

Study of Freshwater Fish Seeding for Community Food Security in Beutong, Nagan Raya District

Zuriat¹, Dewi Mustika¹, T. Amarullah¹, Endah Anisa Rahma¹, Syarifah Zuraidah¹

¹ Fisheries and Marine Science Department, Universitas Teuku Umar

Email: zuriat@utu.ac.id

Abstract: One of the basic needs of fish protein food comes from fish farming production. This study was carried out through a case study at UD. Reukan Beumaju in 2019 in tilapia hatchery business (*Oreochromis sp*) of Beutong District, Nagan Raya. The seed production has measures 2-3 and 3-5 cm, reaching 1.205.000 tail. The results of the study on the economic value of the tilapia hatchery business was the R/C Ratio of 1.65, which showed that the results of the hatchery business were feasible to develop, and with the level of production obtained, it could drive the freshwater fish rearing business for 1000 heads of families (KK), with the assumption that per household maintains 1000 fish, then the harvest production is obtained of 100 to 150 kg in a period of 4 months. Beutong sub-district has great potential for water and land resources, so that it can strengthen food security and improve community nutrition. It is necessary to encourage the community to cultivate fish both on a household and business scale, given the potential for marine fish that continues to degrade population. Hatchery business can increase fish rearing business, in order to meet consumption needs and increase food security for fish protein at an affordable price.

Keywords: Food Security, Fish seeds, Economic Value and Production

Background

Fish is one of the crucial needs for food security for human life, as a source of protein for all levels of society, which can be sourced from marine fish and freshwater fish. The source of marine fish has experienced degradation of production and the geographical position of Beutong District as an inland area where the distance is about 45 km from the coast, becoming the distribution of marine fish supplies is limited to Beutong District. As an area that is in the center of freshwater sources, it has the potential for the development of freshwater fish both from cultivation and from public waters such as rivers and swamps. One of the fish that has been developed for cultivation is tilapia (*Oreochromis sp.*). Tilapia is a type of freshwater fish having economic value and is interested by the community and currently the market price reaches Rp. 35,000 per kg (Aliyas *et al.*, 2016)

Indonesia is a maritime country with a coastline of 104 thousand km and a total maritime area of 5.8 million km². Based on data from the Ministry of Marine Affairs and Fisheries (KKP), Indonesia's total fishery production in 2013 reached 19.56 million tons, far growing from 15.5 million tons in 2012. However, as the population increases, the need for fish also increases, and This cannot be fulfilled from marine fish production, but must be through cultivation activities (Dwi *et al.*, 2018)

Beutong is located about 45 km from the coast so that the supply of marine fish is reduced compared to areas close to the coast. Therefore, efforts are needed to fulfill fish needs, namely through fish farming. Cultivation activities are conducted through processes and stages of activity, namely fish hatchery, nursery and rearing. Nagan Raya Regency is an area rich in fishery resources, where this area has the potential for rivers and land consisting of

2875 ha of rice fields (BPS, 2018). One of the districts that has great potential for developing cultivation businesses is in Beutong District, which has a potential source of water from rivers and technical irrigation which can irrigate nearly 3,000 ha of rice fields.

As a food source, fish has an excellent nutritional content, such as protein as a source of growth, omega 3 and 6 fatty acids which are beneficial for maternal health and the formation of the fetal brain, vitamins, and various minerals which are very beneficial for both mother and fetus. Fish as a food ingredient that contains high protein and contains essential amino acids needed by the body, besides that the biological value reaches 90%, with less binding tissue so that it is easier to digest. The most important thing is that the price is cheaper compared to other protein sources (Adzani, 2020)

Based on the problems described above, several problems can be identified, namely the level of production, economic value and marketing of tilapia seed production by *UD. Reukan Beumaju* as well as the obstacles and prospects for developing a fish rearing business for fish protein food security for the people in Beutoeng District

Methods

This study is based on data on fishery potential in Beutong with the basis of data on technical aspects, social aspects and the hatchery of gift tilapia (*Oreochomis sp*) of *UD Reukan Beumaju* in Beutong District, Nagan Raya Regency. Data were collected in form of interviews, questionnaires and observations consisting of primary and secondary data. The results of the study are displayed in narrative and table form. Financial analysis studies on financing (TC), revenue (TR), B/C ratio, payback period and BEP. Then it was conducted a study on the opportunity to develop a cultivation business for tilapia rearing business activities. According to Sanusi (2000), financial analysis is a feasibility analysis that looks from the perspective of the farmer as the owner. In financial analysis, pay attention to the cash-flow aspect of a project or farming, namely the comparison between the results of gross sales (Gross-sales) and the total costs expressed in present value.

Result

The results of the study on the economic value of the tilapia hatchery business, was the R/C Ratio of 1.65, which showed that the results of the hatchery business were feasible to develop and with the level of production obtain it could drive the freshwater fish rearing business for 1000 heads of families (KK) with the assumption that per household maintains 1000 fish, then the harvest production is obtained of 100 to 150 kg in a period of 4 months.

Table 1. Amount and Value of UD tilapia seed production from *Reukan Beumaju* 2018

No	Size(cm)	Total (Fish)	Price(Rp)	Value
1	2-3	438.000	200	87.600.000
2	3-5	201.000	300	60.300.000
3	5-7	20.000	400	8.000.000
Total		659.000		155.900.000

Source: UD Sales Data Processing *Rakan Beumaju* in 2018

From the data in table 1, it can be seen that the amount of tilapia seed production in 2018, which is 2-3 cm in size is sold more at a price of Rp. 200. This illustrates that tilapia does not

have to have a large size when enlarging it, while in 2019 the size of the seeds measuring 3 = 5 cm was sold more, namely 87.600.000 fish as in table 2, this illustrates that there is a constant demand for farmers for larger seed sizes, to ensure the survival rate of fish until harvest weighing 200 to 300 grams per head and tilapia Feed Conversion Ratio (FCR) for rearing 1.3 (Saparinto, 2013).

Tabel 2. Total and Value of Tilapia Seed Production of UD. Reukan Beumaju in 2019

No	Size(cm)	Total (Fish)	Price(Rp)	Value
1	2-3	274.000	200	54.800.000
2	3-5	292.000	300	87.600.000
3	5-7	23.000	400	8.600.000
Total		659.000		140.000.000

Source: Primer Data, 2019

Table 3. Table of Fish Seed Sales Price by Seed Size

No	Size (Cm)	Price(Rp)	Remark
1	2 - 3	200	High Demand
2	3 - 5	300	High Demand
3	5 - 7	400	Middle Demand

Source: Primer Data, 2019

Discussion

Beutong Subdistrict, is one of the sub-districts in Nagan Raya Regency at Aceh Province, Indonesia which has a very potential freshwater aquaculture fishery resources, where the area is 2000 km² with the water source coming from the Beutoeng river. Tilapia hatchery business is located in Blang Dalam village which has a population of 435 people (BPS, 2018). This sub-district is located on the outskirts of the mountains, which is about 45 km from the coast. Blang Dalam village is one of 24 villages in Beutong sub-district, which has potential aquaculture potential, this is indicated by the potential for land and freshwater sources that flow.

The level of production is a factor of activities and a function of the number of broodstock and the implementation and marketing of the products, as well as the number of ponds. Production obtained for 12 months by UD. Reukan Beumaju is 1.2 million heads, as the basic capital in carrying out activities or business of rearing tilapia because seeds are the main input factor in cultivation to get consumption-sized fish. Tilapia can grow well, in the lowlands and temperatures of 27-30 degrees Celsius. Growth for a population is the increase in the number of individuals, where the factors that influence it can be internal and external factors. Internal factors include age, heredity and gender, while external factors include temperature, food, disease, cultivation media, and so on (Effendi, 1997).

Based on data on the potential for rice fields covering an area of 2.857,5 ha, enlargement can be carried out in only 120 ha of rice fields, where from 120 ha of land, it is only used for fish enlargement business activities, every hectare of rice fields is made to dig ponds or edge of rice fields, with pond system or rice mina covering an area of 1000 square meters and 10.000 seeds or 10 fish per meter of land area can be stocked, it will produce 120 tons of fish per

harvest and it is carried out 3 times a year, so as many as 360 tons of fish will be obtained per harvest.

By the assumption, the enlargement business can be carried out continuously then 3.6 million seeds will be required per year and with a production output of 380 tons, it can meet the fish needs of the Beutong community by 60%, of the total requirement of 540 tons per year and in fact it will continue to be increased, so that it will make Beutong District a center for the development of freshwater fish cultivation in Nagan Raya Regency. The hatchery business prospects need to be improved by UD. *Reukan Beumaju* or other People's hatchery units (UPR), in order to meet the need for seeds. Currently, the seed production by UD. The Beumaju Reukan is only 1.2 million head per year and its marketing is not only for the Beutong community, but includes Nagan Raya Regency and outside districts.

This potential business is certainly an opportunity for policy makers to think about taking advantage of this business potential. It is necessary to conduct a review of the extent to which these activities or opportunities can benefit the community. This review can be done using a business feasibility study. A business feasibility study is a reviewer or analysis of whether an investment activity provides benefits or results when implemented (Nurmalina *et al.*, 2009)

One of the social aspects is human resources as the objects and subjects of development. The total population in Beutong District is 14.765 people, with a total of 3.824 family card, consisting of 24 villages and a rice field area of 2.857,5 ha (BPS, 2019). With the size of population, it is very possible to do fish farming, either hatchery or tilapia enlargement. Of the total number of families of 3.834. If 5% of them carry out cultivation activities. there will be as many as 190 households engaged in tilapia fish farming. To make this happens, it certainly needs socialization, government policies regarding technical development.

190 households that are projected to carry out aquaculture activities, fish production will be greater, provided that the implementation of business-oriented cultivation, where each household has an area of 1000 square meters of fish ponds, then the production will be obtained 190 tons per harvest, and this exceeds the target. This is very possible, because the social environment is a farming community environment (social farm), and the results of interviews conducted, the community has a strong desire for cultivation, and is supported by the hatchery business by UD. *Reukan Beumaju*, whose business study can be seen in the following description, where in its development, technical agencies and government attention are needed to encourage and support in the form of seed subsidies and feed prices for fish cultivators in Beutong District.

The need of cultivation development for the stocking of 10.000 seeds, with a target harvest of 1 ton requires feed between 1 and 1.5 tonnes. According to Salsabila & Suprpto (2015), the conversion or Food Conversion ratio (FCR) of feed in traditional system maintenance is 1.5, so the required capital to purchase feed and seeds is Rp. 15,000,000, which is used to buy seeds with a size of 3-5 cm in the amount of Rp. 3.000.000 and for feed as much as Rp. 12.000.000.

The hatchery process began with the maintenance of male and female parents in one pond or can be separated with a density of 300 individuals. The broodstock was divided into several groups and kept separately with the water level for the broodstock was 70 cm. The feed was

given in the form of 781 plus pellets with feeding done 2 times a day (10 & 3 hours). Mains selection is the initial stage in fish farming activities that will determine the success of seed production. Mother selection aims to get superior seeds.

Operating costs consist of fixed costs and operating costs; which consists of the cost of making pond land and purchasing equipment such as: construction of ponds, guard houses, scales, scoops, nets, buckets, female parent, male parent, feed warehouse, fence and oxygen tube. Where these costs are more inclined to depreciation costs. Depreciation cost is a cost that must be calculated as a result of reducing the economic value of an item, technically ending, so the item cannot be used anymore, except for the maintenance pool. The cost incurred is Rp. 181.285.000, which consists of: operational costs incurred by the Beumaju Partners business in conducting tilapia hatchery cultivation, including: parent feed, seed feed, medicine, plastic packing, oxygen, rubber ties, eating kariawan and wages of two workers with a total cost of Rp. 110.113.000 rupiah. The details of operational costs are as follows.

The study on the development of tilapia rearing business in Beutong District, Nagan Raya can be developed considering the community's need for such a large demand for consumption fish, which is supported by public interest, land feasibility and water sources as technical factors, social potential and existing business feasibility. Tilapia can be properly maintained at an altitude of 500 m above sea level or less (Directorate of PMP, 2007).

The need for developing a cultivation business is carried out, because fish plays an important role in fulfilling nutrition sources and life security for humans. Fish also serves as a source of plural unsaturated fatty acids (PUFA's) protein, minerals and vitamins. Although fish is rich in nutrients, it is a material that spoils quickly and has a short shelf life. Fish and other fishery products have a specific shape and taste, and provide a distinctive appeal, so they are widely liked. The fresh nature of fishery products is generally more preferred than the nature after experiencing processing treatment.

Conclusion

A study on the development of tilapia fish farming in the Beutong District area can be developed considering the technical and social potential, as well as business feasibility. The needs of the people of Beutong District and its surroundings for consumption fish are increasing, while the presence of marine fish is decreasing, so that a political will is needed for the development of freshwater fish farming, especially tilapia, both hatchery and rearing. The fish farming business in Beutong District is feasible to run, as shown by *UD. Reukan Beumaju* with the income level of gift tilapia hatchery business at Beumaju Partners business in one year is Rp. 123.777.000 B/C Ratio of IDR 1.65 Payback period 0.8. The break event point price is Rp.147.36/head while the production point break event is Rp.724,468/year.

References

- Aliyas, Ndobe S dan Raihani Z. 2016. Pertumbuhan dan Kelangsungan Hidup Ikan Nila (*oreochromis sp*) yang Dipelihara pada Media Bersalinitas. *Jurnal Sains dan Teknologi*. (5)1.
- Adzani. 2020. *Manfaat Omega 3, Lemak Tak Jenuh yang Serba Bisa*. <https://www.sehatq.com/artikel/manfaat-omega-3-lemak-tak-jenuh-yang-serba-bisa>
- Dewi, PFA, Widarti, A. & Sukraniti, DP. 2018. fishwater. *Jurnal Ilmu Gizi: Journal of nutrition Science*.7(1).
- Direktorat Pemberdayaan Masyarakat Pesisir (2007). *Teknologi untuk Pemberdayaan Masyarakat Pesisir*. Seri Budidaya Perikanan. Jakarta
- Effendi. 2004. *Pengantar Akuakultur Jakarta*: Penebar Swadaya
- Fakhruzzaman, A. 2010. Analisis Kelayakan Usaha Pembenihan Ikan Nila Gesit (Studi: Unit Pembenihan Rakyat Citomi Desa Tanggulun Barat, Kec. Kalijati, Kab. Subang Jawa Barat). *Skripsi*. Fakultas Ekonomi dan Manajemen. Institut Pertanian Bogor.
- Kementerian Kelautan dan Perikanan (2015). *Laporan Kinerja Kementerian Kelautan dan Perikanan 2014*. Jakarta
- Kasmir dan Jakfa. 2003. *Studi Kelayakan Bisnis. Edisi 2*. Prenata Media Group. Jakarta
- Nurmalina, Sariati & Karyadi 2009. Studi Kelayakan Bisnis. Bogor: Departemen Agribisnis. Fakultas Ekonomi dan Manajemen. Institut pertanian. *Journal. Proceeding of Engineering*.2(2)
- Sanusi, B. 2000. *Pengantar Evaluasi Proyek*. Fakultas Ekonomi Universitas Indonesia. Jakarta.
- Saparinto, C Susiana, R 2013. *Sukses Pembenihan 6 Jenis Ikan Air Tawar*. Andi. Yogyakarta.
- Salsabila, M dan Suprpto, H. 2015. Teknik Pembesaran Ikan Nila (*Oreochromis n\Niloticus*) di Instalasi Budidaya Air Tawar Pandaan, Jawa Timur. *Journal of Aquaculture and Fish Health*.7(3)
- Umar. 2003. *Studi Kelayakan Bisnis*. Jakarta: PT Gramedia Pustaka Utama.