Comparative Study of Cultivation of *Leptobarbus hoeveni* and *Wallago* sp in Ranah Village, Kampar Regency, Riau

*Studi Perbandingan Budidaya Ikan Jelawat (Leptobarbus hoeveni) dan Tapah (Wallago sp) di Desa Ranah, Kabupaten Kampar, Riau*

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|  | **Abstract** |
| Received  25 April 2025  Accepted  25 May 2025 | This research was conducted in Ranah Village, Kampar Regency, Riau Province, in April 2024 to analyze the comparison of production facility use and cost structure, income, and business feasibility of hoven carp and tapah enlargement farming. The research method employed in this study is the survey method, which involves direct observation of objects in the field and the collection of data related to the research conducted. The population in this study consisted of 15 fish farmers of hoven carp and tapah. The data obtained through descriptive analysis explain the differences in product facilities for cultivating the two fish, with a focus on seeds and feed. The analysis of income in tapah farming is higher, at IDR 119,098,750, than the income of hoven carp farming, at IDR 43,680,909. |
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|  | **Keywords:** Comparative, Means of Production, Income. |
|  | **Abstrak** |
|  | Penelitian ini dilakukan di Desa Ranah, Kabupaten Kampar, Provinsi Riau pada April 2024 dengan tujuan untuk menganalisis perbandingan penggunaan sarana produksi dan struktur biaya, pendapatan dan kelayakan budidaya ikan jelawat dan tapah. Metode penelitian yang digunakan dalam penelitian ini adalah metode survei yaitu pengamatan langsung terhadap objek di lapangan dan pengumpulan data terkait penelitian yang dilakukan. Populasi dalam penelitian ini adalah 15 peternak ikan jelawat dan tapah. Data yang diperoleh melalui analisis deskriptif menjelaskan perbedaan fasilitas produksi dalam budidaya kedua ikan tersebut terletak pada bibit dan pakan. Kemudian analisis pendapatan budidaya ikan tapah lebih tinggi Rp 119.098.750 dibandingkan dengan pendapatan budidaya ikan jelawat Rp 43.680.909. Dalam analisis kelayakan budidaya ikan jelawat dan tapah, dikatakan layak dengan RCR = 2,18 (jelawat) dan 2,07 (tapah), FRR yang dihasilkan masing-masing adalah 80,83% (jelawat) dan 93,45% (tapah) dan PPC = 1,24 (jelawat) dan 1,07 (tapah). |
|  | **Kata kunci:** Komparatif, Alat Produksi, Pendapatan |

1. Introduction

Kampar Regency is one of the regencies in Riau Province, with an area of 11,289.28 km², and has considerable potential in the fisheries business. This potential is evident in the 2022 freshwater fish production in the Kampar Regency, which reached 65,167.83 tons ([BPS Kampar Regency, 2023](#BPS)). One of the areas that are a center for aquaculture in Kampar Regency is Ranah Village. This village has an advantage in fish farming, utilising floating net cages that take advantage of the flow of the Kampar River that crosses the area. The types of fish that are raised are hoven carp (*Leptobarbus hoeveni*), patin (*Pangasius sucthi*), pomfret (*Colossoma macropomum*), tilapia (*Oreochromis niloticus*), and tapah (*Wallago* sp). Among these types of fish, hoven carp and tapah fish are superior commodities because they have high market demand and profitable selling prices.

Although both types of fish have high prospects, there are fundamental differences in the cultivation process, especially in terms of seed availability. Hoven carp fish seeds can be easily obtained through artificial spawning, which allows farmers to maintain sustainable cultivation without relying on natural catches ([Aryani, 2018](#Arya)). In contrast, tapah seeds still rely on natural spawning, which limits their availability and makes them dependent on the season ([Yunita et al., 2023](#Yuni)). This poses additional challenges for tapah farmers, both in terms of time and cost.

Differences in seed prices, production facilities, and levels of adaptation to the cultivation system make the comparison of hoven carp and tapah cultivation efforts very relevant. According to [Hermawan (2019)](#Herma), differences in input will affect the cost structure of cultivation efforts, which ultimately impacts income. The more affordable price of hoven carp seeds (IDR 2,400/fish for a size of 5–8 cm) compared to tapah (IDR 70,000–IDR 100,000/fish for a size of 17–20 cm), and the selling price of fish for consumption which is also different (IDR 40,000–IDR 60,000/kg for hoven carp and IDR 150,000–IDR 160,000/kg for tapah), an in-depth analysis is needed to determine the efficiency and sustainability of the two cultivation efforts. In addition, selfish has successfully undergone the domestication process, making it one of the superior local fish in the region. This domestication process makes fish more adaptable in intensive cultivation systems, which ultimately increases production efficiency ([Teletchea & Fontaine, 2014](#Tele)).

On the other hand, tapah is still classified as a fish that has not been fully domesticated, so it requires more attention in the maintenance process. This difference affects the cost structure and income generated from the cultivation of both types of fish.

1. Material and Method
   1. *Time and Place*

This research was conducted from April 22 to 27, 2024, in Ranah Village, Kampar Regency, Riau Province. The selection of the research location was carried out intentionally (purposive sampling) based on considerations of the research area's conditions, which is a cultivation business for hoven carp and tapah.

* 1. *Methods*

The research method employed in this study is the survey method, which involves direct observation of objects in the field and the collection of data related to the research conducted. The survey method is a quantitative research method used to obtain data about past or present events, beliefs, opinions, characteristics, behaviours, and variable relationships from samples taken from a specific population.

* 1. *Data Analysis*
     1. *The Production Cost Analysis (Total Cost)*

To determine the amount of production costs in the cultivation of hoven carp and tapah, the formula used is ([Suratiyah, 2015](#Sura)):

TC = FC + VC

Information:

TC = Total Cost (IDR)

FC = Total Fixed Cost (IDR)

VC = Total Variable Cost (IDR)

* + 1. *Cost Structure*

To calculate the percentage of the production cost structure, the formula used is ([Suratiyah, 2015](#Sura)):

P = CP/TC x 100%

Description:

P = percentage value of cost components

CP = value of production component costs

TC = value of total cost of production components

* + 1. *Acceptance Analysis*

To determine the amount of revenue, the following formula is used ([Suratiyah, 2015](#Sura)):

TR= Y. Py

Information:

TR = Total Revenue / Total Income (IDR)

Y = Production Quantity (IDR)

Py = Product Price (IDR)

* + 1. *Revenue Analysis*

To determine the level of income obtained, the following formula is used ([Suratiyah, 2015](#Sura)):

Pd = TR - TC

Information:

Pd = Income (IDR)

TR = Total Revenue (IDR)

TC = Total Cost (IDR)

1. Result and Discussion
   1. *Use of Production Facilities for Hoven carp and Tapah Fish Cultivation Business in Ranah Village*

In the fish farming business, which utilises the floating net cage system, production facilities play a crucial role in determining the success or failure of the production process. If appropriately utilised, these production facilities can increase the amount of production and net income received by the farmer. The cage is a container or land where fish can grow and develop. The type of cage used by farmers in Ranah Village to cultivate hoven carp and tapah is a floating net cage, which has a shape resembling a boat, with the front tapered to enable the cage to withstand the water current and not be easily swept away in the river. The primary materials used in making this cage consist of kulim wood, osak wood, drums, blocks, nails, hinges, ropes, and nets. These materials are already available in this area and can also be obtained from Bangkinang, Pekanbaru.

To prevent the entire body of the cage from sinking, a buoyancy device, such as a plastic drum, is used to maintain its stability. For one cage unit, typically between 4 and 6 plastic drums are used, which are placed on both sides of the cage. To reach the cage to provide food and for other needs, farmers construct a wooden bridge. Cages for raising hoven carp and tapah in this village have various sizes, such as 8 × 3 × 1.8 m, 10 × 3 × 1.8 m, and 12 × 3 × 1.8 m. Farmers can obtain it at an average price of IDR22,590,909 per cage unit for hoven carp, while the average cost per cage unit for tapah is IDR 24,375,000/m³. In conducting fisheries cultivation, especially for hoven carp, the availability of high-quality seeds is crucial for achieving high production yields. The average cost of seeds incurred by hoven carp fish farmers in Ranah Village is presented in Table 1.

Table 1. Average seed costs incurred by hoven carp farmers in Ranah Village

| No | Respondents | Total Seed Cost (IDR) |
| --- | --- | --- |
| 1 | Muhammad Syafi | 1,920,000 |
| 2 | Nopi | 4,800,000 |
| 3 | Erick Setiawan | 1,920,000 |
| 4 | Chandra | 5,100,000 |
| 5 | Yes | 4,000,000 |
| 6 | Sapriady | 3,400,000 |
| 7 | Reno | 4,000,000 |
| 8 | vortex | 4,000,000 |
| 9 | Yasri | 2,080,000 |
| 10 | Jayasman | 1,920,000 |
| 11 | Nur Afni Ahdar | 2,080,000 |
| Amount | | 35,220,000 |
| Average | | 3,201,818 |

Based on Table 1, it is known that the average price of hoven carp seeds in one cage unit is IDR 3,201,818 per harvest. Hoven carp seeds can be obtained by farmers from Jambi City or Sungai Putih, measuring approximately 5-6 cm or around 2 inches in length. The price of hoven carp seeds in Ranah Village ranges from IDR 1,600 to IDR 1,700 per fish, depending on the agent supplying the seeds. This price difference is caused by the presence of more than one agent who comes directly to the village, so the selling price of the seeds is adjusted to the prevailing market conditions. The price of hoven carp seeds is IDR 1,600 to IDR 1,700 per fish, which can be obtained directly from agents who visit Ranah Village. They sell at an estimated price based on the market rate. The selling price of these seeds varies because more than one agent visits this village. The determination of this selling price must, of course, be able to cover marketing or operational costs, and traders can make a profit ([Arief & Pradini, 2019](#Arief)). To achieve a good harvest, the tapah seeds used must be of high quality, meaning they have a high survival rate and a uniform size, which helps prevent cannibalism in fish and results in a low mortality rate. The average cost of seeds incurred by tapah farmers in Ranah Village is presented in Table 2.

Table 2. Average seed costs incurred by tapah fish farmers in Ranah Village

|  |  |  |
| --- | --- | --- |
| No | Respondents | Total Seed Cost (Rp) |
| 1 | Imsak Nuzul | 35,000,000 |
| 2 | M. Rohimi | 33,000,000 |
| 3 | Zul Hermis | 35,000,000 |
| 4 | The Firmansyah | 33,000,000 |
| Amount | | 136,000,000 |
| Average | | 34,000,000 |

Table 2, it can be seen that the average cost of tapah seeds in one cage unit is IDR 34,000,000. These tapah seeds are typically sourced from the Sorek area and purchased directly from agents who visit Ranah Village. Tapah seeds still depend on natural catches because they cannot be artificially spawned. As a result, the availability of seeds is limited, and the price is increasing. This is an obstacle in the cultivation of tapah because the small number of seeds can affect the continuity of production and price stability in the market. Tapah fish seeds can usually be obtained for IDR 50,000 and IDR 110,000 / fish with a size of 5-7 cm (weight 5 ounces/fish) Feed is one of the key factors determining success in cultivating hoven carp in the floating net cage system and can also enhance production results. Hoven carp is a type of fish that likes darkness, so feeding hoven carp is usually done at 06.00 WIB and 17.00 WIB. The main feed for hoven carp at the age of 2-3 months is 781-1 pellets, and the type of pellets for fish aged 4 months and above is Bintang S-888 pellets. Hoven carp feed has been modified so that feed does not only depend on pellets.

Research by [Taslim (2015)](#Tasli) stated that hoven carp farmers in Ranah Village provided feed from eggs removed from the shell, which were then placed in 5 kg plastic bags and boiled as an additional feed source. The method of feeding involves spreading it into the cage through the cage door, with a maximum feeding frequency of twice a day, namely in the morning and evening. However, there are still farmers who ignore the frequency of feeding due to the high price of feed. The cost of rotten egg feed in Ranah Village is approximately IDR 50,000 to IDR 65,000 per bucket (approximately 15 kg per bucket).

The hoven carp is an omnivorous animal, but it tends to be herbivorous, allowing it to utilize vegetable protein sources more effectively than other types of fish. As a result, its diet does not rely solely on pellets but also includes vegetable feed ([Pangentasari, 2018](#Pange)). This causes hoven carp farmers in Ranah Village to provide plant feed in the form of vegetables harvested by local farmers as additional feed to accelerate the growth of hoven carp. Vegetable feed is used to increase fish weight, thereby enhancing production. This refers to [Zain's (2018)](#Zain) research, which suggests that raising hoven carp using alternative feed is a rearing technique that improves production efficiency. The estimated size of adult hoven carp obtained can reach 1 kg per fish or more, depending on optimal feeding during the rearing period. Factors such as feed quality and quantity, including pellets, rotten egg feed, and vegetables, play a crucial role in supporting optimal fish growth. The average feed costs incurred by hoven carp farmers in Ranah Village are presented in Table 3.

Table 3. Average feed costs incurred by hoven carp farmers in Ranah Village

|  |  |  |
| --- | --- | --- |
| No | Respondents | Total Feed Cost (IDR) |
| 1 | Muhammad Syafi | 23,860,000 |
| 2 | Nopi | 40,900,000 |
| 3 | Erick Setiawan | 23,500,000 |
| 4 | Chandra | 37,770,000 |
| 5 | Yes | 35,929,000 |
| 6 | Sapriady | 34,565,000 |
| 7 | Reno | 22,856,000 |
| 8 | vortex | 35,475,000 |
| 9 | Yasri | 22,415,000 |
| 10 | Jayasman | 21,255,000 |
| 11 | Nur Afni Ahdar | 22,138,000 |
|  | Amount | 320,663,000 |
|  | Average | 29,151,182 |

Table 4. Average feed costs incurred by tapah fish farmers in Ranah Village

|  |  |  |
| --- | --- | --- |
| No | Respondents | Total Feed Cost (IDR) |
| 1 | Imsak Nuzul | 81,425,000 |
| 2 | M. Rohimi | 64,800,000 |
| 3 | Zul Hermis | 78,500,000 |
| 4 | The Firmansyah | 63,630,000 |
|  | Amount | 288,355,000 |
|  | Average | 72,088,750 |

Feed is a crucial factor to consider for maximizing the success of fish farming. Feed must be of good quality and sufficient quantity. Good feed must contain the necessary nutrients and energy for growth, reproduction, and optimal fish health. The feed usually given by farmers in Ranah Village for tapah is dead chicken and small fish. The frequency of feeding is 2 times a week. In one production, the tapah farming business can use up to 8-10 tons of dead chicken and approximately 2 tons of small fish. The cost of dead chicken feed spent in a week is IDR 450,000, which can be used up in around 75 kg of dead chicken feed per week. For small fish, they are usually given 10 kg per feeding (Table 4).

* 1. *Cost Structure of Hoven Carp and Tapah Cultivation Business in Ranah Village*

Cost analysis aims to determine the total amount of costs incurred in a single production. At the same time, production costs refer to the expenses incurred by farmers during the production process. These costs typically include expenses for purchasing production facilities and depreciation costs resulting from the use of production equipment. Costs in cultivating hoven carp and tapah consist of 2, namely fixed costs and variable costs. Fixed costs are the total costs incurred to obtain production factors that cannot be changed in quantity ([Sukirno, 2013](#Sukir)). Fixed costs incurred in the cultivation of hoven carp and tapah are in the form of depreciation costs and maintenance costs. Maintenance costs refer to the expenses incurred to repair or maintain production equipment. In contrast, depreciation costs represent the replacement value of fixed capital that has lost its function and can no longer be used. The total average fixed costs of hoven carp and tapah cultivation are presented in Table 5.

Table 5. Average total fixed cost

|  |  |  |  |
| --- | --- | --- | --- |
| No | Information | Hoven carp Fish | Fish |
| 1 | Depreciation Expense | 4,329,909 | 4,222,500 |
| 2 | Maintenance Fee | 266,091 | 937,500 |
|  | Average Total Fixed Cost | 4,596,000 | 5,160,000 |

Table 5 shows that the average total fixed costs incurred for cultivating hoven carp and tapah over the year are IDR 4,596,000 and IDR 5,160,000, respectively, with depreciation costs being the most significant. Variable costs are the total costs incurred to obtain production factors that can be changed in quantity ([Sukirno, 2013](#Sukir)). Variable costs are the expenditures for cultivating hoven carp and tapah in a business that is variable in nature, consisting of seeds and feed. The total average variable costs of cultivating hoven carp and tapah are presented in Table 6.

Table 6. Average variable cost

|  |  |  |  |
| --- | --- | --- | --- |
| No | Information | Cultivation of Hoven carp | Cultivation of Tapah |
| 1 | Seed | 3,201,818 | 34,000,000 |
| 2 | Feeding | 29,151,182 | 72,088,750 |
|  | Average Total Variable Cost | 32,353,000 | 106,088,750 |

Based on Table 6, it can be seen that the average cost of seeds for hoven carp cultivation is IDR 3,201,818, whereas for tapah, it is significantly higher at IDR 34,000,000. This difference can be attributed to variations in price and the quantity of seeds used in each type of cultivation. The cost of feed for cultivating hoven carp fish is IDR 29,151,182 while cultivating tapah incurs a higher cost of IDR 72,088,750. The cost of this feed can be influenced by both the length of the maintenance time and the type of feed used. Total cost is the sum of variable cost and fixed cost or the total cost incurred during the production process. For more details, see Table 7.

Table 7. Average total cost of cultivating hoven carp and tapah

| No | Information | Hoven carp (IDR) | Tapah (IDR) | Cost Structure (%) | |
| --- | --- | --- | --- | --- | --- |
| Hoven carp | Tapah |
| 1 | Fixed costs |  |  |  |  |
|  | Depreciation | 4,329,909 | 4,222,500 | 11.71 | 3.79 |
|  | Maintenance | 266,091 | 937,500 | 0.72 | 0.84 |
| 2 | Variable Costs |  |  |  |  |
|  | Seed | 3,201,818 | 34,000,000 | 8.66 | 30.56 |
|  | Feeding | 29,151,182 | 72,088,750 | 78.89 | 64.79 |
| Total | | 36,949,000 | 111,248,750 | 100% | 100% |

In Table 7, the total cost of the hoven carp cultivation business is IDR 36,949,000. In contrast, the total cost incurred from the tapah cultivation business is IDR 112,248,750. The proportion of each cost component to the total cost incurred in the cultivation process of hoven carp and tapah is also determined, providing an overview of the relative contribution of each cost component to the total production cost. The depreciation cost in hoven carp cultivation, at IDR 4,329,909, is slightly higher than that of tapah, which is IDR 4,222,500. However, the contribution of depreciation to the total cost of hoven carp fish cultivation is greater (11.71%) compared to tapah (3.79%). This shows that although the nominal value of depreciation is almost similar between the two types of fish, the proportion of depreciation to the total cost of hoven carp cultivation is greater, which indicates the use of more significant or higher assets in the operation of hoven carp fish cultivation compared to tapah.

For maintenance costs in the cultivation of hoven carp amounting to IDR266,091, contributing 0.72% to the total cost, while in Tapah fish, maintenance costs of IDR937,500 contributed 0.84%. Meanwhile, the cost of seeds for cultivating tapah is IDR 34,000,000, which is significantly higher than that of hoven carp at IDR 3,201,818. The contribution of seed costs to the total cost of tapah cultivation is 30.56%, while in hoven carp fish cultivation, it is only 8.66%. This difference is due to the higher need for seeds in tapah cultivation. Feed costs are the most significant component for both types of cultivation. In tapah cultivation, feed costs reach IDR72,088,750, more than double the cost of feed in hoven carp IDR29,151,182. However, the contribution to the total cost is greater for hoven carp at 78.89% compared to tapah at 64.79%.

* 1. *Income from Hoven Carp and Tapah Cultivation Business in Ranah Village*

Income can be defined as the money received by a person through economic activities, such as wages or money owned, during a specific period ([Lasena et al., 2023](#Lase)). Income is the price paid to customers multiplied by the number of units sold. The amount of cash received compared to the amount of costs incurred has a significant impact on income. If income increases and costs decrease, income will increase, but if income decreases or costs increase, income will decrease ([Nasution, 2018](#Nasu)). Income is the amount of value or sales results of a business, such as hoven carp or tapah, received in running a business. [Suratiyah (2015)](#Sura) stated that income is the product of the amount of production and the selling price of the product. Business income is calculated based on income during a year of production. To determine the income from hoven carp and tapah cultivation businesses, refer to Table 8 and 9.

Table 8. Hoven carp cultivation business revenue

| No | Respondents | Production (kg/year) | Price (IDR/kg) | Reception (IDR/year) |
| --- | --- | --- | --- | --- |
| 1. | Muhammad Syafi | 1,600 | 35,000 | 56,000,000 |
| 2 | Nopi | 3,500 | 35,000 | 122,500,000 |
| 3. | Erick Setiawan | 1,200 | 35,000 | 42,000,000 |
| 4. | Chandra | 3,000 | 35,000 | 105,000,000 |
| 5. | Yes | 3,800 | 35,000 | 133,000,000 |
| 6. | Sapriady | 3,200 | 35,000 | 112,000,000 |
| 7. | Reno | 1,300 | 35,000 | 45,500,000 |
| 8. | vortex | 3,600 | 35,000 | 126,000,000 |
| 9. | Yasri | 1,300 | 35,000 | 45,500,000 |
| 10. | Jayasman | 1,400 | 35,000 | 49,000,000 |
| 11. | Nur Afni Ahdar | 1,500 | 35,000 | 52,500,000 |
|  | Amount | 25,400 | 385,000 | 889,000,000 |
|  | Average | 2.309 | 35,000 | 80,818,182 |

Table 8 shows the average amount of income obtained from the hoven carp cultivation business in one production, which is IDR 80,818,182.

Table 9.Tapah cultivation business revenue

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Respondents | Production (kg/year) | Price (IDR/kg) | Reception (IDR/year) |
| 1. | Imsak Nuzul | 2,000 | 140,000 | 280,000,000 |
| 2 | M. Rohimi | 1,300 | 140,000 | 182,000,000 |
| 3. | Zul Hermis | 2.100 | 140,000 | 294,000,000 |
| 4. | The Firmansyah | 1,200 | 140,000 | 168,000,000 |
| Amount | | 6,600 | 560,000 | 924,000,000 |
| Average | | 1,650 | 140,000 | 231,000,000 |

Table 9 shows the average amount of income obtained from the tapah cultivation business of IDR 231,000,000/one production. Income here is defined as the net income received by the farmer after being reduced by the total production costs incurred. Generally, the more income is earned, the better, as it can be reinvested in the business or saved by the business owner. To find out the income of eel and tapah fish farmers, see Table 10.

Table 10. Hoven carp and tapah cultivation business income

|  |  |  |  |
| --- | --- | --- | --- |
| No | Information | Hoven carp (IDR) | Tapah (IDR) |
| 1 | Production (Kg) | 2.309 | 1,650 |
| Price (IDR) | 35,000 | 140,000 |
| Reception | 80,818,182 | 231,000,000 |
| 2 | Fixed Costs   1. Depreciation 2. Maintenance | 4,329,909  266,091 | 4,222,500  937,500 |
| Variable Costs   1. Seed 2. Feeding |  |  |
| 3,201,818 | 34,000,000 |
| 29,151,182 | 72,088,750 |
| Total cost | | 36,949,000 | 111,248,750 |
| Income | | 43,869,182 | 119,751,250 |

Table 10 shows that the production of hoven carp cultivation is 2,309 kg, with a price of IDR 35,000, resulting in a revenue of IDR 80,818,182. Therefore, the average income from hoven carp cultivation is IDR 43,869,182. The production of tapah cultivation is 1,650 kg, with a price of IDR 140,000, resulting in a revenue of IDR 231,000,000. Therefore, the average income from tapah cultivation is IDR 119,751,250. Where the income received from tapah cultivation is greater than hoven carp. Upon comparing the two net incomes, a significant difference is evident. This finding aligns with previous research conducted by [Hotmauli et al. (2020)](#Hotma), who noted that the high and low business profits obtained were due to the differences in business income and total costs incurred during production, resulting in varying profits.

1. Conclusions

Based on the research results and discussion, the following conclusions can be drawn: The cultivation of hoven carp and tapah has different production facilities and cost structures in carrying out the business. The main difference lies in the seeds and feed, where the cost of cultivating tapah is more concentrated on feed (64.79%) and seeds (30.56%), while hoven carp has a more even cost distribution, with feed as the main component (78.89%) and seeds (8.66%). Income from the tapah farming business is higher than the income from the hoven carp fish farming business. The net income from the hoven carp fish farming business averages IDR43,680,909, while the net income from the hoven carp fish farming business averages IDR119,098,750.

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