ASC SHRIMP STANDARD REVISION

Data Overview & Rationale for Change of Scope
Saltwater Shrimp Species

March 2020

Data Overview & Rationale for Change of Scope re. Saltwater Shrimp Species

Purpose

The purpose of this document is to present the acquired background data for the potential inclusion of *Penaeus (Litopenaeus) stylirostris, Penaeus (Feneropenaeus) merguiensis, Penaeus (Marsopenaeus) japonicus* and *Penaeus (Metapenaeus) ensis* within the ASC Shrimp Standard to all interested stakeholders

Background

The ASC Shrimp Standard v.1.1 is based on the anterior work of the Shrimp Aquaculture Dialogue (ShAD) and sets requirements that define what has been deemed 'acceptable' levels as regards the major social and environmental impacts of saltwater shrimp farming. The purpose of the ASC Shrimp Standard was and is to provide means to measurably improve the environmental and social performance of shrimp aquaculture operations worldwide.

The Standard currently covers species under the genius *Penaeus* (and *Litopenaeus*)[1] and is oriented towards the production of *L. vannamei* and *P. monodon.* Other species of shrimp are eligible for certification if they can meet the specified performance thresholds. Some countries, especially in Asia, experienced a substantial decline in exports in the last few years, mainly linked to reduced shrimp production due to disease problems. Related to this and advancing technology a species diversification has occurred.

An ASC desk study was facilitated in 2017 in order to identify potential new candidates for the inclusion in the standard. As a result, it was decided to further evaluate the potential inclusion of *Penaeus stylirostris* (Blue Shrimp), *Penaeus merguiensis* (Banana Prawn) and *Penaeus japonicus* (Kuruma Prawn). Discussion with various stakeholders further identified *Penaeus ensis* (Greasyback Shrimp) as a species of interest.

[1] The ASC's Technical Advisory Group (TAG) supported in November 2019 the proposal that based on recent research re. phylogenetic analyses of several shrimp within the family Penaidae, the *Penaeus* genus should be used to define all potential new saltwater shrimp species. This also means that from the Shrimp Standard Review's public consultation of March 2020, references to the 'Litopenaeus' genus will be removed and replaced by 'Penaeus', and/or used interchangeably. Notably, the Whiteleg shrimp *may* be referred to by ASC as '*Penaeus (Litopenaeus) vannamei*' – or 'P. vannamei' – and if so: this latter species refers to the same as the one listed in the scope of the Shrimp Standard v1.1 as '*Litopenaeus vannamei*' or '*L. vannamei*'.

Producer Countries and Volumes

The information in this section is based on the FAO species factsheets for *Penaeus stylirostris* (FAO, 2016a), *Penaeus merguiensis* (FAO, 2016b), *Penaeus japonicus* (FAO, 2016c) and the FAO State of the World Fisheries and Aquaculture Report ('SOFIA'; FAO, 2018a). As there is no species factsheet on *Penaeus ensis,* data for that species is based on the fishery and aquaculture statistics yearbook (FAO, 2018b).

Of the above-mentioned species, the aquaculture production of *P. japonicus* stands highest with 57,351 tonnes; followed by *P. merguiensis* with 24,681t and *P. stylirostris* with 2,401t. These species are also of significant interest to the wild-capture sector; with harvest levels standing respectively at 1,174t, 105,239t and 30,660t.

There is only very limited data available on the global aquaculture production of *P. ensis.* According to the FAO production has decreased in recent years with 754t in 2007 and 150t in 2016. Information on capture production of *P. ensis* is not available on the FAO website.

As seen in Fig. 1 the interest for aquaculture production of *P. stylirostris* and *P. merguiensis* has dropped in recent years. The main area of production for *P. stylirostris* are in Central America and the Pacific, mainly New Caledonia, Mexico and El Salvador. The two main producers of *P stylirostris* from New Caledonia are already ASC certified according to the requirements for *P. monodon*. The two farms have a combined production capacity of 780t per year. *P. merguiensis* is mainly produced in South-East Asia (Indonesia and Vietnam) and *P. japonicus* is produced in Asia, Europe and especially Australia, where it was one of the most valuable aquaculture sectors in 1999 (Hewitt and Duncan, 2001).

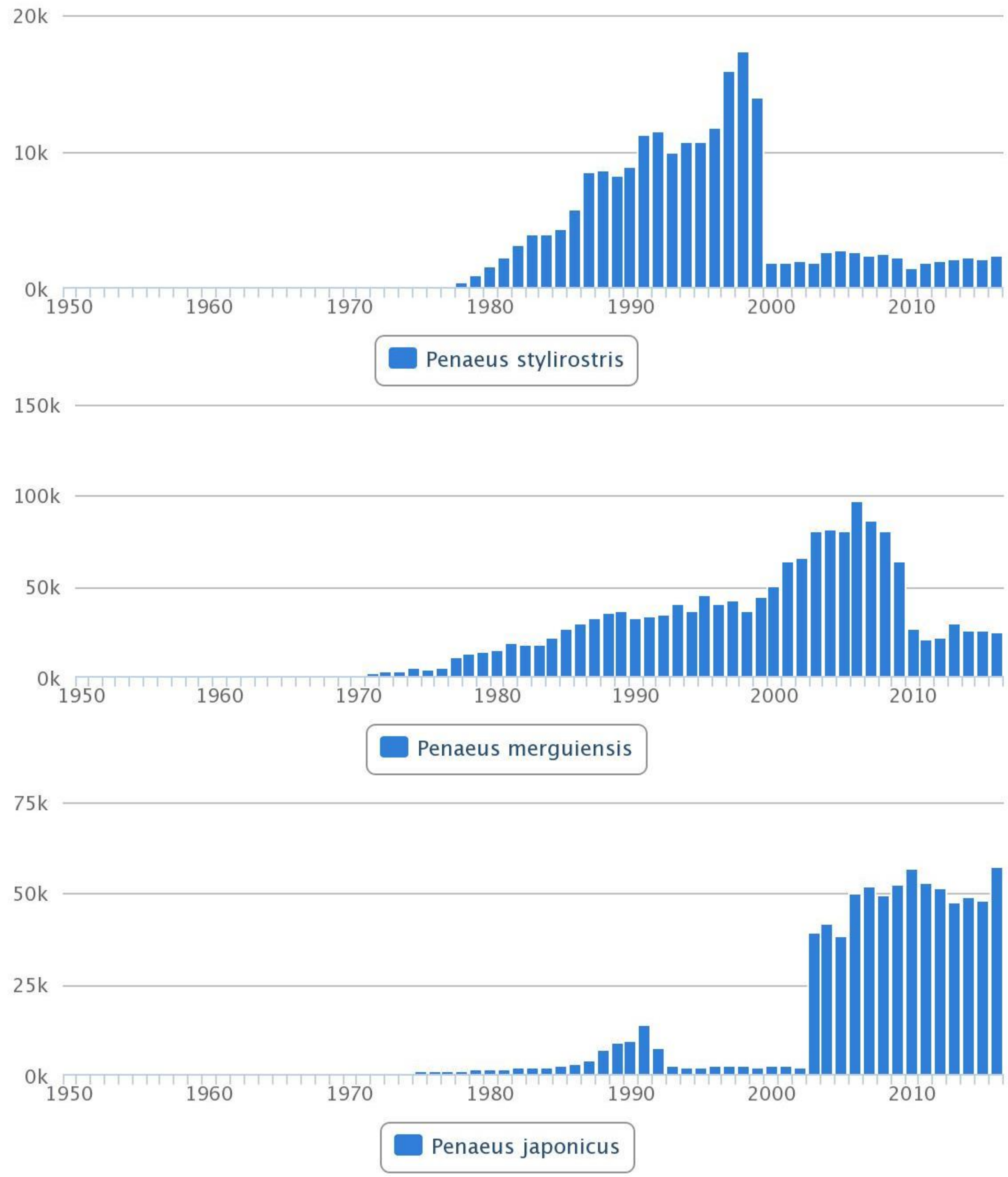

Figure 1: Global Aquaculture Production of *P. stylirostris, P. merguiensis* and *P. japonicus*. based on FAO FishStat (FAO, 2016a, 2016b, 2016c).

Considerations

The structure of this paper is based on the existing ASC Shrimp Standard v.1.1 (March 2019) and the performance indicators within that standard. ASC farm audit information and scientific literature were reviewed and form the basis of this paper.

There are currently[2] 11 ASC certified farms in Vietnam farming *P. merguiensis* and two farms in New Caledonia farming *P. stylirostris.* The farms in Vietnam are focussed on extensive farming of *P. monodon* and do not specifically stock *P. merguiensis*. Larvae enter the farm through the water inlet. Therefore, there is no data reported on survival rate, feeding rate or effluents.

The French farms are certified under the Shrimp Standard based on the requirements for *P. monodon*. Data presented in this paper is based on the initial audit in 2017. Due to issues with toxic algae in 2018, the data from the surveillance audit is not included.

Corresponding Metrics

The ASC Shrimp Standard v1.1 covers seven principles regarding legal regulations, environmentally suitable sighting and operation, community interactions, responsible operation practices, shrimp health management, stock management and resources use.

Principles are then divided into different criteria and indicators, each with qualitative or quantitative requirements; and some of which are species-specific. The species-specific indicators are listed in Table 1.

[2] As of January 2020

Table 1: Species specific indicators within the ASC Shrimp Standard v.1.0

Indicator	Requirement	Metric	Additional Information
5.1.3	Annual average farm survival rate (SR) 1) unfed and non-permanently aerated pond 2) fed but non-permanently aerated pond 3) fed and permanently aerated pond	1)>25% 2)>45% 3)>60%	
5.1.4	Percent of stoked lost larvae that are specific pathogen free (SPF) of specific pathogen resistant (SPR) for all important pathogens	100%	If commercially available
6.2.2	Percent of total post larvae from closed loop hatchery	100%	Reach 100% within six years after publication of the ASC shrimp standard
7.4.1	Feed Fish Equivalence Ratio (FFER)	1.35:1 1.9:1	*L. vannamei* *P. monodon*
7.4.2 a	economic Feed Conversion Ratio (eFCR)		Records available
7.4.2 b	Protein Retention Efficiency (PRE)		Records available
7.5.1	Nitrogen effluent per tonne of shrimp produced over a 12-month period	<25.2 kg/T <32.4 kg/T	*L. vannamei* *P. monodon*
7.5.2	Phosphorous effluent per tonne of shrimp produced over a 12-month period	<3.9 kg/T <5.4 kg/T	L. vannamei P. monodon
7.5.4	Treatment of effluent water from permanently aerated ponds; concentration of settleable solids	<3.3 mL/L	Evidence that discharge water goes through a treatment system
7.5.5	Percentage change in diurnal DO relative to DO at saturation in receiving water body for the waters specific salinity and temperature	<65%	

The ASC Shrimp Standard does not yet provide a threshold for eFCR and the protein retention efficiency (PRE) but requires the farmer to provide the records for the data within the audit. The average reported eFCR for all ASC certified shrimp farms, based on data received until April 2019, is 1.50 ± 0.34 (n= 113). The average PRE is 34.4 ± 10.8% (n = 105) (two farms were excluded from the data analysis as FCR and/or PRE were around 10-fold higher than in all other farms). Generally, protein requirements for penaeid shrimp are reported to vary between around 30% (L*. vannamei*) and up to 55% (*P. japonicus*) (Laubier and Laubier, 1993).

Literature Research

The global (all species) aquaculture production has risen continuously in the last decades and was at a total of 80.031 million tonnes in 2016 with about 7.862 million tonnes of crustaceans (FAO, 2018b). In 2016 about 72,000t of shrimp were certified under the ASC Shrimp Standard. The amount tripled to about 224,500t as of February 2020[3].

Shrimp and prawn farming has been identified as one of the aquaculture practices with the greatest environmental impact (Hall et al., 2011). It is thus paramount to drive the shrimp aquaculture industry towards more environmentally sustainable and responsible practices. Penaeid shrimp have been researched and farmed since the early 1970s with a focus on *P. monodon* due to its high commercial value and high growth rates (Briggs et al., 2004). The increased interest in more diversified shrimp farming practices over the past few years is not only driven by market consideration, but also by lower susceptibility to certain diseases, easier reproduction; as well as different environmental requirements such as broader optimal temperatures and salinities (Briggs et al., 2004; Laubier and Laubier, 1993).

The following sections focus on the four (4) potential new saltwater species for the ASC Shrimp Standard in terms of nutritional requirements and common culture techniques. As all four species belong to the *Penaeus* genus, and requirements are generally similar.

Blue Shrimp (*Penaeus (Litopenaeus) stylirostris*)

There is only limited data available for *Penaeus stylirostris* (Blue Shrimp). *P. stylirostris* has a similar protein requirement to *P. monodon* (~ [36 – 42]%) and comparatively higher survival rates and tolerates higher stocking densities (Briggs et al., 2004; Goyard et al., 2002). FCR of the two ASC certified farms was reported as 2.3, thus similar to literature data were the FCR was reported as 2.82 ± 0.22 (Hernandez-Llamas et al., 2004).

SPF and SPR stocks are available in New Caledonia (see audit report at SOPAC) and the Americas (Briggs et al., 2004). The so called Super Shrimp™ lines of *P. stylirostris* were developed by breeding survivors of IHHNV (infectious hypodermal hematopoietic necrosis virus) which eventually resulted in domesticated lines of blue shrimp with a high resistance to IHHNV (Wickins and Lee, 2002).

P. stylirostris is an open thelycum species (i.e. it has an absence of seminal receptacles) and thus easier to breed in captivity (comparable to *L. vannamei*) (Briggs et al., 2004; Wickins and Lee, 2002).

[3] Based on ASC audit reports (asc-aqua.org)

Banana Shrimp/Prawn (*Penaeus (Feneropenaeus). merguiensis*)

To date it seems that *P. merguiensis* aquaculture is often a by-product of extensive shrimp aquaculture, but interest in the specific farming of *P. merguiensis* has increased in the last decades as it is believed that Banana shrimp are more tolerant to certain diseases compared to *P. monodon* (Thongrod and Boonyaratpalin, 1998; Wickins and Lee, 2002).

There are currently three companies farming *P. merguiensis* under ASC certification in Vietnam on a total of 11 sites. All of them practice extensive farming of *P. monodon* and do not stock *P. merguiensis.* Thus, there is no information on survival rates or feeding efficiency available. Research suggests that *P. merguiensis* require high protein levels in feed of around 50 – 60% (Hoang et al., 2003; Sedgwick, 1979; Staples and Heales, 1991; Thongrod and Boonyaratpalin, 1998). Whereas Ruenreungdee and Sornprasom (2008) achieved an FCR of 1.53 (thus similar to *P. monodon* (Briggs et al., 2004) and currently certified farms) with a protein content of only 30-38% in the diet.

P. merguiensis mature, mate and spawn readily in captivity without requiring environmental or hormonal manipulation (Briggs et al., 2004; Wickins and Lee, 2002).

Kuruma Prawn (*Penaeus (Marsopenaeus) japonicus*)

Penaeus japonicus is mainly produced in Australia and often considered the most demanding penaeid in terms of protein requirements (up to 55%) (Coman et al., 2002; Guillaume, 1989; Laubier and Laubier, 1993). Only little data is available on feed efficiency. A study by Türkmen (2007) showed a comparably high average FCR of 3.50 with fluctuations between 0.47 to 7.04. Mortality rates were found to be below 25% if the temperature was kept below 32°C. Higher temperatures caused a significant increase in mortality and should be avoided (Hewitt and Duncan, 2001). The same study found the highest daily feed consumption at 32°C of 2.34 ± 0.27 % body weight. Unfortunately, growth rates were not measured during the trial and there is thus no information about FCR.

Greasyback Shrimp/Pink Shrimp (*Penaeus ensis*)

Data availability on *P. ensis* is very limited. AQUACOP (1984) suggests that *P. ensis* (as well as *P. merguiensis*) grow too slowly for the purpose of commercial production. Additionally, harvest size is rather small. Research on maturation showed mortality rates of 26.7% in the control group, which is comparatively high for adult shrimp (Yano, 1985).

As this is the only data that was found for *P. ensis* and based on the low production rates, it is not recommended to specifically include *P. ensis* in the ASC Shrimp Standard revision.

Conclusion

The acquired data for protein requirement, FCR and survival are summarised in Table 2 to provide a better overview. Overall, it appears that both *P. merguiensis* and *P. japonicus* are similar to *P. monodon,* with slightly higher protein requirements. Protein requirements are often overestimated and are likely similar for most *penaeid* shrimp (Guillaume et al., 2001). It is therefore suggested, to add *P. merguiensis* and *P. japonicus* to the ASC Shrimp Standard, using the same values as for *P. monodon.*

P. stylirostris appears to be similar to *L. vannamei* in terms of survival rates with slightly higher protein requirements (more similar to *P. monodon*). In terms of aquaculture, it thus lies therefore somewhere between the latter two species. There are currently two farms producing *P. stylirostris* certified to the ASC Shrimp Standard, based on the metric requirements for *P. monodon.* Based on the low production values of only 2,401 tonnes it should be assessed, whether or not adding *P. stylirostris* specifically to the ASC Shrimp Standard is appropriate. It is therefore suggested to continue certifying *P. stylirostris* according to the metric requirements for *P. monodon.*

The obtained data is however so far only based mostly on scientific literature research. Including production data in the evaluation of metric requirements is indispensable according to the ASC Metrics Methodology. The ASC is therefore currently working on the acquisition of production data for all three species and requests producers to contact the ASC if they would be able to share data on any of these species.

Table 2: *Summary of acquired data for the three potential shrimp species*

			Literature		
Penaeus	*stylirostris*	*merguiensis*	*japonicus*	*vannamei*	*monodon*
Protein Requirement [%]	30 – 35[1] 36 – 42[2]	50[1]	>52[14] 42[1] 55[15]	30[1, 15] 20 – 35[2]	36 – 42[2] 40[1]
FCR	2.82 ± 0.22[3] 1.6[2]	1.47 – 1.65[6] 1.11 – 1.82[7] 1.53[8]	4.12[13] 3.50 (0.47 – 7.04)[11]	1.2[2]	1.6[2]
Survival [%]	64 – 75[4] 50 – 60[2]	82 – 90[6] 83[9] 98[8]	62*[11] >75[12] 60[13]	65 – 90[2]	45 – 80[2]

			ASC Farms		
Penaeus	*stylirostris*	*merguiensis*	*japonicus*	*vannamei*	*monodon*
FCR	2.25[5] 2.28[5]	No stocking of larvae thus not applicable[10]	No certified farms	1.44 ± 0.34 (n=76)	1.35 ± 0.15 (n=15)
Survival [%]	67[5]			79.2 ± 9.9 (n=59) 61.2 ± 13.1* (n=28) 70.6 ± 22.4* (unfed) (n=3)	76.2 ± 11.7* (n=19) 36.6 ± 16.1* (unfed) (n=11)

*Non-permanently aerated pond

[1] (Guillaume et al., 2001); [2](Briggs et al., 2004); [3](Hernandez-Llamas et al., 2004); [4](Goyard et al., 2002); [5]SOPAC SA, New Caledonia, [6](Hoang et al., 2003); [7](Sedgwick, 1979); [8](Ruenreungdee and Sornprasom, 2008); [9](Staples and Heales, 1991); [10]Camimex, Than Doan and Namcan, Vietnam; [11](Türkmen, 2007); [12](Hewitt and Duncan, 2001); [13](Turkmen, 2005); [14](Guillaume, 1989); [15](Laubier and Laubier, 1993)

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