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GROWTH PERFORMANCE OF BLACK NILE FISH (*Oreochromis niloticus*) WITH A COMBINATION OF COMMERCIAL FEED AND INDEPENDENT FEED AT THE P2MKP FISH BOSTER CENTER, BUNCITAN VILLAGE, SEDATI DISTRICT, SIDOARJO REGENCY, EAST JAVA PROVINCE

Performa Pertumbuhan Ikan Nila Hitam (*Oreochromis niloticus*) dengan Pemberian Kombinasi Pakan Komersial dan Pakan Mandiri Pada P2MKP Fish Boster Centre Desa Buncitan Kecamatan Sedati Kabupaten Sidoarjo Provinsi Jawa Timur

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ABSTRACT

The fisheries sector supports food security, one of which is through black tilapia cultivation which has many advantages. The study was conducted at the P2MKP Fish Boster Center to assess the effect of using a combination of commercial and independent feed on the growth of black tilapia, to find an alternative feed that is efficient, economical and supports optimal growth. The study was conducted at the P2MKP Fish Boster Center, Sidoarjo, using survey and internship methods. Activities include pond preparation, seed distribution, provision of a combination of commercial and independent feed, and monitoring the growth and health of black tilapia. Data were collected through observation, interviews and documentation and analyzed descriptively quantitatively. The water quality in the black tilapia pond was monitored well with a temperature of 28ºC - 33ºC, pH 8 and DO 4.3 - 4.62 ppm. Growth showed optimal results: SGR 1.29, absolute weight 198.75 grams, absolute length growth 20 cm, Survival Rate 85% and FCR 1.1. Commercial feed is used at the beginning of maintenance, then will be replaced with independent feed for cost efficiency. Research at P2MKP Fish Boster Center shows that a combination of commercial and independent feeds increases the growth of black tilapia better than single use. This combination can also optimize resources, reduce dependence on commercial feeds, and be an alternative for farmers in increasing the productivity of black tilapia cultivation.

Keywords: Black Tilapia, Commercial Feed, Feed Efficiency, P2MKP Fish Booster Centre, Self-Made Feed

ABSTRAK

Sektor perikanan menjadi pendukung ketahanan pangan, salah satunya melalui budidaya nila hitam yang memiliki banyak keunggulan. Penelitian dilakukan di P2MKP Fish Boster Centre guna menilai pengaruh penggunaan kombinasi pakan komersial dan mandiri terhadap pertumbuhan ikan nila hitam, menemukan alternative pakan yang efisien, ekonomis dan mendukung pertumbuhan optimal. Penelitiann dilaksanakan di P2MKP Fish Boster Centre, Sidoarjo, dengan menggunakan metode survey dan magang. Kegiatan mencakup persiapan kolam, penebaran benih, pemberian kombinasi pakan komersial dan mandiri, serta pemantauan pertumbuhan dan kesehatan ikan nila hitam. Data dikumpulkan melalui observasi, wawancara dan dokumentasi dan dianalisis secara deskriptif kuantitatif. Kualitas air pada kolam ikan nila hitam terpantau baik dengan suhu 28ºC - 33ºC, pH 8 dan DO 4,3 – 4,62 ppm. Pertumbuhan menunjukkan hasil yang optimal: SGR 1,29, bobot mutlak 198,75 gram, pertumbuhan panjang mutlak 20 cm, *Survival Rate* 85% dan FCR 1,1. Pakan komersial digunakan pada awal pemeliharaan, lalu akan diganti dengan pakan mandiri guna efisiensi biaya. Penelitian di P2MKP Fish Boster Centre menunjukkan bahwa kombinasi pakan komersial dan mandiri meningkatkan pertumbuhan ikan nila hitam lebih baik dibandingkan penggunaan tunggal. Kombinasi ini juga dapat mengoptimalkan sumber daya, mengurangi ketergantungan terhadap pakan komersial, serta menjadi alternatif bagi pembudidaya dalam meningkatkan produktifitas budidaya ikan nila hitam.

Kata Kunci: Efisiensi Pakan, Ikan Nila Hitam, Pakan Komersial, Pakan Mandiri, P2MKP Fish Boster Centre

INTRODUCTION

One of the sectors that supports food security is the fisheries sector. Efforts made to maintain health in the fisheries sector by maintaining the stability and continuity of fish production in an area (Susanto *et al.*, 2020). Black tilapia (*Oreochromis niloticus*) is one of the superior freshwater fish commodities because black tilapia has rapid growth, high protein content, high adaptability to the environment including disease and stress, can be maintained at high densities, and can accept natural feed and artificial feed (Hendriana *et al.*, 2022). Commercial feed produced by factories has good quality but is expensive, this causes an increase in the prices of fishery products which will later be borne by consumers (Bibin *et al.*, 2021).

The Independent Marine and Fisheries Training Center (P2MKP) was founded by Mr. Eka Jaya Tjioe, the head of PT. Indosco Dwi Jaya Sakti, which started its cultivation activities in 2013. This training center is the center for research on cultivation systems using booster products ranging from medicines to multivitamins. Before this training center, PT. Indosko Dwi Jaya Sakti conducted research in ponds spread across East Java. The research site of PT. Indosko Dwi Jaya Sakti on April 30, 2014 was officially designated as the Independent Training Center for Marine and Fisheries based on the decision of the Head of the Marine and Fisheries Human Resources Development Agency and was named the Fish Boster Center.

The purpose of this study was to determine the growth performance of black tilapia by providing a combination of commercial feed and independent feed and to assess the potential of independent feed in supporting fish growth and comparing it with the commercial feed used. This study provides information related to the selection of more efficient and economical types of feed and this research contributes to the development of feed technology in the fisheries industry.

The formulation of the problem in this study is how the combination of commercial feed and independent feed affects the growth performance of black tilapia at the P2MKP Fish Boster Center. This study aims to determine the extent of the impact of the combination of commercial

feed and independent feed on the growth rate of black tilapia, both in terms of weight, length and health of the fish. In addition, this study also identifies the use of independent feed can be better than commercial feed in supporting optimal tilapia growth.

The hypothesis in this study is that providing commercial feed and independent feed will result in better tilapia growth compared to only providing one type of feed, namely commercial feed. Based on this assumption, it is expected that black tilapia given a combination of commercial feed and independent feed will show a significant increase in weight, length and health conditions compared to black tilapia that are only given commercial feed. This hypothesis is based on the assumption that independent feed can provide additional benefits in supporting optimal fish growth.

METHODS

Time and Place

This research was conducted from October 1 to December 13, 2024 at the P2MKP FISH BOSTER CENTER, Buncitan Village, Sedati District, Sidoarjo Regency, East Java Province. Research method This research uses a survey and internship method, which is a method that shows a fact or characteristic of a population actually and accurately in order to find elements, characteristics, properties, or existing problems (Sulastri & Arshad, 2017). Data were collected through observation activities, documentation, interviews, and direct participation in observation activities on the effect of providing a combination of commercial feed and independent feed on the growth performance of black tilapia. This research activity includes preparation of containers and media, selection and distribution of seeds, feed management, water quality management, monitoring of growth and health, pest and disease control, harvesting and post-harvest

Tools and Materials

The tools used in this study include TDS, scales, rulers, commercial feed, independent feed, scoops, DO meters, secchi disks, water pumps, blowers, uniring, waring and cameras. The materials used for the study were all tilapia in the concrete pond.

Research Procedure

Preparation of containers and media

Container preparation is carried out by reducing the water in the pond until it runs out. Then the remaining ammonia that is still in the pond is pushed using a rubber mop towards the central drain. In addition to using a rubber mop, this process also requires flowing water to speed up the pond cleaning process. The water used comes from a river near the pond. After the cleaning process is complete, the pond is filled to a height of 90 cm using water from a treated reservoir. The water used to fill the pond comes from treated river water (Rizky *et al.*, 2022). The water is left for a day and then the next day the fermentation will be spread to stimulate plankton growth and improve water quality (Setianingrum *et al.*, 2025). The water in the feeding pond is left for 3 days and then the fish are spread.

Seed Selection and Spreading

The seeds were taken from the Pasuruan area, totaling 32,000 with a stocking density of 80 fish/m^2. Before being spread, the fish were acclimatized in the pond for 15 minutes (Permatasari *et al.*, 2025). After 15 minutes the fish will be spread into the pond. Spreading is done slowly by opening the seed plastic one by one. After that, the plastic will be left open but the plastic is tilted so that the seeds in the plastic will come out slowly (Fitri *et al.*, 2025). This procedure is carried out to reduce stress on the seeds.

Feed Management

The feed is weighed using a digital scale to adjust to the fish feeding schedule. Then the feed will be mixed with Grotop 3 gr/kg feed, Progol 3 gr/kg feed, Vita Liquid 5 ml/kg feed, Amino 5 ml/kg feed and water 80 ml/kg feed for reference for treatment has been listed on each product label. The treatment in feed mostly contains amino acids which function to optimize performance in fish without sacrificing growth performance and reducing negative nutritional impacts (Wangkahart *et al.,* 2023). After the treatment is mixed into the feed, the mixed feed is stirred by hand and then left in a spread condition on the feed sack for 5-10 minutes so that the effect of vitamin administration is more optimal. The addition of probiotics to the feed can increase feed efficiency, fish growth rate and feed consumption (Mudiarti *et al.,* 2025). Feed can be spread directly into the pond. Feeding is done 2 times a day, namely in the morning and evening. The amount of feed is 3% of the total weight of fish in the pond (Bujang *et al.,* 2025).

Growth and Health Monitoring

Disease attacks can cause a decrease in fish quality, increase production costs and cause fish deaths, either small or large (Mendrofa *et al.,* 2025). Growth and health monitoring is carried out once a week (Bujang *et al.,* 2025). Fish in floating nets will be measured for length and width and weighed to determine their weight. Not only that, the health of the fish will be checked through visual observation. This observation is carried out by lifting the cage to make it easier to take fish from the pond. Then the fish will be taken and weighed simultaneously until they reach 1 kg after reaching 1 kg the fish are returned and calculated to determine the average weight of the fish. Then 1 fish will be taken as a sample for measuring length and width.

Pest and Disease Control

By understanding several types of diseases in tilapia, implementing good cultivation and careful monitoring can minimize the risk of fish getting sick (Fitriyyah *et al.,* 2024). Handling when the pond is exposed to rainwater by giving manstap at a dose of 30 ppm. Manstap can improve the quality of water in the pond. Control the outlet when the feed is to be spread. The outlet pipe will be removed so that the ammonia at the bottom of the pond will be sucked into the central drain because the shape of the pond is rather concave. Not only during production, prevention of pests and diseases can be done during pond preparation such as drying and adding toxic substances to the pond to kill bacteria and viruses in the pond (Ambarwati & Mujtahidah, 2021).

Harvest

The harvest method is the same as the sampling method, but at harvest time the fish are no longer measured for length and width but are directly weighed and the total weight of the fish in the cage will be calculated. Harvesting is done when there is only an order. If there is none, the fish will be kept in the cage until someone orders. Harvesting is divided into two, namely partial harvesting and total harvesting (Arzad *et al.,* 2019). Partial harvesting only reduces the number of fish in the cage slightly, usually if there is a small order, partial harvesting will be carried out. Total harvest is carried out when there is a large order of fish, namely by draining the pond water until it recedes and then the fish in the pond will be taken by workers using a fish scoop. Total harvest is different from partial harvest because partial harvest the water is only reduced slightly if the total harvest the water will be drained and the harvesting method is also different if the partial harvest is carried out such as sampling but total harvest has its own way. Harvesting is carried out carefully so that the fish are not injured or die because injured fish will have a decreased body condition, this affects their vitality (Mamis *et al.,* 2023).

Post-Harvest

After harvesting the fish are sorted into fish that are sold and not suitable for sale, tilapia that are suitable for sale are fresh and healthy fish, this can be seen from the color of the scales

and bright eyes (Neno *et al.*, 2016). Shipping is done in two ways, namely live shipping and dead shipping. Live shipping is done by preparing a transport vehicle and filling the tank in the back of the vehicle with fresh water and then aeration is added using an oxygen tank that has been connected to a modified hose to maintain the dissolved oxygen levels in the water and also to prevent the fish from getting stressed. Live transportation is moving fish from their original environment to a different environment with sudden changes in environmental properties such as containers and shaking of the means of transportation causing fish metabolism to accelerate so that changes in water quality occur (Adibrata *et al.*, 2022). Dead harvest of fish that have been harvested are immediately put into barrels without aeration and then the fish will be immediately cleaned of scales and dirt

Research Parameters

The parameters observed to measure the effect of providing a combination of commercial feed and independent feed include:
Absolute weight growth (Effendie, 1997):

$$\mathrm{Wm} = \mathrm{Wt} - \mathrm{Wo}$$

Wm = Absolute weight growth (grams)
Wt = Biomass weight at the end of the study
Wo = Biomass weight at the beginning of the study (grams)

Absolute length growth (Effendie, 1997):

$$\mathrm{Pm} = \mathrm{Lt} - \mathrm{Lo}$$

Pm = Absolute length gain (cm)
Lt = Final average length (cm)
Lo = Initial average length (cm)

Specific growth rate is formulated using the following formula (Zonneveld *et al.*, 1991):

$$\mathrm{SGR} = \frac{\mathrm{LnWt} - \mathrm{LnWo}}{\mathrm{t}} \times 100\%$$

SGR = Daily growth rate (gr/day)
Wt = Fish weight at the end of the time (gr)
Wo = Fish weight at the beginning of the time (gr)
t = Time (days)

FCR formula according to Safari *et al.*, (2017):

$$\mathrm{FCR} = \frac{\text{Amount of feed consumed}}{\text{Biomass difference}}$$

Formula for calculating SR according to (Nimrat *et al.*, 2011):

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

SR = Survival rate %
Nt = Number of fish at the end of maintenance (fish)
No = Number of fish at the beginning of maintenance (fish)

Water Quality Data

Water quality monitoring is carried out three times a day in the morning, afternoon and evening to determine changes in each parameter in the water. The parameters checked at the P2MKP FISH BOSTER CENTER are pH, Water Color, Temperature, Brightness, Water Height and DO (Dissolve Oxygen).

Data Analysis

Data obtained from the field will be analyzed using quantitative descriptive analysis and also presented in the form of tables and graphs.

RESULTS

Table 1. Water Quality Parameters for Black Tilapia Maintenance

Parameter	Measurement Method	Measurement Time	Unit of Measurement	Average
Water Physics				
Color	-	3 times/day	-	Green Brown
Temperature	TDS	3 times/day	˚C	28˚C - 33˚C
Water Height	Secchi Disk	3 times/day	Centimeter	74 cm - 94 cm
Brightness	Secchi Disk	3 times/day	Centimeter	15 cm – 20 cm
Water Chemistry				
pH	TDS	3 times/day	-	8
Dissolved Oxygen	DO meter	1 time/10 days	ppm	4.3 ppm – 4.62 ppm

Table 2. Black Tilapia Research Data

Parameter	Results
Specific Growth Rate	1.29
Absolute Length Growth	20 cm
Absolute Weight Growth	198.75 gr
Survival Rate	85%
Feed Conversion Ratio	1.1

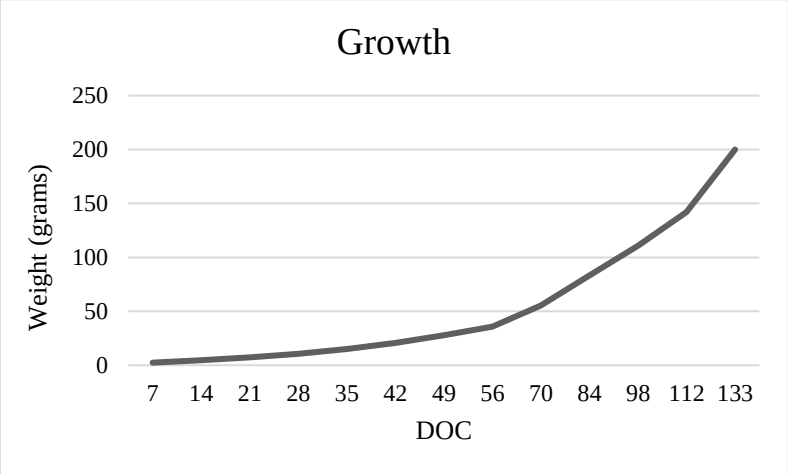

Figure 1. Growth Graph

DISCUSSION

The tools used to measure water quality include: TDS, Secchi disk and DO meter. In this black tilapia cycle, the water quality data obtained is brownish green water color. In the morning the water will be brown and during the day it will be greenish brown due to the activity of natural food or phytoplankton (Yoanda *et al.*, 2023; Pramleonita *et al.*, 2018). The temperature in the pond is 28°C – 33°C. The standard temperature in tilapia cultivation is 25°C – 32°C (SNI 7550-2009, 2009). The water height in the pond is 74 cm – 94 cm but according to Jayadi et al. 2021 the water height in the tilapia cultivation pond is 1 meter. The brightness in the cultivation pond is 15 cm – 20 cm. Water clarity is one of the parameters that indicates whether the media is habitable or not, such as water that is too cloudy and also not too clear (Kamelia *et al.*, 2018). pH 8 and DO 4.3 ppm - 4.62 ppm are in accordance with the SNI for tilapia fish farming, namely pH in the range of 6.5 - 8.5 and DO at ≥ 3 ppm (SNI 7550-2009, 2009).

In the research data on black tilapia, the *Specific Growth Rate* (SGR) was influenced by two factors, including genetic factors and external factors such as: the type and quality of feed given and its living environment, if the feed given is of good quality, the amount is sufficient and the environmental conditions are supportive, it is certain that the growth rate of the fish will be faster (Baihaqi & Haeruddin, 2024; Yanuar, 2017). The growth rate at the P2MKP Fish Boster Center was 1.29. Absolute Weight Growth at the P2MKP Fish Boster Center reached 198.75 grams. Absolute weight growth is influenced by isotonic conditions, namely the concentration of fish living media is the same as the concentration of body fluids in fish (Dahril *et al.*, 2017). Absolute Length Growth 20 cm. Absolute length growth can be influenced by the frequency of feeding if the frequency of feeding is right, it is certain that the absolute length growth of the fish will be maximized (Thaariq *et al.*, 2025). *Survival Rate* (SR) Reaches 85%. The survival rate in fish can be influenced by environmental conditions, maintenance media and external responses and food during the cultivation process (Mu'min *et al.*, 2025). The FCR in this cycle is 1.1. The lower the FCR value, the lower the fish in utilizing feed in growth (Augusta *et al.*, 2020). According to Amalia et al. 2024 FCR in good tilapia cultivation is in the range of 0.8 - 1.6 so that the FCR at the P2MKP Fish Boster Center is included in the good category

The growth graph always increases without decreasing. However, the increase in the graph is also followed by the increasing age of the black tilapia in the cage. Black tilapia are given commercial feed at 1 - 20 days of maintenance age and for 21 - 153 using independent feed. The use of commercial feed is only used when the fish are still small because it has a balanced nutritional composition for fish, commercial feed is easy to obtain and commercial feed provides better growth results compared to independent feed (Nurhudah *et al.*, 2023; Tasak *et al.*, 2025). The use of commercial feed is no longer continued because the cost of feed is expensive and less effective when the tilapia are adults because adult tilapia have more perfect digestion and have higher enzyme activity compared to small fish (Rahmatia, 2016). To cut feed costs, the use of independent feed is enforced. Independent feed can make production costs efficient by up to 60% of production costs, besides that nutrition can also be adjusted to the needs of the fish (Karangan *et al.*, 2025; Yudiarini *et al.*, 2024). Commercial feeds used include: PF 800 (MS), PF 1000 (MS), STP (1). And for independent feed using independent feed sizes 2,3 and 4.

CONCLUSION

Based on research at the P2MKP Fish Boster Center, it shows that providing a combination of commercial feed and independent feed can increase the growth of black tilapia compared to only providing commercial feed or independent feed separately. The use of a combination of commercial feed and independent feed can also optimize resource utilization

and reduce dependence on commercial feed. The combination of commercial feed and independent feed can be an alternative for farmers to increase cultivation productivity.

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