



Growth Increase of Silver Pompano (*Trachinotus blochii*) Stimulated by Recombinant Growth Hormone (rGH) Addition on Their Commercial Feed

Wiwin Kusuma Atmaja Putra^{1*)} and Tengku Said Raza'i¹⁾

¹⁾Aquaculture Research Group-Research Laboratory, Raja Ali Haji Maritime University
Jl. Polytechnic, Senggarang, Tanjungpinang, Riau Islands Province, Indonesia

^{*)}Corresponding author : wiwinbungo@yahoo.com

Received 12 January 2017; Accepted 11 June 2018; Available online 30 November 2018

ABSTRACT

Addition of recombinant Growth Hormone (rGH) in commercial feed this study was conducted to determine the effect of the addition recombinant Growth Hormone (rGH) to the growth of Silver pompano. This research was conducted by experimental method with control treatment (without rGH), A treatment (dose 2 mg.kg⁻¹ of feed), B treatment (dose 3 mg.kg⁻¹ of feed), and C treatment (dose 4 mg.kg⁻¹ of feed) with 4 replications (15 tail for one replication). Data on absolute growth, specific growth, feed conversion ratio, survival rate, mortality and water quality parameters (dissolved oxygen; DO), pH, ammonia and temperature) were analyzed descriptive. The best results of this research were C treatment with absolute growth (19.9 g), specific growth (0.71 g.day⁻¹), feed conversion ratio (5.8) survival rate (16.67%) and mortality (83.33%). The water quality of the research media ranges: parameters DO (5.2-7.1 mg.L⁻¹), salinity (25-28 ppt), pH (6.8-7.1) and temperature (30-31.2 °C). The conclusions of this research were recombinant Growth Hormone (rGH) to increase the growth of Silver pompano fish be compared to control treatment.

Keywords: recombinant growth hormone; growth; silver pompano

1. Introduction

Growth is an important factor in fish farming. Factors that affect the growth of fish such as eating, environment, and hormones (Kawaroe et al., 2001; Sukmaningrum et al., 2014). Hormone that can stimulate growth is the growth hormone of one recombinant Growth Hormone (rGH). The addition of growth hormone recombinant fish giant grouper (rEIGH) at a dose of 3 mg.kg⁻¹ of feed to produce growth in a higher weight than the control (Sudrajat et al., 2013) showed that the RGH through the feed with the method of coating significantly can increase the growth rate of 46.85%. Zhao (2016) investigated the effect of amino acids with the title Effects of feeding frequency and dietary proteinlevels on juvenile allogynogenetic Gibel carp (*Carassius auratus gibelio*) var. CAS III: growth, feedutilization and serum free essential amino acidsdynamics. The purpose of this research is to determine the effect of the addition of recombinant Growth Hormone (rGH) to the growth of silver pempano fish.

2. Materials and Methods

Material

The research material was Fish Juvenil S. pompano fish as much as 360 tails with a size of 4±1cm and recombinant Growth Hormone (brand MinaGrow). The feed is brand Megami with a dose of 6% of the total body weight of each treatment every day.

Experimental design

This research used experimental method completely randomized design with four treatments and four replications (each replication stock contained 15 fish).

Treatment used in this study include:

- K : commercial feed (with out rGH)
- A : rGH dose of 2 mg.kg⁻¹
- B : rGH dose of 3 mg.kg⁻¹
- C : rGH dose of 4 mg.kg⁻¹

Table 1. Nutrient feed megami commercial brands

| No. | Code | Packing (Kg) | feed Size (mm) | protein (Min%) | Fat (Min%) | fiber (Max%) | Ash (Max%) | Moisture (Max%) |
|-----|------|--------------|----------------|----------------|------------|--------------|------------|-----------------|
| 1 | GR-1 | 20 | 1.4-1.9 | 46 | 10 | 2 | 13 | 0 |

S. pompano preparation

S. pompano fish juveniles were obtained from the Institute for Mariculture (BPBL) Batam with the average body length of 4±1 cm. *S. pompano* do acclimation feed and prevention against parasites by soaking it in fresh water.

Feed preparation

Commercial feed given and added rGH is a commercial feed Megami (Table 1). Dose rGH as much as 2, 3, and 4 mg dissolved in a solution of phosphate buffer saline (PBS) solution or physiological NaCl (infusion) of 30 mL for every 1 kg of feed, mixed with *coating* materials such as egg yolk as much as 2 g kg⁻¹ of feed, and then sprayed evenly to the test feed. Test feed stored in a container and put in *freezer* -20° C after dried aired.

Preparation floating net

Floating cages used by 2 pieces merk Aquatec (1 treatment = 4 replicates x 15 head = 60 head fish) as figure 2 shown below:

*Parameter research**Absolute growth*

Absolute growth calculated by the formula

$$L = (Wt + D) - Wo$$

Information:

L : Absolute growth (g)
 Wo : Weight of fish baseline (g)
 Wt : Weight of fish end of the study (g)
 D : Weights of dead fish (g)

Specific Growth Rate (SGR)

Specific growth rate (SGR) was calculated using the formula:

$$SGR = \frac{(Wt + D) - Wo}{t}$$

Information:

SGR : *Specific Growth Rate* (%)
 Wt : Weight of fish end of the study (g)
 D : The weight of dead fish (g)
 Wo : Weight of fish baseline (g)
 t : Time (days or hours)

Feed conversion ratio

Feed Conversion Ratio (FCR) was calculated by the following formula:

$$FCR = \frac{F}{(Wt + D) - Wo}$$

Information:

FCR : *Feed Conversion Ratio*
 F : Feed that is given (g)
 Wt : Weight of fish end of the study (g)
 D : Weights of dead fish (g)
 Wo : Weight of fish baseline (g)

Survival rate

Survival rate (SR) is calculated using the formula:

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

Information :

SR : Survival Rate (%)
 Nt : The number of fish at the end (tail)
 No : The number of fish in the early (tail)

Mortality

Mortality is the percentage of fish that died during the study and is calculated by the formula as follows:

$$\text{Mortality} = (\text{Dead Fish} / \text{number of fish}) \times 100\%$$

Water quality

Water quality parameters were observed among others: dissolved oxygen (DOmeter mg L⁻¹), water temperature (C), the pH value (1-14) and salinity (ppt)

3. Result and Discussion

The absolute growth of silver Pompano fish during the research can be seen in Figure 1:

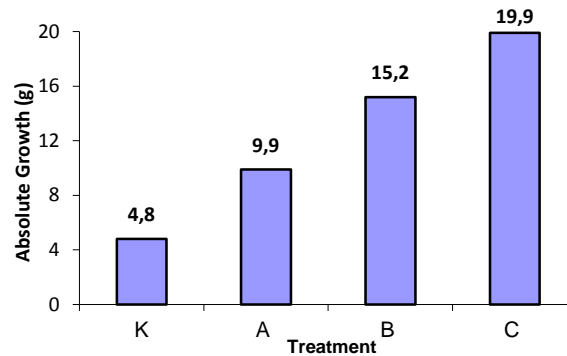


Figure 1. Growth absolute on silver pompano each treatment

The Specific Growth Rate of silver Pompano fish during the research can be seen in Figure 2:

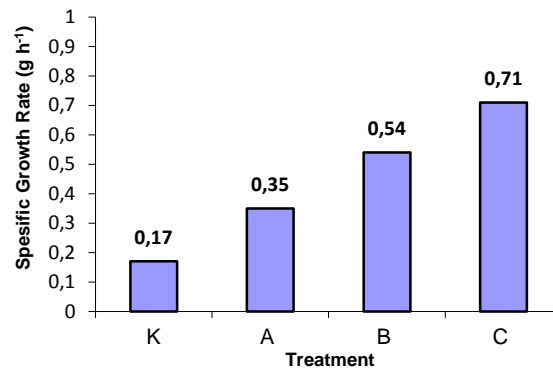


Figure 2. Specific Growth rate on silver pompano each treatment

The absolute growth of the best pompano silver fish is the C treatment (dose 4mg rGH kg⁻¹ of feed) 19.9 g of 30 day⁻¹ compared with the control treatment of 4.8 g day⁻¹. The best results of the three treatments were done by adding rGH with doseis 4 mg kg⁻¹ of feed which gives an increase in specific growth *S. pompano* of 0.71 g compared to the control treatment (with out rGH) was only able to increase specific growth (daily) at 0.17 g for 28 days (4 week).

The results show that any increase of dose RGH in will increase the absolute and specific growth rate of silver Pompano fish. Giving of recombinant Growth Hormone will increase glycogen in the liver, feed conversion and protein retention in fish. (Handoyo et al., 2012) studied in

eel and white shrimp, reported that growth hormone kertang grouper twice (in the larval and adult phase) showed better growth than one-time administration. High protein retention ability in rGH-treated fish compared with controls showed that GH could increase the utilization of non-protein (carbohydrate) nutrients as energy source (protein sparring effect). Furthermore, the role of GH in improving feed efficiency has also been reported in tilapia (Kobayashi et al., 2007). Growth hormone affects several aspects of behavior, including stimulating appetite, feeding behavior, aggression, and avoiding predators (J. P´erez-S´anchez, 2000).

Results of Parameter Feed Conversion Ratio (FCR) *S. pompano* can be seen in Figure 3.

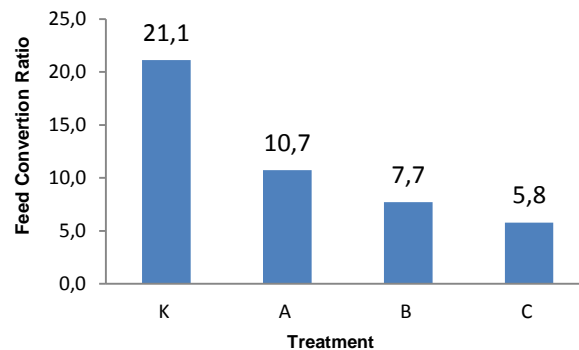


Figure 3. Feed Conversion Ratio Graph (FCR) Silver pompano each treatment

FCR value of best star bawal fish was at treatment C (4 mg kg⁻¹ feed) of 5.8 compared with control treatment of 21.1. Factors that affect the dose of rGH, digestibility, hormone administration and environmental factors. Oral administration of rGH through feed is efficient more growth of fish compared with injection and immersion. rGH administration by oral method is thought to enter the body through the digestive system and stimulates the pituitary gland to produce GH in greater quantities, then GH is channeled through the circulatory system to the target organ. Growth hormone can not only regulate food intake but can also at the pituitary or hypothalamus level to induce the release of growth hormone from somatotroph (Wong et al., 1993). The hormones that enter the fish are then channeled by blood circulation, and are absorbed by target organs, such as liver, kidneys, and other organs (Affandi & Tang, 2002). Fish feed mostly used as a source of energy and maintain body condition, while the rest is used for body growth. Energy is needed for metabolic processes, replace damaged cells (*maintenance*), physical activity, growth, and reproduction (Perez-Sanchez, 2000) and (Belfranin 2016). Energy requirements for *maintenance* must be met first, if the excess will be used for growth (Kalidas, 2012)

Data parameters of water quality waters in floating net cages which dissolved oxygen (5.2-7.1 mg L⁻¹), salinity (25-28 ppt), temperature (30-31.2°C) and neutral pH (6.8-7.1). Fish growth is influenced by internal and external factors. Internal factors include heredity, age, disease resistance, and the ability to use food. External factors include temperature, chemical factors that affect the aquatic environment dissolved oxygen, free carbon

dioxide, ammonia, and pH, as well as food provided (McMaster et al., 2005)

4. Conclusion

The best treatment in this study was C treatment (dose 4 mg kg of feed) compared with control treatment.

References

- Affandi, R., Tang, U. M. 2002. *Fisiologi hewan air*. Unri Press. Riau.
- Belfranin, Christina M. 2016. Growth performance of adult Florida pompano, *Trachinotus carolinus*, fed semi-purified diets with graded levels of methionine. *Open Access Theses*. 616. University of Miami.
- Handoyo., Boyun., Alimuddin., Bambang, N., Utomo, P. 2012. Pertumbuhan, konversi dan retensi pakan, dan proksimat tubuh benih ikan Sidat yang diberi hormon pertumbuhan rekombinan ikan Kerapu Kertang melalui perendaman. *Jurnal Akuakultur Indonesia* 11(2):132–40.
- Pérez-Sánchez. J. 2000. The involvement of growth hormone in growth regulation, energy homeostasis and immune function in the Gilthead Sea Bream (*Sparus Aurata*): A short review. *Fish Physiology and Biochemistry* 22:135–44.
- Kalidas, C. 2012. Survival and growth of juvenile silver pompano. *Indian Journal of Fisheries* 59 (3):95–98.
- Kobayashi, S.I. 2007. Transgenic Nile Tilapia (*Oreochromis niloticus*) over-expressing

growth hormone show reduced ammonia Excretion. *Aquaculture* 270 (1–4):427–35.

McMaster, M. F., Kloth, T.C., Coburn, J.F. 2005. Pompano mariculture in low salinity. 2nd International Sustainable Marine Fish Culture Conference and Workshop 9 p.

Kawaroe, M., Prartono, T., Saefurahman, G. 2001. Kepadatan dan laju pertumbuhan spesifik *Nannochloropsis* sp. pada kultivasi heterotropik menggunakan media hidrolisat singkong. *Omni-Akuatika* 11(2):15-19.

Sudrajat, Agus, Oman., Muhammad, Muttaqin. 2013. Efektivitas perendaman didalam hormon tiroksin dan hormon pertumbuhan rekombinan terhadap perkembangan awal serta pertumbuhan larva ikan Patin Siam *Jurnal Akuakultur Indonesia* 12(1): 33–42.

Sukmaningrum, S., Setyaningrum, S., Pulungsari, A.E. 2014. Retensi protein dan retensi energi ikan Cupang Plakat yang mengalami pemuasaan. *Omni-Akuatika* 10 (1): 1-10.

Wong, A.O. L., Chang, J.P., Peter, R.E. 1993. Dopamine Functions as a Growth Hormone-Releasing Factor in the Goldfish, *Carassius Auratus*. *Fish Physiology and Biochemistry* 11(1–6): 77–84.

Zhou, S., Han, D., Zhu, X., Jin, J., Yang, Y., Xie, S. 2016. Effects of feeding frequency and dietary protein levels on juvenile allogynogenetic gibel carp (*Carassius auratus gibelio*) var. CAS III: growth, feed utilization and serum free essential amino acids dynamics. *Aquaculture Research* 47 (1): 290-303.