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Potential for Aquaculture of Lais Fish (*Kryptoterus palembangensis*) in Swamplands

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ABSTRACT

Lais fish (Kryptopterus palembangensis) is one of the endemic fish in South Sumatra. The availability of lais fish in nature began to decline because continuous fishing by the community would interfere with the sustainability of lais fish. It is known that high economic value is the cause. Therefore, efforts need to be made to develop lais fish farming so that it can be produced in a controlled manner. The writing method used is a literature study. The technology and management of lais fish include differences in stocking density in floating net cages, feeding different types of feed, soaking larvae in probiotic solutions, the influence of temperature differences and maturation of gonads with Fe minerals. Then for the average water quality in the growth of lais fish is a temperature of 25.2-32°C, a pH range of 4.7-7.9, DO 2.6-8 mg.L^{-1} and ammonia content ranging from 0.010-2 mg.L^{-1}. Lais fish belong to the group of carnivorous fish because its main types of food are small fish, insecta and shrimp. In fish studied in a controlled manner, feed using tubifex sp. provides the highest growth and survival. Spawning of wedge lais fish (Kryptopterus palembangensis) once a year with a total spawning pattern of spawners in the rainy season where at the time of splashing water begins to rise and spawning is carried out in the crevices of the rocks. The picture of blood cells is a supporting aspect in determining the health status of fish. The physiological condition of healthy fish is characterized by the presence of increased growth. Physiological growth of lais fish in a healthy state i.e., total erythrocytes 264±3.0x10^{4} cells mm^{-3}, hemoglobin 8.3±0.11 g/dL, hematocrit 26.66±0.57%, total leukocytes 2.53±0.01 x 104 cells mm^{-3} and Blood glucose 89.00 ± 1.00 mg / dL

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INTRODUCTION

Indonesia is recognized as one of the countries with the greatest fish biodiversity in the world. According to the Fish database, Indonesia has 8.500 species of fish residing in its waters, 440 of which are endemic freshwater fish (Kementerian Kelautan dan Perikanan, 2015). An estimated 1.275 species in Indonesia have been included in the list of endangered fish categories, including lais fish. This lais fish is endemic to South Sumatra with the scientific name *Kryptopterus palembangensis*.

This fish is found in the Musi, Lematang, and Ogan Rivers. The economic value of lais fish in the fresh state is relatively high, reaching Rp. 80,000 per kg. If lais fish is processed into salai fish (smoked fish), the price reaches about Rp. 150,000 per kg. Because the demands of lais fish are satisfied by natural catches, the number of lais fish enthusiasts will impact the natural population decline. Studies on this fish's biological and ecological aspects have already been carried out but are still very lacking. There is no further information about the spawning, hatching, and aquaculture of lais fish (*Kryptoterus palembangensis*), especially in South Sumatra.

Based on preliminary research, observations, and conversations with lais fishmongers in the Indralaya and Jakabaring markets, the availability of lais fish varies considerably over time. This conclusion is contrary to the continuously rising consumer demand for lais fish, which has significance for its development requirements. As a result, increasing output and safeguarding them through controlled aquaculture is required to continue developing lais fish resources and maintaining their sustainability.

Domestication can improve the production of lais fish from the natural environment. Domestication enables formerly wild animals, mainly fish, to live and breed in under-regulated settings. The establishment of local fish-based agriculture can also be used to promote ecologically friendly agriculture, alleviate poverty, and support the food supply for local communities. (Nugroho *et al*., 2012).

Technically, the domestication of this one species for fish must take into consideration the location planned; the technology employed in domestication efforts; the required facilities and personnel; the availability of sufficient funding; and the biological characteristics of the fish (biological aspects; eating habits; growth; and other aspects). The lais fish (*Kryptoterus palembangensis*) has yet to be domesticated, and the population its naturally declining. Domesticating lais fish is crucial to ensure sustainability and satisfy market demand for these species. The research that has been done thus far on Lais lais (*Kryptoterus* sp.) includes the following: Study of gastric contents and growth of lais fish (Lukas & Minggawati, 2014), lais fish-eating Habits (Lestari *et al*., 2021), DNA barcode and kinship of tin lais fish (Syaifudin *et al*., 2021), lais fish Growth Pattern (Ahmadi, 2022), Feeding habits and spawning season of lais fish (Prasetyo, 2005), lais fish stocking density (Agusnimar *et al*., 2014).

Following this description, Lais fish aquaculture (*Kryptoterus palembangensis*) is required to reduce the requirement for nature sustainably. Thus, the analysis of the development of Lais fish aquaculture in the review of management and technology needs to be developed.

METHOD

The data method used in preparing this *review* journal comes from various literature. Several types of references are used, national and international scientific journals. The topic of this scientific article discusses management and technology, environment, feed, reproduction, and the health of Lais fish in South Sumatra. Data Analysis Literature studies are carried out to collect data from various sources with predetermined themes and select articles according to relevant titles. Then the data is selected and selected according to the topic of study. This article review was carried out from

2012 to 2022 by covering areas in Palembang, Riau Islands, Kalimantan, Bangka Islands, and Lampung.

RESULTS AND DISCUSSION

Aquaculture Lais fish

Lais fish belongs to the family *Siluridae,* which has the potential to be developed as a cultivated biota. The development of lais fish aquaculture has been carried out. Starting with the domestication strategies that have been used, one of which is the variation in stocking density in the floating net cages in Lake Kayangan (Nurmayani *et al.*, 2020). The difference in the stocking density applied gave optimal results at a density of 40 $L^{-1}s$; this shows that lais fish provides a good response, as can be seen from the average specific growth rate produced of 2.53% with feed efficiency of 55.69%. In addition to the stocking density of glass, catfish aquaculture has been varied with several treatments to obtain significant production results, including the provision of different types of feed. In the research conducted by (Maiyulianti *et al.*, 2017), The feed given is tubifex, pasta feed, pellets, and trash fish. The treatment with feed using tubifex gives the best results in absolute growth, specific growth rate, survival, feed efficiency, and feed conversion in lais fish seeds. This result aligns with the research (Agusnimar & Rosyadi, 2013). The best feed for selais fish larvae is *Tubifex* sp.

Treatment is needed to increase the survival of lais fish larvae in large quantities (mass) to survive until they become broods. Efendi et al. (2016) conducted a study of soaking larvae in probiotic solutions in a span of one time in six days, where the treatment had a very noticeable effect on the survival of lais fish larvae by 91.33%. Previous studies have been carried out are the effect of different temperatures on survival (Gunawan *et al.*, 2019) and the maturation of gonads with the mineral Fe (Sabara *et al.*, 2016).

Feed Lais Fish

Feed is an essential and limiting factor in the production of fish farming. Nutritious feed will positively affect fish growth, including micronutrient content such as protein, fat, and carbohydrates that suit the needs of fish (Syamsunarno et al., 2011). The food eaten by fish can be known from the analysis of the gastric contents of fish. If a variety of fish food organisms are abundant in water, it is not necessarily an essential part of the composition of fish food. Fish choose certain foods by finding them as the most significant part of the food in their stomach. Lais fish include carnivorous fish where fish and insect fragments make up the most significant percentage of lais fish's intestines and stomach (Prasetyo, 2005). This result is in line with the research conducted by Lukas & Minggawati (2014). Lais fish are classified as carnivorous fish because the primary type of food is small fish. The leading food of lais fish is insects, shrimp, and chicks (Lukas & Minggawati, 2014). According to Lestari *et al.* (2021), in addition to insects, there are several complementary foods in lais fish in the form of phytoplankton with the genus Synedra 7.98%, Rhizosolenia 7.72%, Aulacoseira 6.27%, Nitzichiace 6.14%, and Mastogloia 5.83%, other food lais fish in the form of phytoplankton with the genus Surirella 2.63%, Ulotrix 0.87%, Tribonema 0.21%, Oscillatoria 0.13%, and Anchanatidium 0.08%.

In the research conducted by Agusnimar & Rosyadi (2013), In lais fish larvae raised in an aquarium, the feed that gives optimal results is to use *Tubifex* sp. Supported by research conducted by Maiyulianti *et al.* (2017), treatment with the administration of *tubifex* sp. on jam fish fry gives the best results compared to pasta feed, pellets, and trash fish—Tubifex sp. The protein content in *tubifex* sp. is higher when compared to pasta feed, pellets, and trash fish, so it will help fish growth. Protein is the most crucial nutrient for fish because it is helpful for body maintenance, body tissue formation, replacement of damaged tissues, and addition (synthesis) of body proteins in the growth process (Negara *et al.*, 2022). If the supply of protein in the feed is optimal, fish will grow well. (Yolanda & Marhento, 2022).

Reproduction of Lais fish

K. palembangensis is widely found in the rainy season, closely related to food availability, migration, and flood cycles (Gumiri *et al.*, 2018). Spawning of wedge lais fish (*Kryptopterus palembangensis*) once a year with a total spawning pattern of spawners in the rainy season where the water begins at the time of splashing to rise, and spawning is carried out in the crevices of the rocks. Problems in spawning lais fish still depend on the spawning season. So, it is necessary to increase seed production by hormonal induction. Supporting factors include the substrate's nature and physicochemical conditions that can threaten its suitability as a spawning ground for fish (Chumacero *et al.*, 2020). The *wedge Laish fish's first maturity* (Lm) is at a standard length of 85.31 mm, ranging between 84.53 - 85.71 mm.

The characteristic features of the female fish mother have a wider and fatter body size than the male fish. In addition, the shape of the head of the male fish is narrower and pointed when compared with the female fish. The total length size range of male fish ranges from 13.1-17.4 cm and weighs 10.7-27.55 grams, while female fish's body length ranges from 13.1-19 cm and weighs 12.6-51.1 grams. Fecundity is the number of eggs that have matured in the ovary of a fish before being removed or spawned. Fecundity measurements were made in female fish with mature gonads (TKG IV). During the study, one female fish matured gonads with a total of 10,656 eggs, a total body length of 9.3 cm, and a total body weight of 4.45 g. The fecundity of *Kryptoterus* eggs amounted to 10,657 eggs (Jusmaldi *et al.*, 2019; Ragheb, 2016).

The size of lais fish eggs is relatively the same between the anterior, middle, and posterior ovaries. This condition suggests that fish eggs mature together or have a total spawner. This is meaning they have one spawning season a year. *K. bicirrhis* fish roe no difference between each part, indicating that *K. Bicirrhis* fish is *a total spawner*. Similar to the research of Jusmaldi *et al* (2019), that in the long lais fish buoy (*K. Apogon*) has a total spawner *spawning* type.

Fish Health Status

Health in fish is influenced by several aspects, such as adequate water quality, adequate feed, and the prevalence rate of pathogens (Ferdiansyah *et al.*, 2016). The picture of blood cells is a supporting aspect in determining the health status of fish. Blood is one of the defense components

from disease attacks that enter the body of fish (Saparuddin, 2019). Fish blood hematology can be used as an indicator to determine the state of health of fish.

Natural mortality can vary significantly from year to year depending on changes in predation, food availability, diseases, and other biological and environmental factors (Björnsson *et al.*, 2022). This parameter can provide important information about the physiological status of the fish (Hastuti & Subandiyono, 2015). The physiological condition of healthy fish is characterized by increased growth. Physiological growth of Lais fish in a healthy state, i.e., total erythrocytes 264.00 ± 3.00 x104 cells mm-3, hemoglobin 8.3±0.11 g/dL, hematocrit 26.66±0.57%, total leukocytes 2.53±0.01 x 104 cells mm^{-3} and blood glucose 89.00 ± 1.00 mg/dL (Addini *et al.*, 2020).

Habitat and Environmental Conditions

Optimum water quality will support fish life from growth, health, and reproduction in Lais fish farming. Swamp waters, especially in South Sumatra, are still acidic, with a high enough ammonia and dissolved iron content that causes a low percentage of fish survival and growth (Marsi *et al.*, 2016). Only local fish typical of swamps can survive and still grow better than other fresh fish. Lais fish is a fish that has a habitat in river waters and swamp forests. Therefore, Lais fish will be able to grow and develop in swamp water (Prasetyo, 2005).

Table 1. Water Quality from Various References

No	Researchers	Water Quality			
		Temperature (°C)	pH	DO (mg L^{-1})	Amonia(mg L^{-1})
1	Agusnimar *et al.* (2014)	27.00-32.00	5.00-5.50	6.00-6.20	1.500-2.000
2	Efendi *et al.* (2016)	26.00-31.00	6.00-6.50	4.00-6.50	0.780-1.420
3	Maiyulianti *et al.* (2017)	25.20-27.50	4.90-7.00	4.00-8.00	0.200-0.500
4	Gunawan *et al.* (2019)	29.00	4.70-7.90	4.00-7.90	0.030-0.079
5	Syaifudin *et al.* (2021)	29.10-31.10	7.10-7.58	3.10-5.50	0.160-0.260

Water quality data on the maintenance of lais fish are shown in table 1. The average water quality data is still in optimal conditions for fish farming with a temperature range of 25.20-32.00°C. Temperature is a factor in water physics that plays a vital role in fish farming production. The temperature will affect appetite, digestion rate, and fish metabolism will impact growth (Syaifudin *et al.*, 2021; Zonneveld *et al.*, 1991). According to Stickney (1979), The metabolic rate of most fish species will increase above the optimum temperature then the energy begins to be diverted from growth to a high metabolic rate. According to (Kelabora, 2010), High water temperatures can result in most of the energy stored in the fish's body being used to adjust to a less supportive environment, damaging the metabolic system or exchanging substances. Therefore, fish growth is slow when the temperature is below and above optimum, caused by relatively low feed consumption. Temperature changes will affect food intake, metabolic processes, enzymatic processes, protein synthesis, and diffusion of small molecules (Chapman, 1996). Then in the pH range of 4.70-7.90, some types of fish that, because of their original living environment, are in the swamps have the resistance to live at a low pH. The *dissolved oxygen* ranges from 2.60-8.00 mg L^{-1}, and ammonia content ranges from 0.010-2.000 mg L^{-1}.

CONCLUSION

The development of Lais fish aquaculture (*Kryptoterus palembangensis*) needs to be carried out through management and technology in terms of feed approach, reproduction, health status, and environmental conditions. Therefor it can be used as one of the aquaculture commodities in a controlled manner to maintain sustainability and meet the demand of the lais fish market.

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