

# Evaluation of Cinnamon (*Cinnamomum verum*) Administration to the Growth Performance of Tamba Fish (*Tor tambra*)

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**Keywords:** Cinnamon, Fish Feed, Growth Performance, Tamba Fish, *Tor tambra*.

**Abstract:** Fish feed is a substantial component in aquaculture. Cinnamon (*Cinnamomum verum*) is known as natural ingredient to improve physiological endurance. Research on evaluating the growth performance of Tamba fish (*Tor tambra*) by administering fish feed mixed with cinnamon powder has been conducted. The study aims to analyze the growth performance and survival rate of Tamba fish fed with different cinnamon concentrations. Completely Randomized Design (CRD) with nine replications and three treatments was chosen as experimental design. Tamba fish or *jurung* weighing  $\pm 50$  grams were maintained for three months. The treatments used were T1 (pellet feed without cinnamon); T2 (0.5% cinnamon pellet); T3 (Pellet with cinnamon pellet in a ratio of 1: 1). Each aquarium was filled with 10 Tamba fish. Data analysis includes specific growth rates, growth patterns, fish survival, and water qualities. The highest growth rate of tambra fish was obtained from T3 treatment with 0.266% or weight gain of 25.11 grams. The growth pattern of tambra shows a negative allometric growth pattern with a survival rate of 70-80%. Administration of cinnamon as feed supplement then is considered as effective formulation to improve the appetite of tambra fish.

## 1 INTRODUCTION

*Jurung* fish (*Tor* sp.) is a local Indonesian fish, especially in North Sumatra. This species belonging to the Cyprinidae family, have characteristics as fast swimmers, silvery-white body to black, living in waters with heavy currents and high dissolved oxygen levels. Demands on *jurung* fish for consumption have increased their catchment from the wild. Therefore, to maintain its population in nature, domestication needs to be conducted, including through intensification of fish feed technology. Domestication of *jurung* is needed to support the cultivation of fish especially in the undeveloped North Sumatra.

Fish feed is an important component in aquaculture. The need for sufficient energy can only be fulfilled through proper feeding to maintain the survival and growth of the fishes. According to Kompang, (2000), the availability of fish feed as a source of energies, e.g protein, fat, carbohydrates, vitamins and minerals, are important for the longevity of the fishes. Research by Sunarto and Sabariah (2009) on the growth of other *jurung*

species or *Tor douronensis* showed the highest growth by 6% of biomass per day.

*Jurung* is an omnivorous fish, commonly feed on both plant and animal feeds, including plant residues, insects, mollusks, fruits, detritus and plankton (Rupawan, 1999; Haryono, 2006). Good fish feed quality will be able to spur the growth rates and fish survival. Therefore it is necessary to add nutritious composition to the feed in order to increase the adaptability of fish.

Cinnamon (*Cinnamomum verum*) is a natural ingredient from plants, often used to increase physiological endurance. Phytochemicals contained in cinnamon include essential oils, cinnamadehid, eugenol, calcium oxalate, flavonoids, saponins and other nutritional content such as sugar, protein, crude fat and pectin (Gunawan and Mulyani, 2004). Addition of cinnamon leaf extract by 1 g / kg of feed reduced the levels of fat, cholesterol and triglycerides in catfish meat (*Pangasianodon hypophthalmus*) (Setiawati, et al., 2016).

Cinnamon may also function as an appetite enhancer. The ability of fish to consume feed well, will determine the survival rate and growth of fish weights. Therefore, the addition of cinnamon powder

to fish feed to analyze survival / survival and ability to add weight (growth rate) needs to be evaluated in order to improve the aquaculture of *jurung* fish.

## 2 MATERIALS AND METHODS

### 2.1 Experimental Design

Experimental design used in this study was the Completely Randomized Design with 9 replications. The treatments in this study are: T1 treatment (pellet feed); T2 (0.5% cinnamon pellet); T3 (Pellet + cinnamon pellet in a ratio of 1:1). The aquariums used are 50 x 40 x 30 cm in size, 27 of which are filled with 10 fish.

### 2.2 Fish Sample

*Jurung* fish used in this study were obtained from the natural streams weighing 40-50 g/individual. Prior experimentation, all fishes are acclimatized for 1 week by feeding them the commercial pellets. The aquarium is filled with tap water until 50% of the height.

### 2.3 Fish Feed Formulation

Fish feeds used in experiment was the commercial pellets for fish growth. Feed in the form of corn granules, derived from dried local corn, was crushed into small granules. A 0.5% cinnamon feed was formulated by mixing 0.5 gram cinnamon powder and 100 gram commercial pellet (Tarigan, 2017). The formulation was then mixed with progol (3-5 g/kg of feed) as cinnamon adhesive in feed. The formulation is added with 150 mL of water per kg of feed. The formulations were stirred evenly and dried in ambient temperature ( $\pm$  60 minutes).

### 2.4 Fish Treatment

During experiment, *jurung* fishes were fed twice a day for 5% of body weight. Water volume was replaced based on waste disposal volume. Body weight was measured in the interval of 2 weeks. Water quality was measured daily (dissolved oxygen, pH, water temperature) and twice a week (NH<sub>3</sub>, PO<sub>4</sub>, BOD<sub>5</sub>).

## 2.5 Data Analysis

Data obtained in this study were length-body weight of fishes measured using standard caliper and analytical scale, the survival rate (Huisman, 1988), specific growth rate (Huisman, 1988), and growth pattern (Effendi, 2002).

## 3 RESULTS AND DISCUSSIONS

Provision of different cinnamon concentration in fish feed showed differences in body weight of *jurung* at the end of the study. Formulation of T3 produced the highest increase of 25% compared to other feed compositions (Figure 1, Table 1). The addition of optimum cinnamon powder favored the fish appetite. In contrary, the addition of higher cinnamon powder render fish to consume the pellets.

Table 1: Mean body weight and specific growth rate (SGR) of *jurung* during observation.

Treatment	Body weight (g)	SGR (%)
T1	17,57	0,176
T2	15,69	0,175
T3	25,11	0,266

Cinnamon is a natural ingredient with strong aroma. Formulation and provision of cinnamon into this fish feed will also increase the aroma of the fish feed, which is thought to be less likeable by *jurung* fish leading to decrease of fish appetite. Kurnia et al. (2002) stated that the aroma of fish feed should mimic the natural appearance of their prey in the wild.

The survival rates of *jurung* in all treatments are still considered as normal although the lowest percentage was obtained from T3 (Table 2). The growth of *jurung* fish during rearing in aquarium shows a negative allometric growth pattern with a value of  $b = 2.67$  (Figure 2). The growth rate of fish can be explained by measuring the fish's length-weight relationship (Muchlisin et al., 2010).

According to Jobling (2002), the value of  $b$  obtained less than 3 indicates that the weight gain of fish is smaller than the length of growth so that the fish look slimmer. Negative allometric patterns can be caused partly by the physico-chemical conditions of the environment, food availability, and fish behavior. Environmental factors and fish behavior are thought to have the greatest contribution on the growth patterns of *jurung* fish. *Jurung* fish including

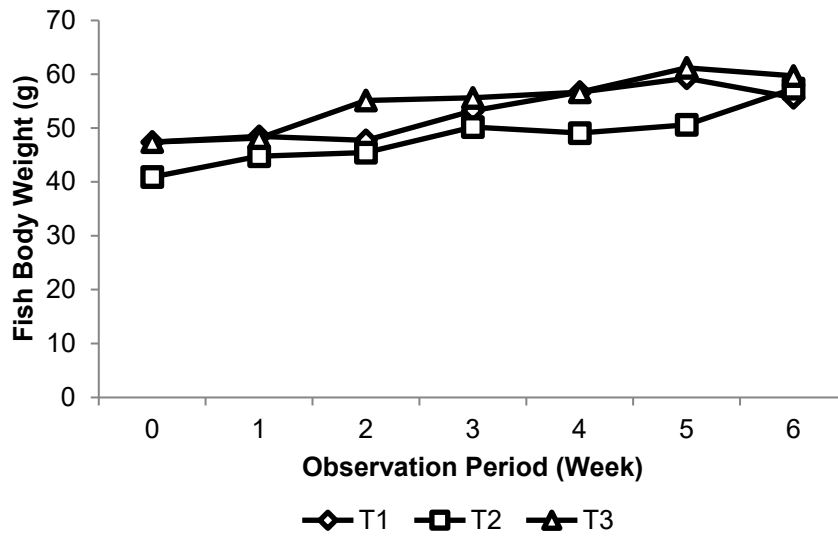


Figure 1: Profile of *jurung* body weight (gram) during observation period.

Table 2: Survival rates (%) of *jurung*

Treatment	N	Observation period						Survival rate (%)
		1	2	3	4	5	6	
T1	10	8	8	8	8	8	8	80
T2	10	8	8	8	8	8	8	80
T3	10	8	8	8	7	7	7	70

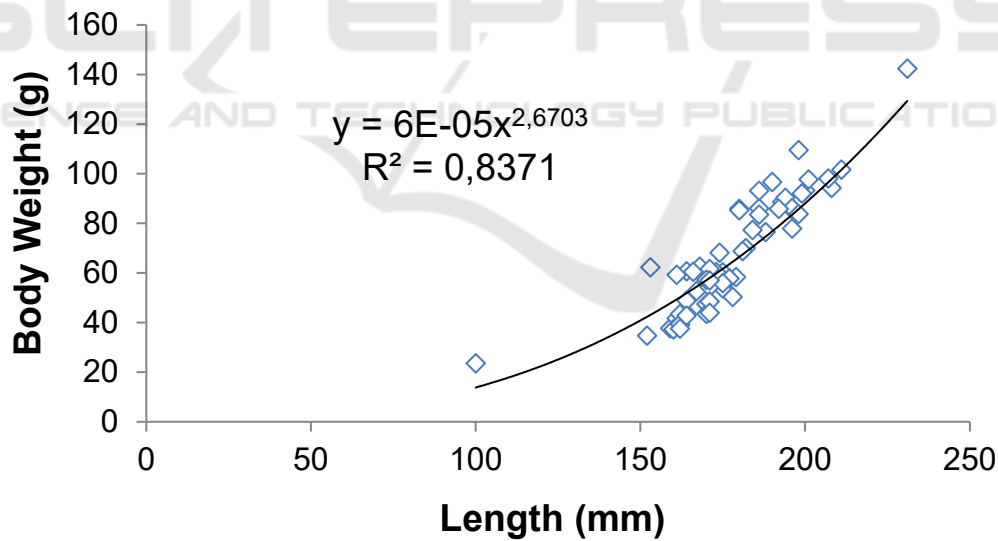


Figure 2: Growth pattern of *jurung* fish after provision of cinnamon feed formulation.

active swimmer fish that allows a lot of energy used to move. This is consistent with the statement from Shukor et al. (2008), and Muchlisin et al. (2010) that fish that are classified as active swimmers have lower *b* values because swimming activities require greater energy.

#### 4 CONCLUSION

The highest weight gain was obtained from the T3 treatment of cinnamon (1:1) with a negative allometric growth pattern and a survival rate of 70-

80%. Giving the mixture of cinnamon in the feed can increase the appetite of *jurung* fish.

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