Abnormalities of hybrid grouper (*Epinephelus fuscoguttatus* x *Epinephelus lanceolatus*) in Situbondo

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Abstract. Grouper is one of consumption fish which is demanded excessively by local consumers and foreign consumers. Hybridization of grouper has been performed considerably that produce the good genetic quality of hybrid variants. One of grouper fish which has good genetic in its growth is kertang grouper fish. Nowadays many hatcheries performing hybridization between kertang grouper fish and tiger grouper fish, however observation of the hybrid abnormality has not been performed yet. Abnormality is able to increase since genetic causes, so that observation of abnormality occurrence in cantang hybrid grouper fish in Situbondo, Jawa Timur, Indonesia in May – July in 3 times grading of juvenile stadia was performed. Results showed abnormalities were observed on mouth and operculum, branched of neural arch, fusion of neural arch, fusion of posterior truncus vertebrae, fusion of caudal vertebrae, fusion of anterior truncus vertebrae.

1. Introduction

Groupers are one of the main marine aquaculture commodities. Although they are relatively expensive, but there is a high demand for it. Hybridization carried out on various species of grouper has resulted in several types of hybrid groupers, which have more advantages than its original type. Cantang grouper is a type of hybrid grouper cultured by fish farmer. It is the result of hybridization between tiger grouper and kertang grouper. The main advantage of cantang grouper is its fast growth with low FCR compared to tiger grouper or kertang grouper. The interest from fish farmers for grouper breeding is increasing, but the occurrence of abnormalities in the hybrid variety had never been observed. Abnormalities may increase due to genetic and environmental factors. Many factors still need to be assessed to suppress abnormalities, such as genetics, the environment, diseases, treatment, and maintenance conditions [1,2,3,4,5]. Therefore, it is necessary to conduct a study on type of abnormalities in hybrid grouper that is cultivated in hatcheries in Situbondo, East Java.

2. Methodology

This research was carried out in cantang grouper hatchery located in Situbondo, East Java. The survey was conducted for 3 months, from June to August 2017. Materials used included KOH 35% and 40%,...
glycerin, Alizarin Red S, alcian blue, 96% alcohol, and fish feed. Observations were made including juvenile maintenance, grading at several juvenile ages, and seed harvesting. Juvenile maintenance was started 1 month after hatching (D30), which was the time for early grading of juvenile maintenance. Grading was conducted in 3 stages, when the juveniles aged 60 days; 67 days, and 74 days. Each stage of grading was carried out by taking sample as much as 30% of the population to know the type of abnormality that had occurred. The type of disability occurred was used as additional information. The bone and cartilage staining was conducted using Alizarin Red S and alcian blue to provide a picture of abnormality that occurs in the vertebra and fins of cantang grouper.

3. Results and Discussion

3.1. Results
Survey was conducted on juvenile maintenance and divided into 3 times of grading. The first grading was conducted when the juveniles entered the age of 60 days, which consisted of 3 size variations, the first category of size was 1.8-2 cm with population density of 150.000. The second size category was 2.1-2.3 cm with a population density of 150.000. The third size category was 2.4-2.5 cm with a population density of 200.000. The second grading was conducted 1 week after the first grading (Day 67), consisting of 3 variations of size: 2.4-2.6 cm; 2.7-2.8 cm; > 2.9 cm, with a population density of 100.000. The third grading was conducted 1 week after the second grading (Day 74) covering 3 variations of size: 2.6-2.8 cm; 2.9-3.1 cm, and 3.2-3.3 cm, with a population density of 100.000. Abnormalities of hybrid grouper are presented in table 1.

Table 1. Type of hybrid grouper abnormality (Epinephelus fuscoguttatus x Epinephelus sp.) cantang in Situbondo- East Java.

| Grading | Dense Stocking | Size of Juvenile (cm) | Type of Abnormality |
|---------|----------------|----------------------|--------------------|
| I       | 150.000        | 1.8-2                | Mouth abnormality. opeculum abnormality. |
| I       | 150.000        | 2.1-2.3              | Mouth abnormality. opeculum abnormality. |
| I       | 150.000        | 2.4-2.5              | Mouth abnormality. opeculum abnormality. neural arch fusion |
| II      | 100.000        | 2.4-2.6              | Branches of neural arch. neural arch fusion |
| II      | 100.000        | 2.7-2.8              | Branches of neural arch |
| II      | 100.000        | >2.9                 | Fusion of posterior truncus vertebrae. fusion of anterior truncus vertebrae |
| III     | 100.000        | 2.6-2.8              | Fusion of posterior vertebrae. fusion of anterior truncus vertebrae |
| III     | 100.000        | 2.9-3.1              | Fusion of caudal vertebrae. fusion of anterior truncus vertebrae |
| III     | 100.000        | 3.2-3.3              | Fusion of posterior vertebrae |
3.2. Discussion

The survey results showed that abnormality incidence consisted of several types of disabilities in several different sizes. Abnormality is an irreversible irregularity that is caused by changes in quality of morphology, etiology, and physiology [6]. On the other hand, abnormality comes from mutations and teratogenicity effects damage environmental factors (water temperature, oxygen solubility, salinity, and parasitic infections) [7]. Abnormalities of the cephal (mouth and operculum) occurred in smaller fish (1.8-2.5 cm) and vertebral defects occurred in larger fish (> 2.5 cm). The abnormality of oral performance might cause the fish to not respond to feeding properly, which may lead to death. Abnormalities in the mouth were usually found just after the fish grew into spindles. Allegedly, other than genetic factors, abnormality can also be caused by nutritional factors of the feed that can lead to malnutrition, which triggered the occurrence of abnormalities in the mouth [8]. The defective fish had difficulty in getting the feed, so the fish growth was slow with low endurance that made them easily get attacked by disease [9]. Poor aquatic environment conditions will result in a decrease or abnormality of aquatic organisms that live in it [10].

Some researchers argue that marine fish seeds produced from hatcheries have many abnormalities caused by many factors such as nutritional deficiencies [11], including deficiency of vitamin C and vitamin D or phospholipids. Moreover, tryptophan may cause unnatural bone growth [12, 13]. The vertebral deformities in fish were in the form of lordosis, kyphosis, scoliosis, spinal fusion, and mandibular joint deformity. Vertebral abnormalities in fish are caused by chemical pollutants, nutritional deficiencies, disease and genetic infections [14]. The vertebrae abnormalities in Hippoglossus hippoglossus fish were in the form of branching in neural spine bone and haemal spine caused by environmental factors and malnutrition [15].

4. Conclusion

Abnormalities on hybrid grouper fish occurred in a hatchery in Situbondo, East Java. The form of abnormalities found were those on mouth and operculum, branched neural arch, fusion neural arch, fusion posterior truncus vertebrae, fusion of caudal vertebrae, and fusion of anterior truncus vertebrae.

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