



DETERMINATION OF DIGESTIVE ENZYME ACTIVITY IN GILT-HEAD SEA BREAM (*SPARUS AURATA*) FEEDING WITH COMMERCIAL FEED

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Abstract: With the increase in the world population, aquaculture has a very important place in meeting the protein needs of humanity. Today, fish farming is developing rapidly depending on the increase in demand. Fish is one of the most important foodstuffs for human nutrition. Studies on the quality and characteristics of the feeds used gain importance with the increase in the knowledge about the nutrient sources of fish. It is known that there is a linear correlation between growth, productivity and feed efficiency in fish like another animal. At this point, the correct and effective use of feed, which is the most important input in production, is very important in terms of increasing the yield and product quality to be obtained from the product and reducing production costs. The identification of digestive enzyme activities is important in developing new feeding regimens and in ensuring optimal growing conditions. As most enzymes regulate the events of viability, the increase or decrease in their activity causes the degradation of the normal functions of fish and diseases in fishes. In this study, body weight and changes in digestive enzyme activity were investigated in sea bream feeding with commercial feed. For this purpose, a total of 3000 juveniles with an initial mean weight (IW) of 2.72 ± 0.78 g were divided into 4 tanks (2000 L). After the six weeks final weight was 7.75 ± 0.67 at the end of experiment. While trypsin activity was increased until the end of the experiment, amylase activity was decreased. On the other hand, small decreases in lipase activity were observed throughout the experiment.

Keywords: Commercial feed, Enzyme activity, Lipase, Trypsin

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1. Introduction

The major aim of aquaculture applications is to ensure sustainable aquaculture production with high growth performance to encounter human food consumption (Navruz et al., 2020). Aquaculture is one of the growing food industries in the world. One of the biggest reasons for this growth is the increase in demand for fisheries (Michael et al., 2014). A lot of research has a grand extent on an improved information about feeding habits, nutritional requirements and digestive capabilities in different species on cultured marine fish. In this sense, a great number of studies on digestive enzymes of marine fish have been applied (Alarcon et al., 2001). The growth performance of fish rely on the enzyme activity of the digestive system and their capacity to digest protein, fat and carbohydrates (Shan et al., 2008). Gilthead sea bream (*Sparus aurata*) is one of the most delicious and valuable marine fish species. (Suzer et al., 2008). Its Latin name gets from the characteristic golden band among its eyes, live in marine waters as well as in the brackish waters of coastal lagoons. Gilthead sea bream is one of the key constituent of aquaculture. So, the aim of this work was to evaluate effect of commercial feed and study

their effect a body weight and digestive enzyme activity on gilthead sea bream.

2. Material and Methods

The experiment was applied at Marine Research Station of Fisheries Faculty, University of Çukurova, Yumurtalık, Turkey. This study was carried out in 2016. Gilthead sea bream juveniles were supplied by Akuvatur Hatchery (Adana, Turkey). A total of 3000 juveniles with an initial mean weight (IW) of 2.72 ± 0.78 g were stocked into 4 tanks (2000 liters). Fish were hand-fed with a commercial diet (Çamlı Feed Ltd., Turkey, 2 mm; 49% crude protein, 19% crude fat, 12% moisture and 13% ash) three times daily at 08:00, 12:00 and 16:00 h during the six weeks. Also, in every two weeks interval fish weight measurements, 5 fish were taken from the each tank for enzyme analysis.

2.1. Enzyme analysis

Trypsin activity was assayed at using method of Holm et al. (1988). Amylase activity was measured for Métails and Bieth (1968), using 0.3% soluble starch dissolved in Na₂HPO₄ buffer pH 7.4 as substrate. Lipase activity (U/ml) was defined as the μ mol of substrate hydrolyzed



per min per ml of enzyme extract (Iijima et al., 1998).

3. Results

Variation of fish body weights observed at measurement periods (every two weeks) during the study is given in Figure 1. Final weight was 7.75 ± 0.67 gr. While the Trypsin activity was increased until the end of the experiment, amylase activity was decreased. After the six weeks, Trypsin activity was 1.55 ± 0.19 (U/ mg protein). Amylase activity was 36.42 ± 0.95 (U/mg protein). On the other hand, small decreases in lipase activity were observed throughout the experiment. Lipase activity was 53.66 ± 0.19 (U/ mg protein). The activity of amylase, lipase and trypsin enzymes in gilthead sea bream is shown in Figure 2.

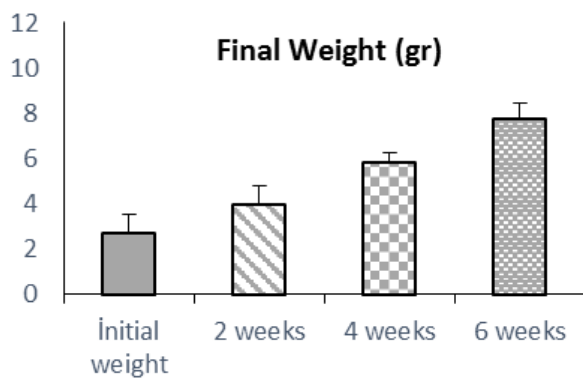


Figure 1. Changes in body weight (g) of sea bream juveniles.

4. Discussion

Digestive enzymes affect the digestion capacity of food by providing digestion. Therefore, the development of the fish is provided. The relationship between feeding frequency and feed use constitutes the basis of economical feeding in aquaculture. (Blier et al., 2008; Ling et al., 2010). Intestinal absorption ability of feed intake also effects nutrient utilization (Wen et al., 2009) Growth heterogeneity limits feed use and absorption in the intestinal. For example, production of Eurasian perch and yellow perch (*P. flavescens*) have a problem (*P. flavescens*) (Langeland et al., 2013). In this study, the objective was to compare digestive enzyme activities of gilthead sea bream (*Sparus aurata*) feeding with commercial feed to evaluate if differences in growth rate could be related to digestive enzyme activity. Growth capacity in fish can be controlled by environmental and physiological factors (Blier et al., 2008) In Atlantic cod (*Gadhus morhua*) (Lemieux et al., 1999) and Atlantic salmon (*Salmo salar*) (Torrissen and Shearer, 1992). Digestive enzymes play a key role in digesting nutrients and digestive capacity has been found to relation with the growth (Gisbert et al., 2004; Slack, 1995). Enzymes activities mirror digestive capacity and influence fish

growth rate (Blier et al., 2008; Ling et al., 2010) Trypsin activity has been shown to have an effect on growth rate. The activity of digestive enzymes is considered as a significant indicator for fish growth and the level of digestive enzyme depends on the capacity of digestion absorption of nutrients which affects the development and the growth in fish (Wei et al., 2010). As digestion efficiency in fish depends on a good digestive functionality able to optimize the hydrolysis and absorption of nutrients (Kokou and Fountoulaki, 2018). Digestive enzymes played an important role in the hydrolysis of proteins, lipids and carbohydrates in the conversion of digested foods. These nutrients have been transported into the tissues and changed into material or energy for the growth (Furne et al., 2005). Similarly, present findings in our study supported that trypsin. Trypsin activity was increased with weight gain in study. Low amylase activity in carnivorous fish is the general assumption (Hidalgo et al., 1999; Krogdahl et al., 2004).

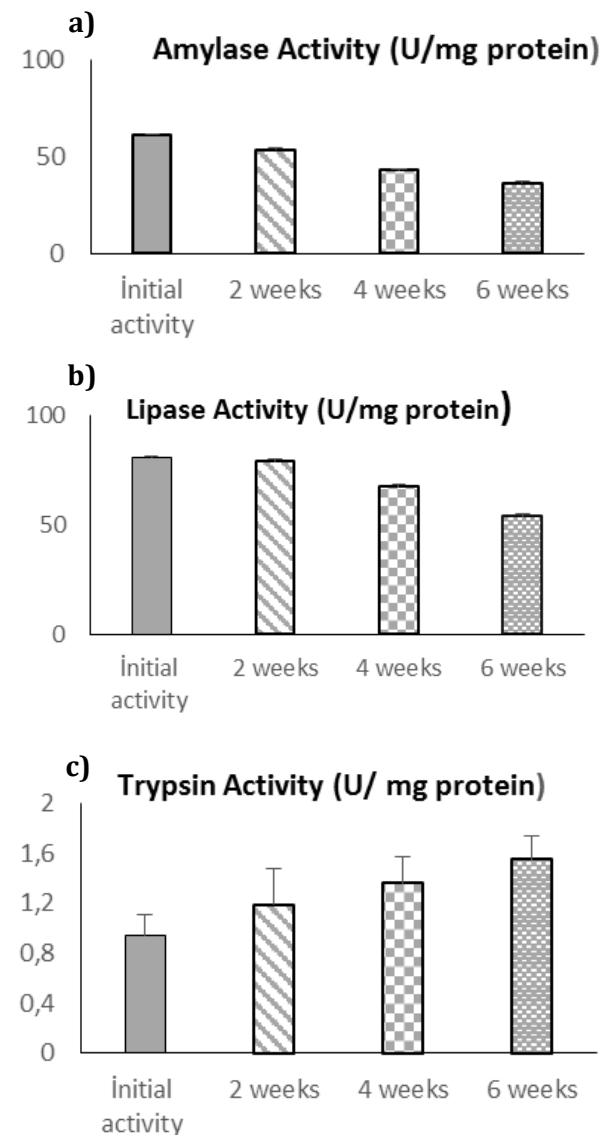


Figure 2. Changes in enzyme activities (U/ mg protein) of sea bream juveniles. a) Amylase, b) Trypsin and c) Lipase

As a carnivorous species, gilthead sea bream has low amylase activities in the liver and intestine compared to carp (*Cyprinus carpio*) and gold fish (*Carassius carassius*) (Hidalgo et al., 1999). Amylase activity was decreased throughout the experiment. Small decreases in lipase activity were observed throughout the experiment. Aliyu-Paiko et al. (2010) and Li et al. (2012) stated that Lipases are inducible enzymes which could be stimulated by the dietary lipid content. Similarly, Ma (2014) described that fish fed showed the positive correlation between lipase activity and dietary lipid content.

5. Conclusion

The main objective of aquaculture practices is to provide sustainable aquaculture production with high growth performance to meet human food consumption. The present work presents the importance effect of using commercial feed on digestive enzyme in aquaculture to enhance growth which is an important aspect in eco sustainability of aquaculture.

Author Contributions

All task made by single author and the author reviewed and approved the manuscript.

Ethical Approval

A retrospective ethics permit is not required for the articles, which were produced from used master/doctorate or research studies before 2020.

Conflict of Interest

The author declared that there is no conflict of interest.

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