suspected that the provision of calcium and magnesium through rearing media can be utilized properly by white shrimp, and with a dose of 80 ppm CaO + 4 0 ppm MgSO4 , the optimal dose has been reached, because with the addition of higher doses there is a decrease in the specific weight growth rate. . Calcium, magnesium and sulfur are macro minerals needed by shrimp to carry out the molting process, where the absorbed calcium and magnesium are then stored in the hepatopangkreas and gastrolith after the release of the old skin, calcium and magnesium are then distributed by the blood and deposited on the skin. This is closely related to the statement of Novia *et al.,* (2018) that growth can occur after the process of changing the shell of shrimp, this is influenced by calcium, because calcium is the most important organic element in shrimp shells because shrimp utilize calcium from food and minerals. water medium. In addition, according to Jahan *et al.,* (2018) Magnesium is also an important mineral needed by crustaceans including shrimp for normal survival and growth.

3.1.3 Growth Rate Specific Length

The results of the ratio of C aO: M g SO 4 with different doses on the growth of shrimp production vanamei on media fresh water for 45 days showed that the average specific length growth rate obtained ranged from 7.38%-10.08% as can be seen in Figure 6.

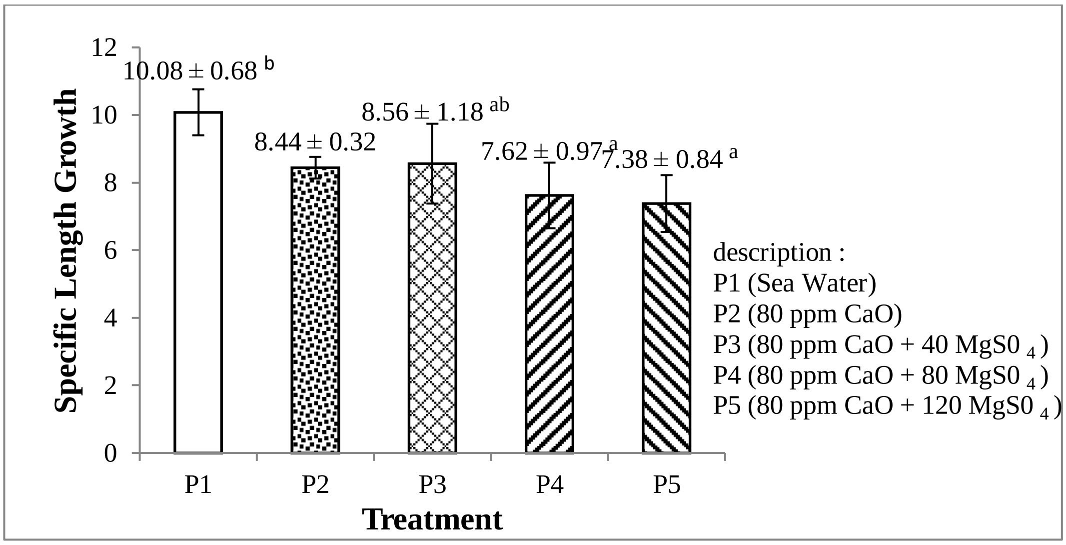

Figure 6. Specific length growth rate of freshwater vaname shrimp

Based on the homogeneity test of the tabulated data , the specific length growth rate value has homogeneous data (P>0.05), therefore the data can be continued with ANOVA analysis. The results of the analysis showed significantly different results (P <0.05) so that further tests could be carried out using Duncan . The results of Duncan's test showed that P1 was not significantly different from P3 (P<0.05) and significantly different from P2 , P4 and P5 (P>0.05). P3 was not significantly different from P2, P4 and P5 (P>0.05). The highest specific length growth rate value was in P1 treatment using fresh water with an average value of 10.20%, followed by P3 with an average value of 8.55%, then P2 with an average value of 8.44%, then P4 with an average value of 7.62 % and the lowest value is in P5 with an average value of 7.38%.

In the treatment using fresh water, the highest treatment was found in P3 which had a value of 8.56 which was not significantly different from the control treatment (sea water). This is presumably due to the influence of calcium oxide (CaO) and magnesium sulfate ($MgSO4$) which helps in the moulting process. When the size of the shrimp meat increases, the exoskeleton of the shrimp does not change because the exoskeleton is rigid, so to adjust the vanamei shrimp will release the old exoskeleton and be replaced with a new one with the help of calcium in this case CaO and $MgSO_4$. This is in line with the statement of Rahmatullah, (2015) which states that the better the growth, the more often the shrimp change their shells.

3.1.4 Feed Conversion Rate (FCR)

The results of the ratio of C aO: M g SO 4 with different doses on the growth of shrimp production vanamei on media fresh water for 45 days shows that the average feed conversion rate obtained ranges from 1.46%-1.7% as can be seen in Figure 7.

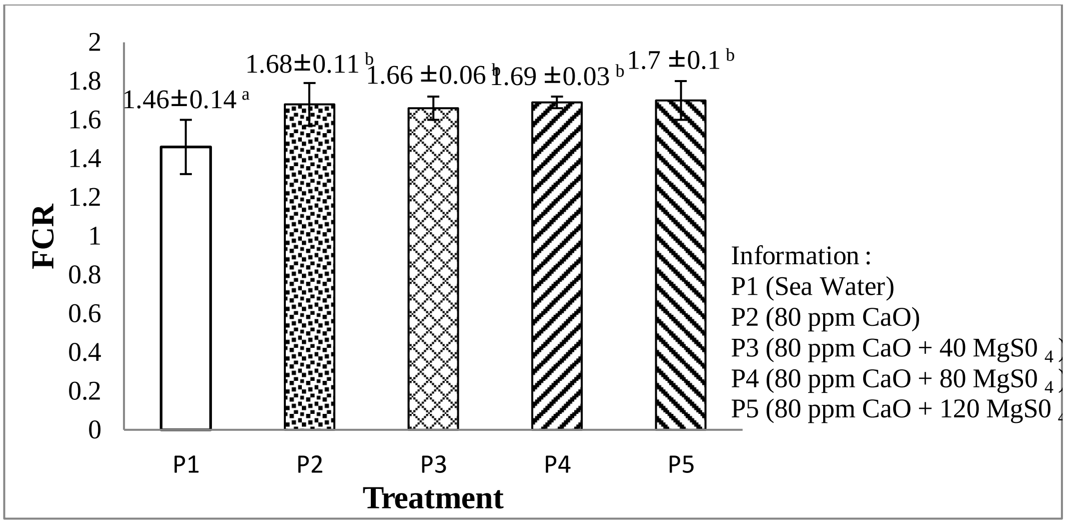

Figure 7. FCR of vaname shrimp on fresh water media

Based on the data homogeneity test, the FCR value has homogeneous data ($P>0.05$), therefore the data tabulation can be continued with ANOVA analysis. The results of the analysis showed that the results were not significantly different ($P>0.05$) so that further tests could be carried out using Duncan . Duncan test results showed that P1 (control) was significantly different from all treatments ($P<0.05$). P2 , P3, P4 and P5 were not significantly different between treatments ($P>0.05$). The best FCR value is in P1 treatment using sea water with an average value of 1.46, the best value using fresh water media is in P3 treatment with an average value of 1.66, followed by P2 with an average value of 1.68, then P4 with an average value an average of 1.9, and finally P5 with an average value of 1.70.

In maintenance using fresh water media, the FCR results were not significantly different between treatments, but the lowest value was found in P3 with a value of 1.66. This is presumably due to the addition of calcium and magnesium which gives good growth results in shrimp so that the level of shrimp feed consumption increases. The feed conversion value is directly proportional to growth, the lower the feed conversion value, the growth value will also increase. According to Galkanda-Arachchige (2020) the use of calcium can provide a low FCR, the lower the FCR, the better. Nadhof (2016) states that the FCR value is inversely proportional to weight, so the lower the value, the more efficient the shrimp in utilizing the feed they consume for growth.

3.2. Result 2

3.2.1 Calcium and Magnesium Levels

The results of giving the ratio of CaO: $MgSO_4$ with different doses to the growth of white shrimp production on fresh water media for 45 days, where the tests were carried out on day 22 and day 45 showed that the average calcium content in the water column obtained by the method

The titration got the results that the highest calcium content was found in P5, which was 37,259 ppm and the lowest calcium content was found in P3, which was 31,142 ppm, while for the magnesium content in the media, the highest result was found in P5 which was 82.92 and the lowest was in P3 which was 28. ,92 ppm.

Table 4. Calcium content

Treatment	Calcium value	Magnesium value
P2 (80 ppm CaO)	33.9226	-
P3 (80 ppm CaO + 40 $MgSO_4$)	31,143	28.92
P4 (80 ppm CaO + 80 $MgSO_4$)	34,478	57.84
P5 (80 ppm CaO + 120 $MgSO_4$)	37,259	82,861

Based on observational data regarding the value of mineral concentration in the form of calcium in the maintenance media, it is known that P5 (80 ppm CaO + 120 ppm $MgSO_4$) obtained the highest value for the presence of minerals in the form of calcium at 37,259 ppm. The lowest calcium content was at P3 (80 ppm CaO + 40 ppm $MgSO_4$) with a gain of 31,142 ppm (shown in Figure 8). When viewed from the growth parameters, P5 has the lowest specific weight growth, this is presumably because at P5 the concentrations of CaO and MgSO4 $_{are}$ very high, so that it can inhibit the transfer of minerals from the environment into the body of white vaname shrimp. This is in line with Alimaturahim's statement (2021) that high concentrations of Ca and Mg in water can suppress shrimp growth, whereas low concentrations of Ca and Mg cannot provide optimal growth. P3 is the treatment with the highest specific weight growth, this is presumably because the white shrimp in P3 is better able to take advantage of the presence of minerals in the waters so that it has the lowest acquisition of calcium mineral measurement results in the medium.

3.2.2 Water Quality

The results of giving the ratio of CaO: $MgSO_4$ with different doses to the growth of vaname shrimp production in freshwater media for 45 days showed the results of water quality measurements where the temperature had a value ranging from 27.6-30ºC, pH had a value of 7.9-8, 3, then it has a value of 4.1-6.8, then the salinity in seawater is between 28-30 ppt, while in fresh water the salinity is 0 ppt. the value of ammonia is in the range of 0.021-0.341 mg/L and the value of alkalinity is 86-140.

Table 5. Water quality

No.	Parameter	P1	P2	P3	P4	P5	Optimum value
1	Temperature (ºC)	27.9 - 30	28 - 30	27.6 - 30	27.6 - 30	27.6 - 30	28-30 °C (Yulihartini *et al* ., 2016)
2	pH	7.9	8.2	8.3	8.2	8.3	7.5-8.5 (Erlando *et al.* , 2015)
3	DO (mg/L)	4.1 - 6.9	4.7 - 6.9	5.9 - 6.5	5.3 - 6.7	4.5 - 6.8	4-8 mg/l (Bahri *et al* ., 2020)
4	Salinity	28-30	0	0	0	0	2 ppt < 40 ppt (Yulihartini *et al.* , 2016) .
5	Ammonia (mg/L)	0.021 - 0.45	0.101 - 0.341	0.021 - 0.137	0.054 - 0.104	0.032 - 0.158	0.1 mg/L (Anna, 2010)
6	Alkalinity	86-88	118 - 136.66	116.66 – 143	120.66 - 140	123.33 - 140	100-150 (Wedenmeyer, 1996)

Water quality is crucial in cultivation activities, this is in line with the opinion of Scabra & Setyowati, (2019) which states that water quality is one of the important factors that support the success of an aquaculture business. Scabra & Budidarti, (2016) Optimal cultivation environment can support fish growth well. The salinity value in this study was 0 ppt, where the salinity value was very far from the optimal salinity of shrimp. The optimum salinity level for vannamei shrimp culture is in the range of 15-25 ppt. During the 45-day rearing period, the pH tends to be stable, and is still within the range of optimal values for vannamei shrimp culture, namely 5.85 – 6.78 for seawater treatment and 5.96-7 for freshwater treatment. Erlando Erlando *et al* ., (2015) stated that the optimal pH value for vaname shrimp culture is 7.5-8.5. The temperature of the rearing media greatly affects the condition of white vaname shrimp, especially the degree of survival and growth of the shrimp. The optimal range for the life and growth of vaname shrimp is in the range of 28 ^{0}C-30 ^{0}C (Yulihartini *et al* ., 2016) . The range of dissolved oxygen during the study was 4.1-6.9 mg/L, this value was included in the optimal dissolved oxygen content for white vaname shrimp, both for survival and for growth. According to (Bahri et al., 2020) The range of dissolved oxygen values between 4-8 mg/L is a good range of values for shrimp life. The ammonia content in the research container was in the range of 0.02 -0.1 mg/L, where the range of ammonia values obtained was classified as good ammonia level for the maintained biota. This is in accordance with Anna's statement (Anna, 2010) . The alkalinity value obtained in this study was 86-88 ppm for seawater treatment, while for fresh water treatment the results were 116-140 ppm. In general, a good environment for fish life is with an alkalinity above 20 ppm. Boyd (1988) recommends the range of alkalinity and hardness for fish is 20-300 ppm. The optimal alkalinity for intensive fish farming is 100 to 150 ppm (Wedenmeyer, 1996).

4. Conclusion

1. From the results of the study entitled the effect of giving the ratio of CaO: $MgSO_4$ with different ratios on the growth of vannamei shrimp production in fresh water media, it can be concluded that the administration of calcium oxide (CaO) and magnesium sulfate ($MgSO_4$) into aquaculture containers can increase the growth of vannamei shrimp. cultured at 0 ppt salinity with yields for specific weight growth of 3.33% and specific length growth of 8.56%.
2. The best dose in this study was at P3 with the addition of 80 ppm CaO + 40 ppm $MgSO_4$.

5.1 Suggestion

Further research is needed by adding other macro minerals, such as phosphorus so that the mineral content is more complete for better growth and survival.

5. Acknowledgment

Thank you to Mrs. Nanda Diniarti , S.Pi., M.Si. , as the first Advisor for the advice, guidance, advice and support, Mr. Andre Rachmat Scabra, S.Pi., M.Sc., as the accompanying Advisor, for the advice, guidance, advice and support, Salnida Yuniarti Lumbessy, S.Pi., M.Sc., as Head of the Aquaculture Study Program, University of Mataram, Dr. Ir. Muhammad Junaidi, M.Sc., as Head of the Department of Fisheries and Marine Sciences, University of Mataram , Both people parents, Kamaludin Seto and especially my beloved mother, Mas'anah and friends who always provide support.

References

Alimaturahim F. 2021. *The Effectiveness of Dolomite Administration on Water Quality, Physiological Response and Growth Performance of Vannamei Shrimp (Litopenaeus vannamei)*. [*thesis*]. IPB University, Bogor [Indonesia].

Anna S. 2010. *Vannamei Shrimp*. Kanisius, Jogjakarta.

Atmawinata M. (2015). *Increase of Ca : Mg Mineral Ratio in Maintenance Media on Production Performance of Giant Shrimp (Macrobrachium rosenbergii) Nursery Seeds*. [*thesis*]. IPB

University, Bogor [Indonesia].

Aziz R. 2014. growth performance and survival rate of white shrimp Littopanaeus vannamei at salinities of 30 ppt, 10 ppt, 5 ppt and 0 ppt. [*thesis]*. IPB University, Bogor [Indonesia].

Bahri S, Mardhia D, & Saputra O. 2020. Growth and Graduation of Vannamei Shell Life (Litopenaeus Vannamei) with Feeding Tray (ANCO) System in AV 8 Lim Shrimp Organization (LSO) in Sumbawa District. *Tropical Biology* , *20* (2), 279–289. https://doi.org/10.29303/jbt.v20i2.1812.

Erlando G, Rusliadi, & Mulyadi. 2015. Increasing calcium oxide (CaO) to accelerate moulting and survival rate vannamei shrimp (Litopenaeus vannamei). *Journal of Fisheries.* 3(1) : 1–7. https://jnse.ejournal.unri.ac.id/index.php/JOMFAPERIKA/article/view/8861.

Prawira MA, Sudaryono A, & Rachmawati D. 2014. Substitution of Fish Meal with Catfish Head Flour in Feed on Feed Utilization Efficiency and Juvenile Growth of Vannamei Shrimp (litopenaeus vannamei). *Journal of Aquaculture Management and Technology* , *3* (4), 1–8. https://ejournal3.undip.ac.id/index.php/jamt/article/download/6634/6402

Rahmatullah S. 2015. *Addition of Ca and P Minerals with Different Ratios in Maintenance Media on Production Performance of Giant Shrimp (Macrobrachium rosenbergii)*. [*thesis]*. IPB University, Bogor [Indonesia].

Roy LA & Boyd C. 2006. *Physiological and nutritional requirements for the culture of the pacific white shrimp WHITE SHRIMP Litopenaeus vannamei IN LOW SALINITY WATERS Except* . Auburn University. [Dissertation]. Auburn University, Alabama [United States of America].

Scabra AR, Budiarti T, Djokosetyanto D. 2016 Kinerja produksi Anguilla bicolor bicolor dengan penambahan CaCO3 pada media budidaya. *Jurnal Akuakultur Indonesia. 15(1)* : 1-7. https://doi.org/10.19027/jai.15.1.7

Scabra AR & Budiardi T. 2020. Response Of The Anguilla Bicolor Bicolor Eel To Media With Different Salinity. *Jurnal Perikanan*, *9(2)*, 180–187. https://doi.org/10.29303/jp.v9i2.167

Scabra AR, Marzuki M, Cokrowati N, Setyono BDH, & Mulyani LF. 2021. Increasing Calcium Solubility Through The Addition Of Ketapang Leaves (Terminalia catappa) in Freshwater Media for Vannamei Shrimp (Litopannaeus vannamei) Cultivation. *Jurnal Perikanan*, *11*(1), 35–49. https://doi.org/http://doi.org/10.29303/jp.vl lil.250

Scabra AR, Hermawan D, & Haryadi. 2021. *Feeding Different Types Of Feed On Vannamei Shrimp (Litopenaeus Vannamei) Maintaining With Low Salinity Media*. *Indonesian Journal Of Aquaculture Medium*, *2 (1)*, 31-45. https://doi.org/10.29303/mediaakuakultur.v2i1.1279

Scabra AR, & Setyowati DN. 2019. Improving Water Quality for Freshwater Fish Cultivators in Gegerung Village, West Lombok Regency. *Jurnal Abdi Insani*, *6(2)*, 267-275. https://doi.org/10.29303/abdiinsani.v6i2.243

Yulihartini W, Rusliadi, & Alawi H. 2016. *Effect Of Additional Calcium Hydroside Ca(Oh)2 On Moulting, Growth And Lifety Of Vannamei Shrimp (Litopenaeus Vannamei).* [*thesis*]. Riau University, Pekanbaru [Indonesia].