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A short review on status, trends and prospects of Jerbung Shrimp (*Fenneropenaeus merguiensis* de Man) in Indonesia

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ABSTRACT

Jerbung shrimp *(Fenneropenaeus merguiensis* de Man) is a native Indonesian shrimp that can be found in the waters of the Arafuru Sea in Maluku Province. Jerbung shrimp is a type of commercial shrimp that has high economic value. Jerbung shrimp has several advantages to be used as a national aquaculture commodity, among others, can mature gonads relatively quickly, fast growth rates, tolerant of changes in salinity, has a low level of variability and is resistant to various shrimp diseases when compared with pacific white shrimp *(Litopenaeus vannamei)* and tiger prawn *(Penaeus monodon)* classified as still vulnerable to disease infections, especially WSSV. The status of jerbung shrimp production in Indonesia is currently still obtained from wild catches that are carried out intensively and it is feared that it can cause pressure on the population of jerbung shrimp. Knowledge about the characteristics, distribution, and techniques of shrimp cultivation is still needed to preserve native Indonesian commodities so that it can increase the country's foreign exchange and can reduce excessive shrimp fishing activities in nature.

Key word : *Aquaculture Industrialization, Fisheries commodity, Jerbung Shrimp and Indonesia.*

Introduction

Shrimp is one of the leading commodities from the aquaculture sector worldwide including Indonesia because it has a high economic value in the global market (Kementerian Kelautan dan Perikanan, 2017). National shrimp production is currently still produced from two leading commodities, namely pacific white shrimp *(Litopenaeus vannamei*) with a total of 70% of the total national shrimp production and tiger prawn *(Penaeus monodon)* reaching 19% and several types of shrimp obtained from the catch including water shrimp bargaining (Hargiyatno and Sumiono, 2013; Anshary *et al.*, 2017).

The increasing demand for pacific white shrimp has caused national shrimp farmers to apply intensive to super-intensive cultivation systems (Farras *et al.*, 2017; Sriwulan *et al.*, 2019). However, this can cause susceptibility to disease attacks in cultured shrimp such as WSSV (Wiradana *et al.*, 2019), IMNV (Prasad *et al.*, 2017) to AHPND (De Schryver *et al.*, 2014). Based on this, the Ministry of Maritime Af-

fairs and Fisheries through the Directorate General of Fisheries and Aquaculture is implementing a new type of shrimp culture to be able to optimize the performance of national shrimp production when there is a decline due to disease attacks and to cut dependence on imported seeds such as pacific white shrimp.

Jerbung shrimp *(Fenneropenaeus merguiensis* de Man) is a native Indonesian shrimp that can be found in the Malaka Strait Sumatera, the Java Sea and the Arafuru Sea (Soegianto and Hamami, 2007; Silaen and Mulya, 2018; Suryanti *et al.*, 2018; Soegianto *et al.*, 2012). Jerbung shrimp are commercial shrimp species that have high economic value (Narumi *et al.*, 2009; Kusrini, 2011). In the world of aquaculture and international trade, jerbung shrimp has many names such as white prawn (Hong Kong), banana prawn (Australia), red foot shrimp (Malaysia) and in Indonesia has several local names such as white shrimp, deer, female shrimp, popet shrimp, kelong shrimp, cap shrimp, pate shrimp, shrimps, pelak, kebo, wind, haku, wangkang, pesayan and sharp shrimp (Martosubroto, 1977; Mulya and Yunasfi, 2018). Based on a study conducted at BBPBAP Jepara, Central Java that as a new commodity, jerbung shrimp has advantages such as being free from the threat of various shrimp diseases when compared to pacific white shrimp and tiger prawns which are still vulnerable to disease infections, especially WSSV.

Another advantage possessed by jerbung shrimp is the availability of shrimp broodstock which can be found in Indonesian waters so that it does not require the importation of broodstock to seedling activities as is the case with pacific white shrimp. Economically, the price of jerbung shrimp with size 30 can reach IDR 80,000/kg and to date the price of these shrimps is still fluctuating according to the catch in nature (Kusrini, 2011; Chansela *et al.*, 2012). Intensive nature capture activities can also cause pressure on the population of jerbung shrimp, which in turn can affect genetic diversity, decrease adaptability, decrease growth, and decrease resistance to disease. This review discussed Jerbung shrimp status, trends, and potential development in Indonesia.

Aquaculture Sector in Indonesia

World aquaculture activities continue to experience rapid development to be able to meet the needs of community fish. Aquaculture activities are one alternative that can be done to maintain the sustainability of fish stocks in the wild as a result of uncontrolled capture fisheries activities. Growth in the world's population is estimated at more than seven billion people and is expected to continue to increase above nine billion by 2050 (Bongaarts, 2009). It is known to be a new challenge to continue to develop livestock business, one of which is aquaculture to be able to meet the food needs of the human population which will continue to increase in the future.

Indonesia is the largest archipelagic country in the world with a large potential output from the marine and fisheries sector. This potential is spread along ±5.8 million km^2 of maritime zones consisting of archipelago waters (2.3 million km^2), territorial waters (0.8 million km^2) and Exclusive Economic Zones (EEZ) (2.7 million km^2) (Rasyid, 2015). Based on this, Indonesia has the potential to develop aquaculture to be able to increase national income and meet the needs of the global market due to an increase in the human population.

Based on the data it can be seen that the value of fisheries production in Indonesia continues to increase especially in the aquaculture sector (Figure 1) (Badan Pusat Statistik, 2017). Therefore, aquaculture activities can be one of the main solutions for fulfilling community nutrition through the consumption of fishery products and reducing the capture of fisheries resources in nature (Klinger and Naylor, 2012). This is consistent with the statement of the Food and Agriculture Organization (FAO) that aquaculture activities can become the main food production sector to be able to meet global food needs with rapid growth in addition to the agriculture and livestock sectors (FAO, 2016).

Indonesia has become one of the countries with

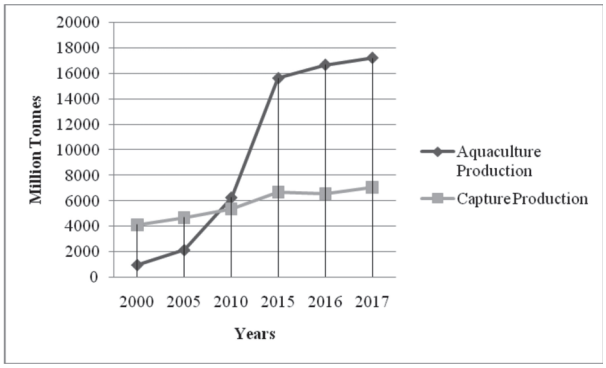

Fig. 1. Aquaculture and Capture production in Indonesia (2000-2017). Source. Badan Pusat Statistik (2017)

an increasing level of aquaculture productivity. Based on Figure 1, it was noted that until 2017 the total aquaculture production reached 17.22 million tons higher compared to production through capture fisheries which were 6.04 million tons (Badan Pusat Statistik, 2017). Global aquaculture production both from shrimp, shellfish, and fish must continue to increase and also to reduce fishing activities that are overexploited in the wild (Bosma and Verdegem, 2011). In general, the current value of aquaculture production is still dominated by China and several other Asian countries including Indonesia (Gephart and Pace, 2015). The export value of aquaculture products in Indonesia during the January-November period in 2016-2017 increased with export destination countries including the United States (12.82%), Japan (8.31%), ASEAN (3.42%), China (11.28%), and European Union (9.38%) (Kementerian Kelautan and Perikanan, 2017). Exports of aquaculture products include finfish, mollusks, crustaceans and aquatic plants.

Status of Shrimp Culture in Indonesia

Crustaceans, including shrimp, are the leading aquaculture commodities in Indonesia which have high economic value (citation). Indonesia is one of the largest shrimp exporting countries in the world, especially to Japan and the United States (Wati *et al.,* 2013). The value of shrimp commodity exports in Indonesia in the 2012-2017 period increased by 10.40% (Table 1). However, globally the value of Indonesian shrimp exports is still low when compared to Thailand, China, and Vietnam (Gephart and Pace, 2015; Mashari *et al.,* 2019).

Table 1 shows that the value of shrimp commodity exports has increased by 10.40% per year. While the value of Tuna-Skipjack (T-Sk) exports tends to decrease by 1.9% per year, as well as for other commodities by 3.20%. Based on these data it can be seen that shrimp farming is still potential to continue to be developed in Indonesia. Shrimp commodity that is still the mainstay in Indonesia is pacific white shrimp *(Litopenaeus vannamei)* with a production value of 12% per year (Direktorat Jenderal Perikanan Budidaya, 2016). Efforts undertaken by the government to maintain the stability of national shrimp production are by providing seeds and brood specific pathogen-free (SPF) or Disease Resistant (DR) (Maheswarudu *et al*., 2016) and the application of technologies such as Biofloc (Bossier and Ekasari, 2017), *Recirculating Aquaculture System* (RAS) (Suantika *et al.,* 2018) and microbubble applications (Wiratni *et al.,* 2017).

However, the threat of disease is still experienced in the cultivation of pacific white shrimp, intensification and diversification activities in aquaculture practices can lead to opportunities for the emergence of various diseases that make shrimp farmers afraid to achieve sustainable production (Prasad *et al.,* 2017). The threat of diseases such as the *White Spot Syndrome Virus* (WSSV) is one of the shrimp diseases that which can result in a decrease in mass production with a relatively fast death pattern (Flegel, 2012; Wiradana *et al.*, 2019). Other pacific white shrimp viral diseases which are the main concern are the *Infectious Myonecrosis Virus* (IMNV) which is an RNA virus from the family of Totiviridae that causes infectious myonecrosis and has been reported for the first time to appear in Brazil and has now been endemic in Indonesia (Prasad *et al.*, 2017).

Based on this, the Indonesian government through the Ministry of Maritime Affairs and Fisheries seeks to develop new types of shrimp that are more resistant to disease and environmental stress due to high stocking densities. Jerbung shrimp is a

Table 1. Value of Main Commodity Exports in Indonesia in 2012-2017

	Value of Main Commodity Exports in Indonesia (USD Million)					
	S-C-O	Crabs	Seaweed	T-Sk	Shrimp	Others
2012	168	330	178	750	1,152	1.294
2013	144	359	210	765	1,454	1,229
2014	155	414	280	692	1,875	1,225
2015	213	310	205	584	1,450	1,182
2016	337	322	162	566	1,568	1,217
2017	397	411	205	660	1,746	1,095

Note : S-C-O : Squid-Cuttlefish-Octopus; T-Sk : Tuna-Skipjack. Source Data : Badan Pusat Statistik (2017)

new commodity shrimp that is currently being successfully developed to be able to contribute to the aquaculture sector in Indonesia.

Jerbung Shrimp (*Fenneropenaeus merguiensis* de Man)

Fenneropenaeus merguiensis de Man is a penaeid shrimp which has the following classification (Martin and Davis, 2001):

Kingdom : Animalia
Phylum : Arthropoda
SubPhylum : Crustacea Brunnich, 1772
Class : Malacostraca Latreille, 1802
Subclass : Eumalacostraca Grobben, 1892
Order : Decapoda Latreille, 1802
Family : Penaeidae Rafinesque, 1815
Genus : *Fenneropenaeus* Perez-Farfante, 1969
Species : *Fenneropenaeus merguiensis* de Man

Jerbung shrimp has a cream color and there is no dark brown stripe across the carapace. The shrimp rostrum is shorter, has 8-10 teeth in the dorsal section and 5-6 teeth in the ventral section. There is no hepatic thorn so carapace will look slippery and there are no thorns on the telson (Bailey-Brock and Moss, 1992). The antenulla has a brown line but not the antennae. The legs and pleopods are yellowish and sometimes brown or pink. Uropods are a combination of yellowish-green to brownish. At the top of the rostrum it is brown (Holothuis, 1980) (Figure 2).

Fig. 2. Jerbung Shrimp *Fenneropenaeus merguiensis* de Man (Sani, 2017)

Habitat and Distribution of Jerbung Shrimp in Indonesia

Jerbung shrimp is a species of shrimp native to Indonesian waters. Until now, the distribution of jerbung shrimp in Indonesia is quite extensive, starting from the western waters of Sumatra, the Straits of Malacca, the East Coast of Sumatra, the North Coast of Java, the South Coast of Java, West Kalimantan, South Kalimantan, East Kalimantan, South Sulawesi, Bintuni Bay, Aru Islands and Arafuru Sea (Figure 3) (Kusrini, 2011; Sani, 2017).

Besides in Indonesian waters, the spread of jerbung shrimp can also be found in several countries in the Asian region such as Thailand, Hong Kong, the Philippines, New Guinea, Caledonia, and western, northern, and eastern Australia (Sani, 2017). In general, the habitat of jerbung shrimp is muddy waters with high turbidity. The depth of the jerbung shrimp habitat is in the range of 10-45 m at the bottom of the waters (Brailey-Brock and Moss, 1992). Adult species will periodically form clusters in offshore areas (Holothuis, 1980). Juvenile of jerbung shrimp can also be found in mangrove areas because in that phase of shrimp will utilize estuary waters as a nursery ground habitat (Vance *et al.*, 1998). Until finally in the next 3 to 4 months juveniles of shrimp that have matured will go to open water until they reach the spawning ground (Meager and Government, 2014; Sani, 2017).

Present Status of Jerbung Shrimp in Indonesia

Jerbung shrimp is a penaeid type of shrimp with high economic value in the Indo-West Pacific region (Chansela *et al.*, 2012) and is generally widespread in almost all Indonesian waters (Figure 3). The report states that jerbung shrimp has several advantages to be used as a national aquaculture commodity, among others, it has the ability to mature gonads relatively quickly, fast growth rates, tolerant of changes in salinity and has a low level of variability (Hoang, 2001; Sani, 2017).

However, the current status of jerbung shrimp production in Indonesia is still obtained from wild catches that are carried out intensively and it is feared it could cause pressure on the shrimp population (Sani, 2017). The Sumiono and Djamali (2006) report state that since the ban on trawl use in 1988, tool replacement through mini trawls began to be developed as a shrimp catching tool followed by tidal trapping such as splinting and togo.

For example, in the waters of Tarakan, East Bornea which conducts intensive shrimp catching activities throughout the year by using mini trawls measuring 1.5 inches and 1 inch at the ends (Research Institute for Marine Fisheries, 2012). Conditions like this can cause a decrease in shrimp resources in nature so it requires the application of better management practices to maintain shrimp

Fig. 3. Distribution of the Jerbung Shrimp in Indonesia. Note : 1) West Sumatra Waters; 2) Malacca Strait; 3) East Coast of Sumatra; 4) North Coast of Java; 5) South Coast of Java; 6) West Kalimantan; 7) South Kalimantan; 8) Bintuni Bay; 9) Aru Islands; 10) Arafuru Sea.

resources, especially jerbung shrimp in a sustainable manner (Kembaren and Suman, 2013).

Efforts to monitor the resources of wild shrimp in nature can be done by monitoring the length and weight of shrimps. As the report of Kembaren and Suman (2013) who measured Jerbung shrimp in Tarakan waters stated that the length of Jerbung shrimp in Tarakan was higher compared to Jerbung shrimp found in several coastal waters in Indonesia such as Panimbang, West Java, Mayangan, Cilacap and Bone waters with the length values are 27.02 mm, 22.1 mm, 28.9 mm, 18 mm and 21.33 mm respectively (Kembaren *et al.,* 2012). Environmental conditions and fishing gear used by fishermen can trigger differences in the size, size of gonad maturity, and growth of jerbung shrimp (Kembaren and Suman, 2013).

Death status was also reported to occur in shrimp in Kotabaru waters with a total of 4.52 deaths per year, natural deaths of 1.96 per year) and deaths due to capture of 2.56 per year. In the Cilacap area, the total mortality of wild shrimp is 1.96 per year and due to capture is 5.06 per year (Saputra and Subiyanto, 2007). And the latest report from Kembaren *et al.* (2012) states that the total mortality rate, natural mortality, and mortality rate due to catching wild shrimp are respectively 7.86 per year, 1.90 per year, and 5.96 per year. Looking at these data, we assume that the current status of wild shrimp in nature tends to lead to over-exploitation. The step of cultivation is very necessary to be able to reduce wild shrimp catching activities in the wild. As an initial effort, domestication activities are needed to support the success of shrimp culture. Besides, information on the population structure of wild shrimp in other waters in Indonesia is needed in the context of fisheries resource management and for genetic improvement in aquaculture systems (Chu *et al.,* 2003). That is because changes in small population size will cause a decrease in genetic variation in jerbung shrimp (Gleen *et al*., 1999; Sani, 2017). Reducing overfishing activities especially in March and September is recommended because this month is the natural egg-laying season for wild shrimp (Kembaren and Suman, 2013).

Future Prospect and Potentials Jerbung Shrimp in Indonesia Aquaculture

Jerbung shrimp has a great opportunity to be cultivated in Indonesia because Indonesia is currently one of the largest shrimp exporters in the world and the development of new shrimp commodities is urgently needed. Therefore, shrimp aquaculture activities have promising prospects to be able to reduce the gap between shrimp supply and demand, increase food security, and create more jobs. The level of national fish consumption in the 2014-2017 period increased by 46.49% and this trend is expected to increase (Badan Pusat Statistik, 2017). This shows that the trend of aquaculture production will continue to increase and thus the development of national shrimp production can also increase due to consumer demand and increased public consumption power. The development of jerbung shrimp

that has been carried out by the Balai Besar Perikanan Budidaya Air Payau (BBPBAP) Jepara, Central Java can make a good contribution to the development of new shrimp commodities in Indonesia. This is shown by the success of BBPBAP in developing jerbung shrimp broodstock and producing jerbung shrimp seeds that are ready to be applied to the community. It has been projected that Indonesia has an export target of 250% in 2024 in shrimp productivity. To be able to meet the increasing demand for shrimp, new shrimp commodities such as Jerbung Shrimp must be needed to reduce dependence on pacific white shrimps that are susceptible to disease in high stocking densities.

Conclusion

Jerbung shrimp farming activities may not have large productivity globally when compared with pacific white shrimp *(Litopenaeus vannamei)*, which was previously in demand by many countries. But jerbung shrimp has important potential to be developed as a new aquaculture commodity in Indonesia. As one of the leading commodities in Indonesia over the last few periods, shrimp is responsible for continuing to develop to maintain stability when other commodities decline. Indonesia is currently one of the largest shrimp exporters in the world so that knowledge about shrimp farming techniques such as jerbung shrimp is still needed to reduce excessive shrimp catching activities in the wild and can provide high-quality broodstock and hatchery efforts can be immediately applied by the community.

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