

# Breeding Crayfish in Paddy Fields: A Big Economic Boost for Farmers

Rachel Ong\*

Department of Agricultural Management, Murdoch University, Singapore

## ABSTRACT

Chinese diners have developed a craving for crayfish, the small, freshwater Crustaceans' common in North America including the US state of Louisiana where they are known as crawfish. They were first introduced to China by the Japanese, who kept them as pets, and set free at the end of the Second World War. Today many farmers raise crayfish in rice paddies to generate extra income and provide some ecological benefits. China's state broadcaster CCTV says that the small red crustaceans have boosted income for some farms by as much as 40-50 per cent.

**Keywords:** Crayfish; Paddy fields

## INTRODUCTION

### The Crawfish Market

Breeding small crayfish in rice fields proves to be big economic boost for Chinese farmers. For decades, raising crawfish in rice fields has generated tremendous growth for the Louisiana crawfish industry, boosting the state economy as a whole. In 2012, crawfish farming in rice fields produced USD \$ 168.5 million, and in 2014, the revenue grew to USD \$ 172 million from 108.5 million pounds of Louisiana crawfish [1].

On the other side of the world, in 2019, China produced upwards of 1.87 billion kilograms of crawfishes (worth USD \$ 7.8 billion), which boosted their economy and fed millions of its people. Crawfishes were originally introduced to China by the Japanese [2], who kept them as pets, and set them free at the end of the Second World War. Today, many farmers raise crayfish in rice paddies that provide some ecological benefits and generate extra income, up to five times their revenue.

With the rise of the world's middle class, a tasty crustacean such as crawfish commands an extremely high demand. International diners have developed a craving for crawfish. These small, freshwater crustaceans are extremely common in North America, including Louisiana's US state, where they are more commonly known as crayfish. According to various sources, the global crawfish market size will further expand by USD \$ 10.32 billion at a CAGR of 16% over the forecast period of 2021-2026 [3] (Figure 1).

### Rearing Crayfish in Paddy Fields

A Singapore company - Singapore Crawfish has refined a Multi-

Cropping technique™, a model designed to create social and economic impact. It increases a farmer's crop yield from just a single crop (paddy) to two additional produce: crawfish and fishes. It all starts with constructing carefully designed paddy fields with deeper trenches, for the breeding of juvenile crawfish and fishes.

The multi-cropping™ technique effectively improves the utilization rate of the paddy fields and helps achieve a symbiotic ecosystem. The paddy stalks provide shade and shelter which improves the survival rate of the crawfishes. It also serves as a filter to remove sediment and ammonia from the water, leaving the water cleaner. Simultaneously, crawfish simultaneously, crawfish eat insects in the paddy, leading to less use of pesticides and crawfish feces act as fertilizers to stimulate paddy growth. This circular economy improves economic efficiency and promotes the development of crawfish breeding, fish rearing and rice farming.

The founder of Singapore Crawfish, Mr. Desmond Chow, aims



Figure 1: Singapore Crawfish.

**Correspondence to:** Rachel Ong, Department of Agricultural Management, Murdoch University, Singapore, Tel: + 6590010370; E-mail: singaporecrawfish@gmail.com

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to share his multi-cropping™ techniques to benefit international farmers. He plans to start with the ASEAN region as rice cropping is extensive at various ASEAN countries. Furthermore, the all-year-round tropical weather provides the perfect conditions for paddy and crawfish farming.

Mr. Chow tells the farmers to first do feasibility study on water and soil samples to ensure that their fields are suitable to rear crawfishes and don't contain any harmful chemicals or minerals. Next, he provides the farmers with healthy juvenile crawfishes and places them into the ditches at the paddy's appropriate time grow out cycle. Mr. Chow is very particular about disinfection which improves the soil conditions before adding in the juvenile crawfishes.

"Crawfishes grow and breed extremely fast, they are very hardy and best of all, their growth-cycle to market size is relatively short. Farmers can harvest after a period as short as 4 months, way faster than most crops! Crawfishes are delicious with a natural sweet taste, and they are very nutritious, they serve as a great source of protein, vitamins and contain important amino acids unparalleled by various meats." says Mr. Chow.

The multi-cropping™ technique, which includes field mapping, is constructed in a labor and energy-efficient way that prevents crawfish from escaping and allows farmers to harvest them easily. The secret lies in the construction stage, where the layout of the paddy fields is of extreme importance. The following steps will be rice transplanting, where the spacing between the crops is of optimal importance. This is to ensure the water gets enough dissolved oxygen and the paddy has ample space to grow. Most of all, choosing the correct type and strain of paddy is also of extreme importance (Figures 2 and 3).

There is also a fascinating science behind the correct stocking size and density of crawfishes to add into the paddy fields. If the craylings are too small, they will face various predators such as dragonfly nymphs, frogs, fishes, etc. The rearing density is also extremely important to prevent over-crowding, leading to mutual cannibalism and competition for food. On the other hand, rearing them too sparsely translates to less economic benefit (Figure 4).

### Commercial Crawfish Feed

Mr. Chow is very proud of his specialized crawfish feed, which he claims; can improve crawfish health and induce faster growth. He mentions, "Understanding how much to feed your crawfishes is key! Overfeeding will cause your water to turn bad fast. Additionally, knowing what time of the day to feed is also of utmost importance to ensure the crawfishes eat their food almost instantly."



Figure 3: Paddy field for multi cropping system approach.



Figure 4: Crawfish eggs.

Mr. Chow started researching Crawfish feed in 2018, where he rented small office space, bought 50 aquarium tanks, and placed crawfish fries within. He started feeding the little crustaceans all sorts of raw ingredients to his crawfishes to identify which feed will enhance their growth.

"I gave my employees a monthly budget of \$100 and told them to buy any raw ingredients they liked from the market. They always came back with interesting ingredients such as carrots, beef liver, peas, tomatoes, dragon fruit, and even durian!" Said Mr. Chow

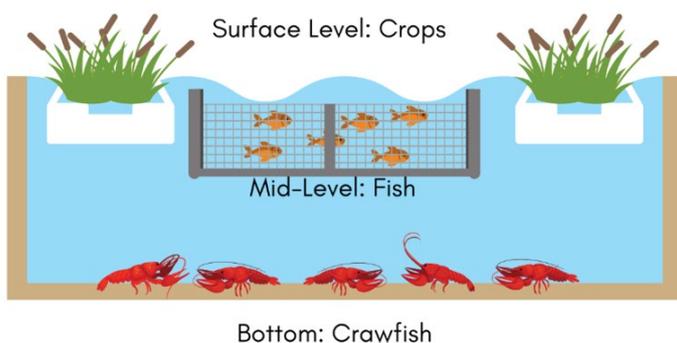


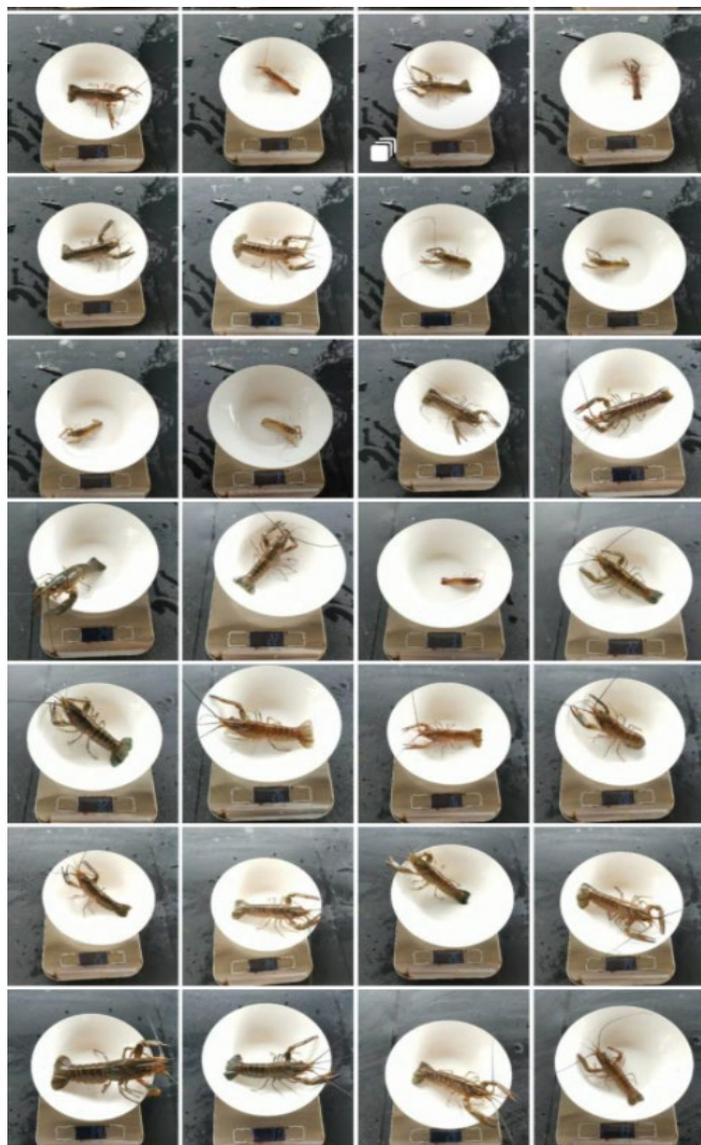
Figure 2: Multi-cropping system.

After years of research, Mr. Chow and his team of scientists created a feed formula by mixing 12 special ingredients that can enhance the growth of crawfishes by up to 200% (Figure 5).

**Harvesting Time: Reap What You Sow!**

Fast forward 6 months later, it is time for harvest!

The estimated yields per hectare are explained in Table 1.



**Figure 5:** Variation in output size of Crawfish when different feed was used.

**Table 1:** Difference in past and present revenue by not utilizing and utilizing the multi-cropping system.

Not Utilizing Multi-cropping System		Utilizing Multi-cropping System	
Past Revenue		Present Revenue	
1 Hectare Field		1 Hectare Field	
Paddy: 5000-6000	7500 \$	Paddy: 4000- 4500	6000 \$ (1.50 \$/kg)
~	0 \$	Crawfish 800- 900 kg	18000 \$ (22.50 \$/kg)
~	0 \$	Fish (JP/LMB) 400- 450 kg	6000 \$ (15 \$/kg)
<b>Total</b> 7500 \$		<b>Total</b> 30,000 \$	

**Fund Raising for Singapore Crawfish**

These days, Mr. Chow and his team of scientist focuses on research and development where they work towards selective genetic mapping in hopes to be able to tailor crawfishes to suit different growing environments. Mr. Chow claims his research could eventually produce -quality brood stock containing high growth genes, bacteria resistant genes, or develop temperature or pH resistance capabilities.

**CONCLUSION**

Mr. Chow strongly believes there is huge market demand for crawfish and this industry has vast potential for future development. The economic benefit crawfishes could bring is enormous beyond imagination. In 2021, Singapore Crawfish is raising a small investment to build the first -tech SPF crawfish hatchery in Singapore that can produce a minimum of 100,000 craylings daily. Mr. Chow believes this crawfish hatchery will help with food sustainability and global food poverty. The craylings will be distributed to farmers in all countries who want to rear this nutritious little crustacean.

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