

Effects of Addition of Vitamin C on Artificial Feed for the Growth of Humpback Grouper's Seeds

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Abstract

This study aims to determine the effect of adding different doses of vitamin C to otohime artificial feed for the growth of humpback grouper (*Chromileptis altivelis*) seeds. This study used an experimental method and a completely randomized design (CRD) with 4 treatments and 3 replications. The results showed that the highest growth in length and weight was shown in treatment D respectively 1.96 cm and 4.14 g, followed by treatment C amounting to 1.87 cm and 4.12 g, followed by treatment B 1.65 cm and 4.07, and the lowest in treatment A of 1.57 cm and 3.97 g. The results of the analysis of variability in humpback grouper seed weight showed that the addition of vitamin C, which had a different significant effect ($p < 0.05$), followed by the Least Significant Difference Test (LSD) obtained at each treatment was significantly different.

Keywords: Humpback grouper; seeds; *Chromileptis altivelis*; vitamin C; growth

Introduction

Humpback grouper (*Chromileptes altivelis*) aquaculture is growing rapidly considering the high consumer demand for this fish. Until now the main feed given in Humpback grouper cultivation still relies on trash fish, while the trash fish is still used by human as a source of animal protein. Therefore it has been tried to use alternative feed in the maintenance of Humpback grouper that is artificial feed in the form of pellets (Suwiryana, et al 2008). This artificial feed has several advantages such as nutrient content and ingredients can be adjusted according to the needs of fish, practical and can be provided in large enough quantities, sustainable and availability (Adelina, et al 2005).

Otohime feed is food that does not sink quickly to the bottom, feed that is not easily broken, the living media water of grouper does not get dirty quickly, and is good for the growth of grouper Humpback. Vitamins are nutrients that exist in micro quantities in the feed, but there must be available. Note because it plays a role in improving the survival of fish is vitamin C. Vitamin C is an organic compound that plays an important role in the process of food metabolism and physiology of fish. Although it is not a source of energy, vitamin C is needed as a catalyst for metabolism in the body. Conditions where fish have

vitamin C deficiency in feed will cause various symptoms of illness such as swimming without direction, pale body color and bleeding on the surface of the body (especially around the mouth, pectoral and abdominal fins), anemia (related to Fe metabolism) and increased mortality (Kato, et al, 1994 in Siregar, et al. 2009).

Vitamin C deficiency in Humpback grouper shows symptoms of bone bending, open gills, decreased blood hemoglobin content, susceptible to disease and decreased fish activity (Giri, et al 1999 in Siregar, et al. 2009). Other symptoms of vitamin C deficiency in fish are damage to collagen and supporting tissues. Collagen is a protein in fish with the highest concentration found in skin and bones (Sandes, 1991 in Siregar, et al. 2009).

This study aims to determine the effect of adding different doses of vitamin C to otohime artificial feed for the growth of humpback grouper (*Chromileptis altivelis*) seeds.

Research Methodology

This research was conducted in Brackish Fish Seed Development Center (BPBILP) at Lamu, Boalemo Regency, Gorontalo Province.

Variables observed in Humpback grouper are: absolute length growth, absolute weight growth, and

Average Daily Growth (ADG) calculated according to Cholik, et al., (2005)

Knowing the effect of the treatment tested then a variety analysis (ANOVA) was conducted. If the results of the analysis of variance tests show a significantly different effect between each treatment, then further tests are carried out, namely the Least Significant Difference Test (LSD).

Results and Discussion

Absolute growth

Average growth of absolute length and weight of humpback grouper (*Chromeleptes altivelis*) seeds for 28 days using four treatments namely treatment A without vitamins (control feed), treatment B with the addition of vitamin C by 2 gr, treatment C with addition of vitamin C by 3 gr and treatment D with the addition of vitamin C of 4 grams can be shown in Table 1. According to Miyasaki, et al. (1995) in Sunarto. et al, (2008) vitamin C can also prevent disease and is important for growth.

Table 1 Average growth rate of humpback grouper for 28 days.

Treatments	Average	
	Length (cm)	Weight (gr)
A control (0 gr)	1.57	3.97
B vitamin C (2 gr)	1.65	4.07
C vitamin C (3 gr)	1.87	4.12
D vitamin C (4 gr)	1.96	4.14

The low growth in the control treatment (without the addition of Vitamin C), that the nutritional content of the feed provided is not sufficient for the growth of Humpback grouper, lack of Vitamin C can also result in inhibited oxygen circulation so that the growth process of fish seed does not run normally. According to Sandes (1991) in Siregar and Adelina (2009), finding that Vitamin C plays an important role in helping the body's reaction to physiological stress, digestion.

Homing. et al. (1984) in Siregar and Adelina (2009) adding that Vitamin C plays an important role in the biosynthesis of cartinine in fish body tissues because it plays a role in the transfer of fatty acids into the mitochondria and subsequently fatty acids are oxidized to produce energy.

Humpback grouper seedlings which are given weeks with the addition of Vitamin C by 4 grams produce a high growth increase, the addition of Vitamin C in feed for Humpback grouper can increase appetite and metabolism of Humpback grouper seeds so as to increase growth. This is according to Keto. et al, (1994) in Siregar and Adelina (2009), which stated that lack of Vitamin C in fish feeds causes decreased fish appetite and loss of balance, even the mortality rate of fish increases if the feed is not given Vitamin C. The same thing is also found Suwirya. et al, (2008), that Vitamin C is needed by fish bodies to increase metabolism, resistance to environmental changes and disease.

Average Daily Growth (ADG)

The daily growth rate and length and weight of Humpback grouper seeds for 28 days using four treatments can be seen in (Table 2).

Table 2 Average daily growth of humpback grouper for 28 days

Treatments	Average	
	Length (cm)	Weight (gr)
A control (0 gr)	0.056	0.142
B vitamin C (2 gr)	0.058	0.144
C vitamin C (3 gr)	0.060	0.145
D vitamin C (4 gr)	0.070	0.148

Daily growth differed between treatments, which were supplemented with vitamin C which increased growth along with increased levels of vitamin C. This proves that vitamin C plays a role in increasing fish growth. In accordance with the opinion of Lovell, (1989) in Sunarto. et al, (2008) that vitamin C works to promote normal growth, prevent bone deformities, seed health or reduce stress, accelerate wound healing and immune abnormal metabolism of fat, such as reduced levels of long chain fatty acids and disruption of body fat use when not eating .

The results of analysis of variability in the length of Humpback grouper seeds showed that the addition of vitamin C, which had a different effect significantly different ($p < 0.05$) on the growth of Humpback grouper seed length. Furthermore, to determine the effect of each treatment, continued with the Least Significant Difference Test (LSD). The Least Significant

Difference Test Results (BNT) obtained that the growth of Humpback grouper length in each treatment of vitamin C addition was significantly different. The results of analysis of variance showed that the addition of vitamin C, which differed had a significantly different effect ($p < 0.05$) on the growth of body weight of Humpback grouper. Furthermore, to determine the effect of each treatment, continued with the Least Significant Difference Test (LSD). The Least Significant Difference Test (LSD) obtained that the growth of body weight of Humpback grouper seeds in each treatment of vitamin C addition was significantly different.

Water quality

The measurement of water quality during the maintenance of Humpback grouper seedlings shows that the obtained range results are still in the criteria of good water quality for the life of the Humpback grouper seeds. The results of water quality measurements can be seen in Table 6.

Table 6 Water quality measurements

No	Parameters	Measurement
1	Temperature	30 – 31 °C
2	pH	7 – 7,8
3	DO	5,6 – 6,28 mg / l
4	Salinity	34 – 35 ppt

Water quality measurements are carried out once a week by using temperature, pH, DO and Salinity measuring devices. Measurements were taken in the morning. The quality of water used during the research of Humpback grouper seedlings is supported by the application of a flowing water circulation

system, while also cleaning the bottom of the pan by means of siphon is carried out every day in the morning before water change, siphoning is done using a hose, after that the water is replaced i.e. by pulling out the outlet pipe which is at the edge of the pan up to 70%, then the water is added again.

The application of a circulating water flow system in a culture container follows the rules as in open water where the water quality is always in good condition. The source of water used is sea water from the waters of Tomini Bay. In accordance Minjoyo (1999) water quality standards for grouper maintenance are temperatures 28 - 32 °C, pH 7 - 8.5, salinity 30-33 ppt and dissolved oxygen > 4 mg / l. Furthermore, the Indonesian National Standard (SNI) 01-6488.2-2000, water quality in Humpback grouper seed production for temperatures ranging from 28 - 32°C, while salinity 28 - 35 ppt.

Conclusion

Addition of Vitamin C a dose of 4 grams gives the best results on the growth of Humpback grouper seeds (*Chromileptes altivelis*). The results of the analysis of variability in Humpback grouper seed weight showed that the addition of vitamin C at different doses had a significantly different effect ($p < 0.05$), followed by the Least Significant Difference Test (LSD) for each treatment obtained significantly different results..

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