

**THE RELATIONSHIP BETWEEN LENGTH AND WEIGHT OF
MACKEREL FISH (*Rastrelliger sp.*) AT THE FISH AUCTION PLACE
(TPI) GUDANG LELANG, TELUK BETUNG, LAMPUNG**

Hubungan Panjang Berat Hasil Tangkapan Ikan Kembung (*Rastrelliger sp.*) di
Tempat Pelelangan Ikan (TPI) Gudang Lelang Teluk Betung Lampung

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ABSTRACT

The fishing centers that can be utilized in Lampung Province is the TPI Gudang Lelang Market. The catch from fishermen around TPI Gudang Lelang consists of economically valuable fish such as hairtail, scads, and mackerel fish. Fishermen at TPI Gudang Lelang can produce catches of approximately 90-100 tons per month. The objective of this independent project is to determine the weight and length of the mackerel fish (*Rastrelliger sp*) caught at TPI Gudang Lelang and to analyze the relationship between the length and weight of the Kembung fish at this location. This independent project was conducted from September to December 2022, located at TPI Gudang Lelang, Teluk Betung, Bandar Lampung. The method employed was direct observation in the field. The subjects of the study were the length and weight of the Kembung fish. The mackerel fish (*Rastrelliger sp*) found at TPI Gudang Lelang have an average body length of 19.6 cm and an average weight of 0.116 grams. The relationship between the length and weight of the mackerel fish, analyzed using regression analysis, yielded a value of (b) 2.84, indicating that the growth in length does not correspond with the growth in weight (with length growth being more dominant than weight growth). Additionally, the value of (R^2) is 0.607, suggesting a weak relationship between the length and weight of the mackerel fish.

Keywords: Gudang Lelang, Mackerel Fish, Long Relationship Weight

ABSTRAK

Provinsi Lampung merupakan salah satu provinsi yang mempunyai potensi memajukan sektor ekonomi Indonesia di bidang perikanan tangkap karena mempunyai wilayah perairan yang luas dan salah satu sentra perikanan yang dapat dimanfaatkan provinsi lampung yaitu Pasar TPI Gudang Lelang. Hasil tangkapan nelayan di sekitar TPI Gudang Lelang merupakan ikan

ekonomis tinggi seperti ikan Layur, Layang dan Ikan Kembung per bulan nelayan TPI Gudang Lelang dapat menghasilkan tangkapan sekitar 90-100 ton. Tujuan dari penelitian ini adalah untuk mengetahui berat dan Panjang hasil tangkapan ikan kembung (*Rastrelliger* sp) di TPI Gudang Lelang dan mengetahui hubungan panjang berat hasil tangkapan ikan kembung di TPI Gudang Lelang. Penelitian ini dilaksanakan pada bulan September-Desember 2022, berlokasi di TPI Gudang Lelang Teluk Betung Bandar Lampung. Metode yang digunakan adalah dengan cara observasi langsung ke lapangan. Objek yang diteliti adalah panjang dan berat ikan kembung. Ikan Kembung (*Rastrelliger* sp) yang ada di TPI Gudang Lelang mempunyai rata-rata ukuran panjang tubuh 19,6cm dan rata-rata berat 0,116gram. Hubungan Panjang berat ikan kembung (*Rastrelliger* sp) dengan menggunakan metode analisis regresi mempunyai nilai (b) 2,84 artinya pertumbuhan panjang tidak sesuai dengan pertumbuhan berat (pertumbuhan panjang lebih dominan dibandingkan berat) serta mempunyai nilai (R²) 0,607 artinya hubungan Panjang berat ikan kembung mempunyai nilai yang lemah.

Kata Kunci: Gudang lelang, Hubungan, Ikan kembung, Panjang berat

INTRODUCTION

One of the fisheries centers in Lampung Province is the Gudang Lelang Fish Auction Place (TPI). The Gudang Lelang Fish Auction Place (TPI) plays a strategic role in boosting business development in the capture fisheries sector. According to Ariadi *et al.* (2021), the Fish Auction Place (TPI) plays a key role in fisheries activities and is a driving force behind improving fishermen's businesses and welfare.

Fishermen's catches in Lampung Bay waters are dominated by pelagic or surface fish, including tuna, skipjack tuna, scad, ribbonhead, and mackerel. The Gudang Lelang Fish Auction Place's monthly catch ranges from 90 to 100 tons (Sari *et al.*, 2021). This TPI and fish market operate 24 hours a day, with a diverse range of market users. One of the most popular fish in the local community is mackerel, due to its affordable price and high nutritional content and protein content.

Mackerel (*Rastrelliger* sp.) is a type of marine fish that gathers in schools at the surface during certain seasons, making it easy to catch. This fish is an important fishery commodity sought after by many people for daily nutritional needs due to its low price and high nutritional value. The high public interest in mackerel (*Rastrelliger* sp.) has encouraged many fisheries operators to exploit this resource without considering the sustainability of these activities. The sustainability of fish availability is determined by the fish's growth and reproductive potential. A shift in fishing grounds, concentrated westward, has occurred in recent years, accompanied by changes in fishing targets due to declining mackerel catches (Marasabessy, 2020).

The author chose the title "The Relationship between Length and Weight of Mackerel (*Rastrelliger* sp.) Catches at the Teluk Betung Auction House (TPI) in Lampung because he wanted to understand the biological conditions of mackerel (*Rastrelliger* sp.) and the factors influencing their growth patterns.

RESEARCH METHODS

Place and Time

This research was conducted at the Teluk Betung Fish Auction Place (TPI) located on Jl. Ikan Bawal, Teluk Betung, Bandar Lampung City.

Research procedures

Data were obtained through field observations in November 2022. Data collection in this study used a survey method or direct observation, so that researchers obtained primary data.

The results of the primary data obtained aimed to determine the biological condition of mackerel (*Rastrelliger* sp) such as: weight and length of fish. Primary data were obtained from direct observations, measurements and recordings of mackerel (*Rastrelliger* sp) landed at the fish auction place (TPI) Gudang Lelang Teluk Betung Lampung. Sampling was carried out for 3 days at the fish auction place (TPI) Gudang Lelang Teluk Betung Lampung by asking permission from traders at the TPI Gudang Lelang. The procedure for collecting biological data of mackerel was carried out by measuring the morphometrics of mackerel in the form of Total Length (TL) using a ruler. Measurement of the Total Length (TL) of the fish was from the tip of the mouth to the end of the caudal fin. The fish were then weighed using a digital scale to obtain the weight in grams. The measurement of fish length can be seen in Figure 1.

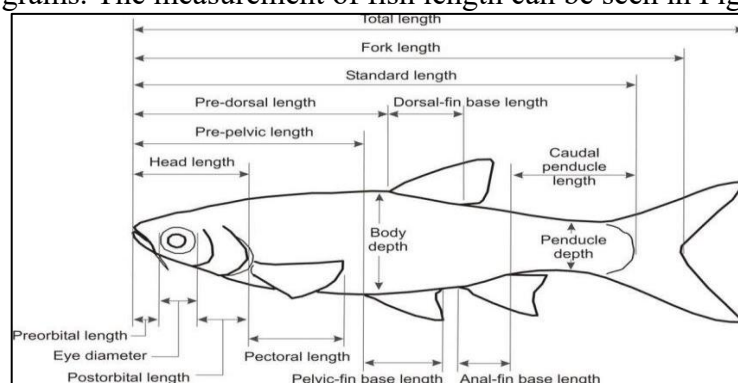


Figure 1. Morphometric measurements of fish

Length Weight Relationship

Growth is the increase in length and weight of fish over a period of time. Generally, older fish are longer and fatter. As eggs mature, fish also experience an increase in volume and weight. The length-weight relationship can be analyzed using the Linear Allometric Model (LAM) equation.

The b value from this calculation reflects the fish's growth pattern. If $b = 3$, the growth pattern is isometric, meaning weight gain is equivalent to length growth. If $b \neq 3$, the growth pattern is allometric. Allometric growth patterns are divided into two categories: positive allometric and negative allometric. A b value below 3 is called negative allometric (length gain is faster than weight gain), and a b value above 3 is called positive allometric (weight gain is faster than length gain). Calculating length and weight involves a method called Weighted Regression. This analysis uses a linear equation: $\text{Log } W = \text{Log } a + b \text{ Log } L$. The b value must match the length and weight of the fish, where length growth is faster than weight growth. Meanwhile, if the b value is greater than three, it indicates that the fish is fat, where the increase in weight is faster than the increase in length (Sudarno et al. (2018) in (Setya et al., 2023).

$$W = (aL^b)$$

Description:

- W : weight
- L : length
- a : linear regression intercept
- b : regression coefficient

RESULT

Measurement is an activity aimed at identifying the size of an object or phenomenon (Suriaman et al., 2023). Measurements can be conducted in two ways: 1) using standard tools, and 2) using non-standard tools. In this study, the authors measured length with a ruler and weight with a digital scale. The results are shown in Table 1 below:

Table 1. Mackerel Measurement Results

No.	Fish	Weight (grams)	Length (cm)
1.	Mackerel	0.115	20
2.	Mackerel	0.112	18
3.	Mackerel	0.112	19
4.	Mackerel	0.112	18
5.	Mackerel	0.120	21
6.	Mackerel	0.117	20
7.	Mackerel	0.110	17
8.	Mackerel	0.113	20
9.	Mackerel	0.114	19
10.	Mackerel	0.113	19
11.	Mackerel	0.112	17
12.	Mackerel	0.115	18
13.	Mackerel	0.113	17
14.	Mackerel	0.113	18
15.	Mackerel	0.121	24
16.	Mackerel	0.118	22
17.	Mackerel	0.118	21
18.	Mackerel	0.119	22
19.	Mackerel	0.122	23
20.	Mackerel	0.120	22
21.	Mackerel	0.118	19
22.	Mackerel	0.120	24
23.	Mackerel	0.116	20
24.	Mackerel	0.117	21
25.	Mackerel	0.115	17
26.	Mackerel	0.116	19
27.	Mackerel	0.115	18
28.	Mackerel	0.117	19
29.	Mackerel	0.120	18
30.	Mackerel	0.117	20
Total		3,48	570
Average		0,116	19,6

The data above, collected in November, showed that mackerel at the auction house had an average weight of 0.116 grams and a length of 19.6 cm, with the smallest measuring 17 cm and a weight of 0.110 grams.

Measurements of the length-weight relationship obtained during data collection at the auction house of Gudang Lelang Teluk Betung, Lampung, using a total of 30 samples, yielded an average length of 19.6 cm for mackerel (*Rastrelliger* sp). The most frequently caught size was 18-19 cm, with a total of 14 individuals. The shortest size caught was 17 cm, with a total of 4 individuals. The longest size caught was 24 cm, with a total of 2 individuals. Furthermore, the most frequently caught mackerel (*Rastrelliger* sp) weight data was 0.115 grams, with a total of 5 individuals, and the smallest size caught was 0.110 grams, with a total of 2

individuals. The results of the regression analysis of the relationship between length and weight of mackerel are shown in Figure 2.:

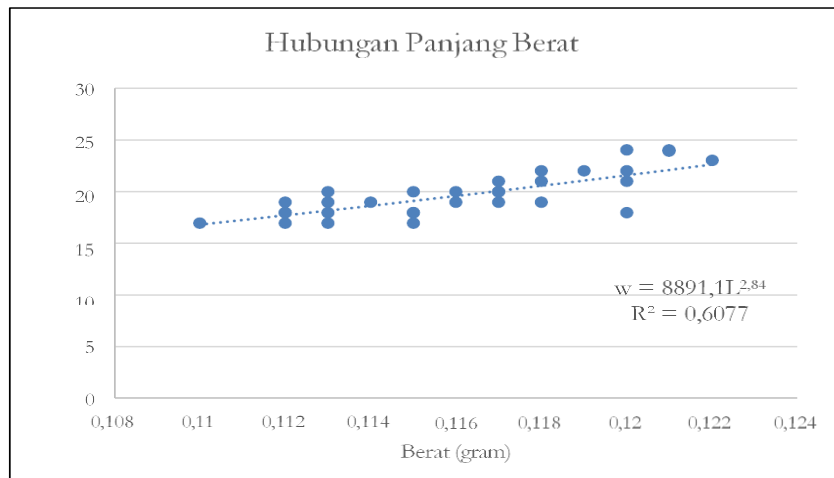


Figure 2. Relationship between Length and Weight of Mackerel Fish

Based on Figure 2, the results of the length-weight relationship show that the regression coefficient (b) for mackerel (*Rastrelliger* sp) at the Teluk Betung Auction Fish Farm (TPI) in Lampung is <3, i.e., 2.84, which is considered negative allometric.

The regression analysis and length-weight relationship graph (Figure 2) show a regression equation of $W = 8891L^{2.84}$, with a coefficient of determination of $R^2 = 0.607$. This means that 60% of the increase in fish body weight is due to an increase in body length, while 40% is due to other factors such as environmental factors and age. This also indicates that total body length does not significantly affect the total weight of mackerel (*Rastrelliger* sp). The explanation of the R^2 and b values can be seen in Table 2 below:

Species	Location	R^2 value	B value	Growth pattern
Mackerel (<i>Rastrelliger</i> sp)	TPI Auction Warehouse, Teluk Betung, Lampung	0,607	2,84	Alometrik Negatif

Anova				
	Df	SS	MS	Significance F
Regression	1	0,176116	0,176116	41,533405E-07
Residual	28	0,118107	0,004218	
Total	29	0,294224		

The total number of fish sampled was 30. With the overall length of the fish ranging from 17 cm to 24 cm, the dominant total length of the fish caught was in the average range of

18-19 cm. Meanwhile, the weight of the mackerel ranged from 0.110 to 0.120 grams, with an average fish weight of 0.116 grams. The results of the b value calculation obtained from the mackerel test at the TPI Gudang Lelang Teluk Betung Lampung were 2.84 with an R² value of 0.607. Based on the b value obtained, it can be stated that the length of the fish weight <3, which means negative allometric which means that the length growth is faster than the weight growth.

DISCUSSION

The result of the b value calculation in the measurement at the TPI Lelang warehouse is 2.84 which states that the growth is negative allometric where the growth pattern of mackerel length is not the same as the growth of its weight, but the growth pattern of length is more dominant than its weight. The results of research conducted by Caesario *et al* (2022) also stated that the b value obtained from the measurement of mackerel in April and June was 1.45 while the results of research by Hasani *et al* (2023) obtained a b value of 2.086 which both indicate that the growth pattern of mackerel around Lampung waters is negative allometric. This is in line with the statements of Rifqie (2007) and Perdanamihardja (2011) who stated that mackerel (*Rastrelliger sp*) in the waters of Jakarta Bay and its surroundings has a b value of 2.98 which is also included in negative allometric. The coefficient of b value of mackerel caught from several regions in Indonesia such as in Sorong Waters obtained the measurement results of b value 2.877 – 2.980 (Suruwaky & Gunaisah, 2013); in Deli Serdang the b value was 0.143 (M. F. Pratama & Farhan, 2023); in Palabuhanratu the b value was 2.325 (Nasution *et al.*, 2015); in Semarang Waters b value was between 1.3146-1.5285 (C. Pratama *et al.*, 2019); in Riau Islands the b value was b value = 1.319 (Rahmitasari *et al.*, 2025); in Kupang Bay the b value was 2.94 (Kurnia *et al.*, 2023); and in the Maros waters of the Makassar Strait, the b value ranged between 2.971 and 2.973 (Wulandari, 2021). Ahmadi & Ansyari (2022) revealed that differences in fish can be influenced by two factors: environmental factors, namely temperature and water pH, and the condition of the food in the waters, such as digested food, such as small fish, zooplankton, and phytoplankton. Furthermore, the condition factor also influences the fish's ability to adapt to environmental changes.

Fish growth is defined as an increase in size, including weight, length, and volume, over a period of time. Fish growth also depends on the availability of food in the waters where the fish live and how the fish digest it. Growth depends on energy absorption by the organism; the greater the energy absorption, the faster the growth (Napisah & Machrizal, 2021).

CONCLUSION

The conclusions of this study are as follows:

1. The mackerel (*Rastrelliger sp*) at the TPI Gudang Lelang has an average body length of 19.6 cm and an average weight of 0.116 grams.
2. The relationship between length and weight of mackerel (*Rastrelliger sp*) has a value of (b) 2.84, meaning that length growth is not in accordance with weight growth (length growth is more dominant than weight) and has a value (R²) of 0.607, meaning that the relationship between length and weight of mackerel has a weak value.

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