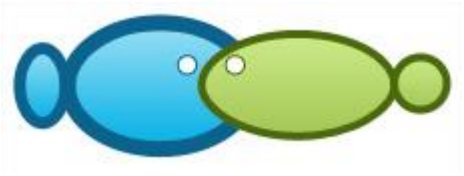

# Market dynamics of blue swimming crab exports to the United States of America: a comparative analysis with red and Venezuelan crab price trend (2018-2022)

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**Abstract**. This research offers in-depth analysis of the trends in *Portunus pelagicus*, blue swimming crab (BSC) export prices to the United States of America (USA) from 2018 to 2022. The aim of this research is to explore the determinants of market dynamics of BSC exports to the USA. Descriptive statistics were used to examine the trend of price crab export to the USA and the impact of catching season, regulations, and international trade policies on the BSC industry. Changes in global demand and significant fluctuations in prices are highlighted in this research finding. This research specifically highlights that the BSC is the commodity with the highest demand among other types of crab sold in the American market, followed by red crab and Venezuelan crab. The impact of China's 25% tariff policy on red crab exports was also examined. Furthermore, this research identified the critical turning points in the average monthly price of blue crab raw materials, as well as fluctuations in the prices of red crab and Venezuelan crab. The findings of this research are expected to contribute to the development of effective marketing strategies, sustainable management of crab fisheries resources, and informed decision-making in international trade.

**Key Words**: blue swimming crab, comparative analysis, export dynamics, market demand, trade policies.

**Introduction**. The United States of America (USA) is one of the three largest importers of aquatic products countries, followed by China and Japan. In 2020, the USA had the highest import value of marine commodities, reaching 15% of the total fishery product imports (FAO 2022). The blue swimming crab (*Portunus pelagicus*) also known as BSC has been imported to the USA's market by several countries including Indonesia which contributes more than 40% of total USA imports (APRI 2014; Ghofar et al 2018; Prince et al 2020). BSC are sold in a variety of products, including fresh meat, processed meat, and value-added products (Seafood Watch 2023). In Indonesia, the export value of crab almost reached USD 411 million in 2018, naming it the third largest fishery export commodity after tuna and shrimp. In 2021, the rank dropped to the fourth after shrimp, commodity group of 'tuna-skipjack tuna-mackerel tuna', and commodity group of 'squid-cuttlefish-octopus'. The price of crab is affordable for people from middle and upper economic groups. Hence, the export of this commodity is directed at high-income countries (FAO 2022).

The crab trading industry has become a significant economic sector at the global level, with the USA as one of the main markets (FAO 2023; Yulianto et al 2024). The 2015-2023 period marks a critical phase in the industry's development, during which the growth in BSC exports to the USA reflects the complexity of external factors, product cycle changes, and global market dynamics (Fahmi et al 2015). The USA market has a

central role in guiding the direction and development of the crab meat industry (Yusuf & Trondsen 2014). Economic factors, international trade regulations, and climate and environmental changes can potentially influence the export volume from crab-producing countries (Gorade 2024). Therefore, an in-depth understanding of export trends to the USA from 2015 to 2023 is critical to identify industry growth drivers, challenges, and opportunities. At the same time, the crab product cycle experiences fluctuations that could be associated with the dynamics of marine ecology, changes in consumer preferences, and international trade regulatory provisions (Foreigntrade 2023; Gorade 2024). This research comprehensively investigated the cycle and the crab export performance from exporting countries to the USA's market over time.

The BSC is a significant export commodity to the USA's market as the primary market. The USA has been the biggest market for Indonesian crab exports which imports up to 50% of the total crab production. The market has stabilized in recent years, with Indonesia as the largest producer of BSC, matching its supply to the USA market. In 2011, exports to the USA were valued at USD 262 million, with the product typically shipped at an export price from India of around USD 10-11 per can. The BSCis also an important commodity in the fishery industries in various countries, including South and Southeast Asia, such as Indonesia, the Philippines, Vietnam, Cambodia, Malaysia, Thailand, India, and Sri Lanka. BSC matures quickly within a short lifespan and can be partially breed. The market for this commodity remains relatively high from 2015 to 2023, with Indonesia and India as the major exporters (FAO 2023).

The price of BSC in the USA market has fluctuated from 2015 to 2023. In December 2022, the USA showed a decrease in the import rate of the BSC by 48% compared to December 2021. This situation signals a potential price increase due to tighter global supplies (Huda et al 2021). The market appeared to be on the verge of a rebound in 2022 as suppliers increased prices after an earlier fall (Huffman 2022).

Several factors have contributed to the fluctuation of the BSC price in the USA market between 2015 and 2023. The quality of fresh meat of BSC significantly affects the selling price and its export (Huffman 2022). Furthermore, as supplies have tightened, BSC prices have increased (Primawan 2023). The BSC market has been subject to significant fluctuations in supply and demand dynamics, leading to price volatility in the USA market from 2018 to 2022. The market has been influenced by various factors such as changes in global demand and the impact of the COVID-19 pandemic on fisheries management and supply chain. The trend analysis of prices during this period is important in understanding the market dynamics in order to determine the most appropriate strategies and decisions in the BSC industry. The aim of this research is to explore the determinants of market dynamics of BSC exports to the USA.

**Material and Method**. This research focused on eleven biggest swimming crab (including blue swimming crab, red swimming crab, and Venezuelan crab) exporters to the USA market with 99.7% contribution from 2015 to 2023: (1) Indonesia, (2) China, (3) Philippines, (4) Vietnam, (5) India, (6) Sri Lanka, (7) Thailand, (8) Nicaragua, (9) Mexico, (10) Tunisia, and (11) Venezuela. This research employed a mixed-method approach, taking into account qualitative and quantitative data to analyze the market dynamics. The data collection process involved a comprehensive review of secondary sources, including UrnerBarry market reports that provide independent and comprehensive market research, industry publications, and government statistics on the economic conditions of the studied countries (Garg & Gupta 2019).

Year to date (YTD) and monthly data on the export price of BSC (pasteurized and fresh crab meat) were collected through literature studies. Secondary data were obtained from the Foreign Trade database and Crab report (Foreign Trade 2023). The data were analyzed using an exploratory data analysis (EDA) to identify the trend of three variables: (1) export prices for blue swimming crab meat are being compared to those of red and Venezuelan crab meat, (2) root price in each crab meat export type, (3) crab meat exports based on quality. Price trade variables of the crab exports to the USA were analyzed descriptively through tabulations and graphs and then elaborated inferentially to gain research findings and formulate the implications of the research (da Silva et al 2019).

## Results and Discussion

***Trend of pasteurised and crab meat export prices to the USA***. Refering to UrnerBarry's price reporting methodology about the crab market (UrnerBarry 2024), Indonesia, the Philippines, Thailand, Sri Lanka, and India have the highest percentages of *Portunus pelagicus*, followed by *Portunus trituberculatus* and *Portunus sanguinolentus*, which are all grouped in the blue swimming crab market. Similarly, Tunisia is notable for its *Portunus segnis* type. In China, the major of imports consist of *Portunus haanii*, with a minority being *Portunus sanguinolentus*, both grouped into the red swimming crab market. Meanwhile, Nicaragua, Mexico, and Venezuela are associated with the *Callinectes sapidus* type, forming the fresh crab market. In total YTD, the export price of blue crab (blue crab meat) is higher than red crab (red crab meat) and Venezuelan crab (Ven crab meat). In the last five years (2018-2022), there has been an increase in the total export price of blue crab meat which reached 28% before it decreased by 2.16% in the following year (Figure 1).

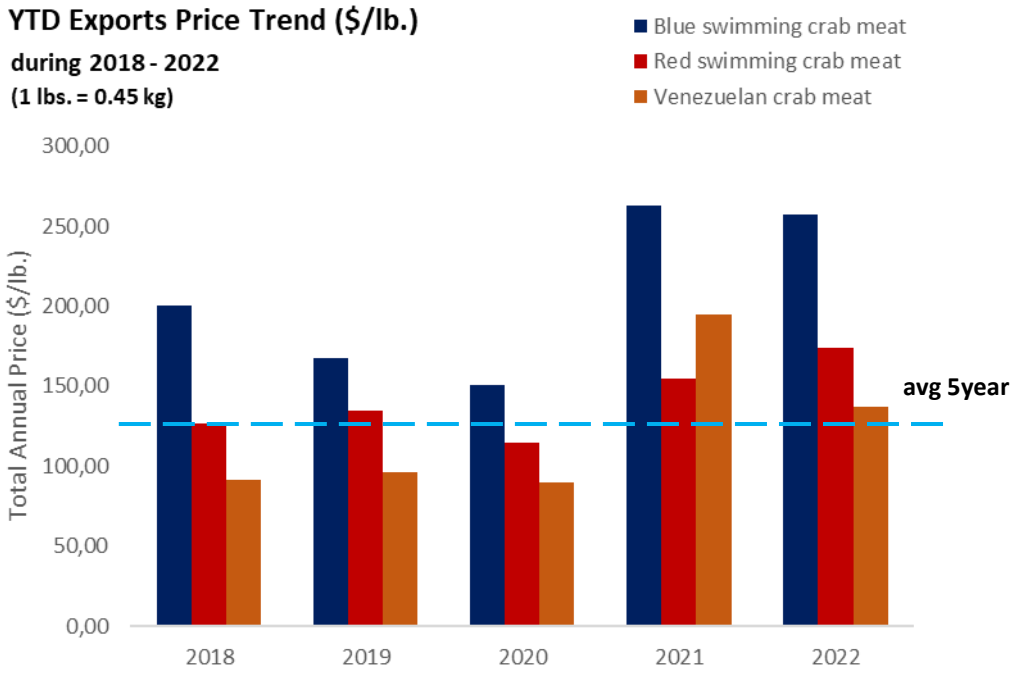


Figure 1. Annual trends in blue, red, and Venezuelan crab meat export prices.

The export price of Venezuelan crab meat to USA in 2021 experienced a significant increase, reaching 113% or the equivalent of an increase of $103.30/lb compared to 2018. This rate then dropped by 30% in 2022, or the equivalent of a $58.09/lb from 2021 (Figure 1). The export price of red crab meat in 2022 was expected to see a consecutive increase of up to 38% compared to 2018, with the difference in price increase reaching $47.56/lb (Figure 1). Higher export prices at the end of 2022 within the last five years was affected by high market demand in USA, the availability of red crab meat, production costs, fluctuations in the Chinese yuan and US dollar, as well as trade policies, including export tariffs and trade agreements between China and USA (Foreign Trade 2023).

The export tariff and trade agreement roadmap between China and USA as shown in Figure 2 commenced in January 2019 with the implementation of new import tariffs on $250 billion worth of USA imports from China. These tariffs started at low levels and gradually escalated over time. Initially, solar panels and washing machines imported into the USA faced tariffs ranging from 20 to 50%. Additionally, tariffs of 25% were levied on approximately $50 billion worth of imports from China. Finally, an additional $200 billion in imports from China incurred a 10% tariff (Bown & Kolb 2018). Ultimately, China officially renewed the 25% tariff as of August 7, 2020 (Foreign Trade 2023). The impact

of these tariffs on the American economy, particularly on inflation, depends on the extent of America's dependence on red crab imports from China and various other categories of goods and services.

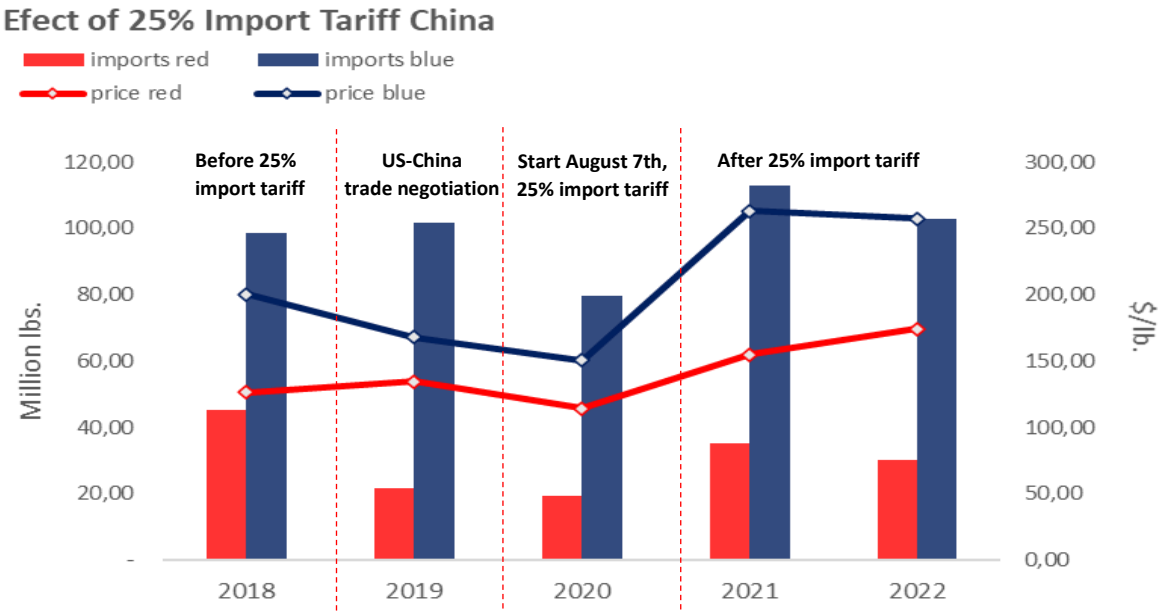


Figure 2. The impact of China's imposing 25% tariff towards volume and price of crab export to USA.

***Trend of root prices across different types of crab meat export to USA***. Analysis of price trends for crab raw materials (root price) exported to the USA is crucial in understanding the price dynamics and market conditions. In the last five years, there have been fluctuations in the prices of raw materials for blue crab, red crab, and Venezuelan crab. Even though the average market price trend remains stable, the demand for blue swimming crabs has been higher than red crabs on a monthly basis in the last five years. The crab market showed downward trend compared to the red crab market. In 2022, demand for blue crab surged at the beginning of the year, reaching close to the last five-year average by September. Unfortunately, the price declined thereafter below the five-year average from October to December of only $18.59.

The average raw material price for blue crab exports per pound ($/lb.) in the last five years experienced significant fluctuations in 2021-2022. June 2021 and 2022 were the turning point for the price fluctuation (Figure 3). In June 2021, the average export raw material price for blue crab meat increased by 8.1% or the equivalent to $1.69/lb. Meanwhile, June 2022 was the starting point for the average decline in export raw material prices by 7.8% or the equivalent to $1.91/lb, before finally sloping down until December 2022 with an average of $15.72/lb per month throughout the last five years of export performance.

Meanwhile, the average export raw material price per pound ($/lb.) of red crab meat in December 2021 was $0.02/lb higher than in November 2021, at $16.36/lb, before gradually declining throughout 2022. However, it remained above the average export raw material price over the last five years, which stood at $11.75/lb per month (Figure 4).

The monthly price average of raw materials for export crab meat from Venezuela was expected to fluctuate, especially in 2021 and 2022. In mid-2021, July emerged as the optimal point for a surge in the price of raw materials for Venezuelan export crab meat, averaging $29.08/lb. per month (Figure 5). However, in the same month of 2022, the average price of raw materials for exported crab meat is expected to decrease by 55% from the previous year. Notably, the month of September, observed over five years of Venezuela's crab meat export performance, exhibits a downward-sloping graph approaching zero. This trend reflects the August–September period, designated as the closed season for crab meat production and export activities in Venezuela. During this

period, crab resources undergo spawning, serving as the raw material for Venezuela's crab meat exports.

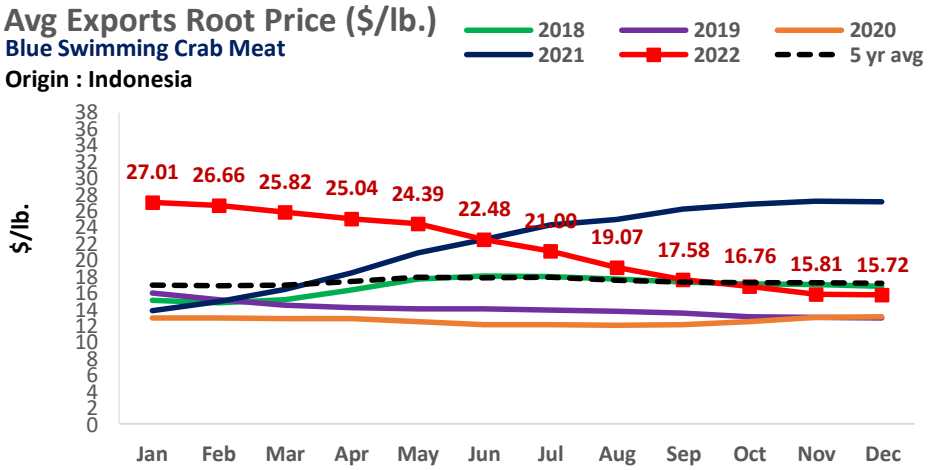


Figure 3. Monthly trend root price of blue crab export.

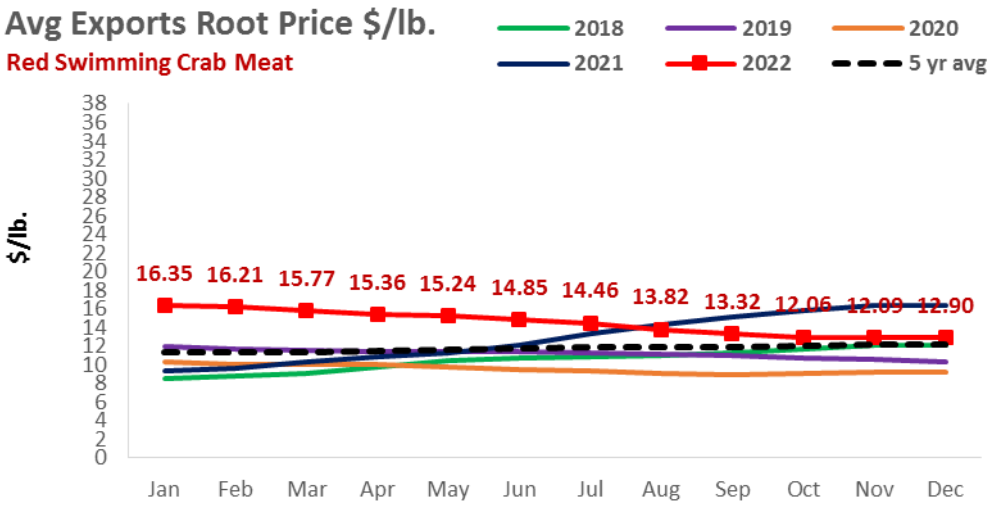


Figure 4. Monthly trend root price of red crab export.

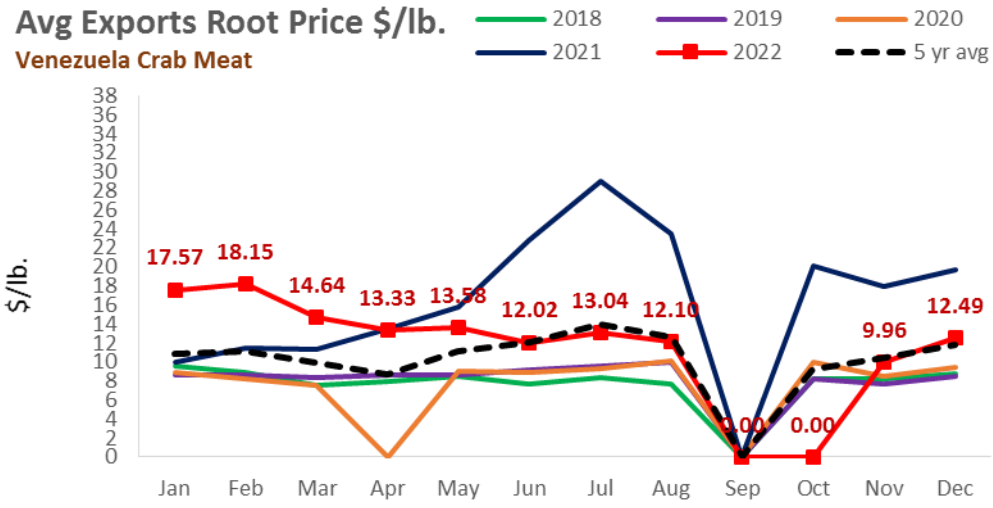


Figure 5. Monthly trend root price of Venezuelan crab export.

***Trend of prices across different grade quality of crab meat export to USA***. The export price of blue, red, and Venezuelan crab meat is also affected by the quality of the crab meat. McDonnell (2024) define five basic commercial crabmeat grades on the market (Figure 6), but this research used four types of crab meat based on their quality, namely: jumbo lump, backfin or lump, special, and claw grade (including claw meat and claw finger).

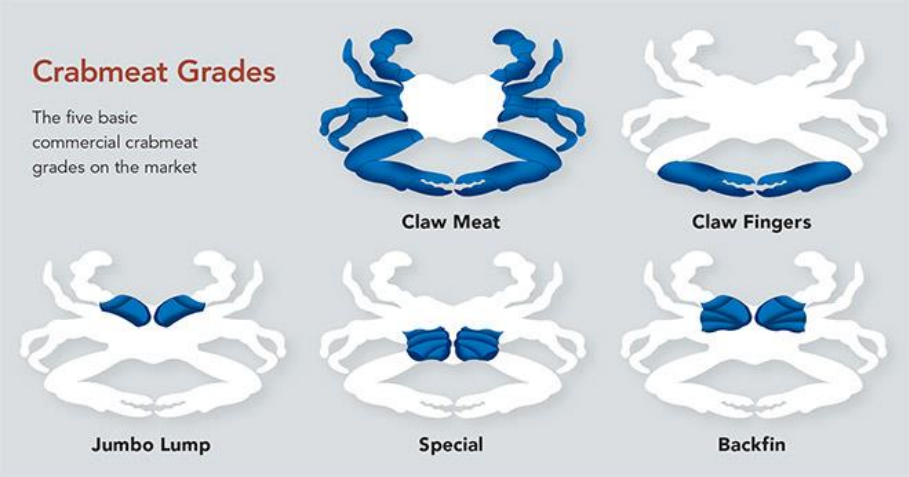


Figure 6. Types of crab meat based on grade quality (Source: J. J. Mc Donnell & Co. https://www.jjmcdonnell.com/crab-product-forms).

The jumbo lump is the preferred type of crab meat with the highest quality grade and is the most expensive due to its rarity as it is only found in the two swimming leg muscles of the crab. This type of meat is usually served in whole form with the slightly sweet taste (The Nibble 2014; Martinez 2022). Meanwhile, backfin or lump quality is a piece of meat from a jumbo lump that is smaller in size and lower in price than a jumbo lump (The Nibble 2014). The backfin or lump meat is the dorsal fin meat of the crab that has a taste similar to that of lump yet smaller in size. The special type of meat consists of small, white meat flakes taken from the body cavity of the crab. This type of meat is most suitable for dishes that prioritize good colour and mild flavour over the look and integrity of the meat. Claw-type meat is the meat in all the swimming fins and claws of crabs, with the lowest grade and affordability compared to other types of crab meat (Phillips Seafood 2024) with reddish brown color (not white), yet it is the most flavorful (Global Seafoods 2023).

The price trend of crab export still fluctuated with the highest price gap between blue and red colossal meat occurred in July 2021 at $17.77. This condition was followed by the jumbo lump type in the same period with a price difference between blue and red crab of $17.65. The export price of jumbo lump blue, red and Venezuelan crab meat reached its peak from August 2021 to February 2022 (Figure 7a). The price of a blue jumbo lump is only $0.56, which is more expensive than the Venezuelan jumbo lump. Meanwhile, the price of Venezuelan jumbo lump is $15.93, which is more expensive than the red jumbo lump. This trend suggests a dominance in export prices for blue and Venezuelan jumbo lump crab meat compared to red jumbo lump crab meat in the American market. Additionally, the price of blue lump crab meat has been dominant in the export market for lump/backfin type crab meat in the American export market over the last five years (Figure 7b). The prime time for price hikes varies for each variety of lump and backfin crab meat, peaking in August 2021. Subsequently, there are fluctuations in the price surge for blue lump, blue backfin, and red lump crab meat, while the price of Venezuelan lump crab meat sees a decrease. There are only two types of special crab meat identified; the special blue and red (Figure 7c) which prime time for price increases occurring between August 2021 and February 2022. However, the price of blue special type crab meat remains between $6.87 and $7.26 more expensive than the special red type. Meanwhile, blue claw crab dominates the export market with prices of $1.34-3.93 higher than Venezuelan claw (Figure 7d). The optimal point for price increases for both types of claw crab meat is from August 2021 to February 2022 before prices decrease for both types of crab meat by 26-36%.

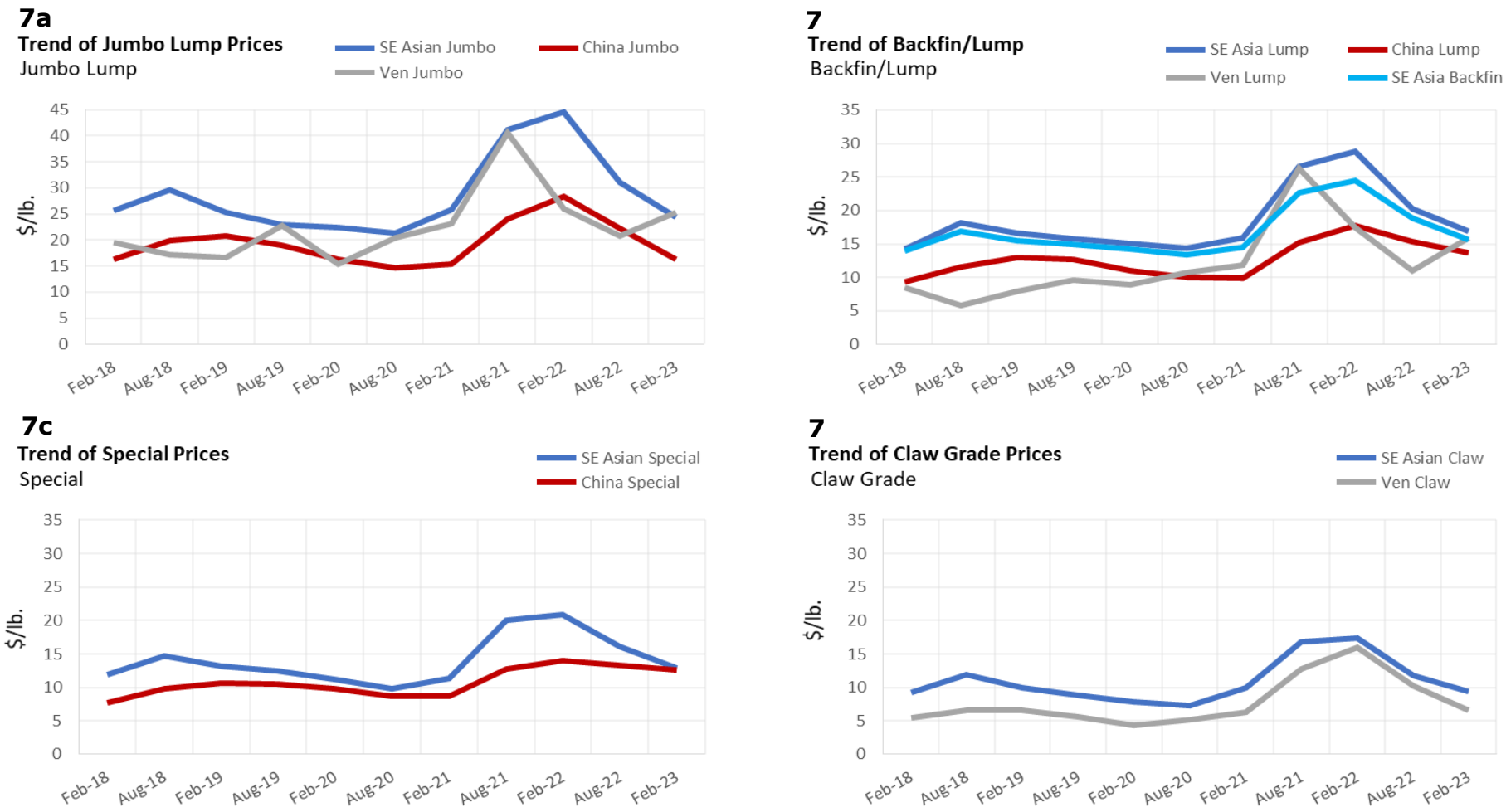


Figure 7a-d. Price trend of crab meat based on grade quality.

**Conclusions**. This research provides an overview of crab export price trends to the American market during 2018-2022. Blue crab is higher in demand in the American market, followed by red crab and Venezuelan crab. China, as the exporter of red crab with the second largest contribution after Indonesia has implemented a 25% tariff policy for every American imported product by August 7, 2020. June 2021-2022 was the turning point for fluctuations in the average monthly price of raw blue crab meat. The period for the pricing of exported raw materials for red crab is anticipated to fall between July and August of both 2021 and 2022. For the past five years, Venezuelan crabs consistently reached their lowest point every September. This coincided with the closed session period for crab production and export activities. The majority of pasteurized crab meat exported to USA, spanning across all four quality grades - jumbo lump, backfin of lump, special, and claw, are primarily sourced from pasteurized blue swimming crab meat.This falls within the market category of blue swimming crab. The shifts in global demand and trade regulations are significant factors that affect the fluctuations of crab export price. The findings of this research can be used as a reference in developing the marketing strategies, sustainable management of crab fisheries resources, and better decision-making in international trade.

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**Conflict of interest**. The authors declare that there is no conflict of interest.

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