# RESEARCH REPORTS IN THE ECONOMICS OF GIANT CLAM MARICULTURE

Working Paper No. 36

Notes On The Use Of Giant Clam Meat For Food
In Taiwan

Ву

Clem Tisdell
And
Cheng-Ho Chen

October, 1992



THE UNIVERSITY OF QUEENSLAND

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by

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Research for the project *Economics of Giant Clam Mariculture* (Project 8823) is sponsored by the Australian Centre for International Agricultural Research (ACIAR), G.P.O. Box 1571, Canberra, A.C.T. 2601, Australia. The following is a brief outline of the Project:

The technical feasibility of culturing giant clams for food and for restocking tropical reefs was established in an earlier ACIAR project. This project is studying the economics of giant clam mariculture, to determine the potential for an industry. Researchers will evaluate international trade statistics on giant clams, establish whether there is a substantial market for them and where the major overseas markets would be. They will determine the industry prospects for Australia, New Zealand and South Pacific countries, and which countries have property right factors that are most favourable for commercial-scale giant clam mariculture. Estimates will be made of production/cost functions intrinsic in both the nursery and growth phases of clam mariculture, with special attention to such factors as economies of scale and sensitivity of production levels to market prices.

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NOTES ON THE USE OF GIANT CLAM MEAT FOR FOOD IN

**TAIWAN** 

**ABSTRACT** 

There have been two major studies of the use of giant clam meat for food in Taiwan (Dawson

and Philipson, 1989, Shang et al., 1991). The purpose of this paper is to provide some

additional information about the demand for and use of giant clam meat for food in Taiwan,

especially given the changing supply situation. It also gives specific recipes used in Taiwan

for preparing dishes using giant clam meat. These are of twofold interest:

A survey of Asian restaurants in Australia found that they were interested in using giant clam

meat in their cuisine but had no recipes and little knowledge of how to prepare it. The range

of recipes indicates that although Taiwanese prefer clam adductor muscle, they do have

dishes which use clam mantle and dried clam meat.

It was also found that a considerable Taiwanese market may exist for the raw meat of young

clams. These findings have favourable implications for farmed giant clams for which there is

likely to be an economic advantage in harvesting them at a young age.

Keywords: Giant clam meat for food, giant clam recipes, Taiwanese market for giant

clams.

JEL Classification: Q57, Q21, Q22

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# NOTES ON THE USE OF GIANT CLAM MEAT FOR FOOD IN TAIWAN

#### 1. Introduction

Many people in the South Pacific have traditionally considered giant clam meat to be in considerable demand in Taiwan. This image was partly built up because of reputed poaching by Taiwanese fishing vessels on reef areas of the South Pacific in the 1970s and into the 1980s (Dawson, 1989, pp. 112-114). Products collected on such expeditions included giant clam muscle. This was collected not only in the northern waters of Australia, including the Great Barrier Reef, but in the Pacific Islands. Apart from such activities, Taiwan was also one of the main outlets for large exports of giant clam muscle from the South Pacific. But with depletion of ·natural stocks of *tridacnid* clams and the advent of the Convention on International Trade in Endangered Species (CITES), this trade has virtually stopped. Taiwan's imports of giant clam meat seem now to be very limited and have been for at least the last five years.

Some scientists, e.g. (Munro and Heslinga, 1982) suggested that in the 1980s, very high prices were paid for giant clam adductor muscle in Taiwan and that Taiwan could be an important market for the meat of cultivated giant clams. However, later in-depth studies indicated that the Taiwanese market was not as large as it was earlier reported to be and also the prices which Taiwanese were willing to pay for giant clam meat were lower than earlier casual reports indicated (Dawson and Philipson, 1989, Shang et al., 1991).

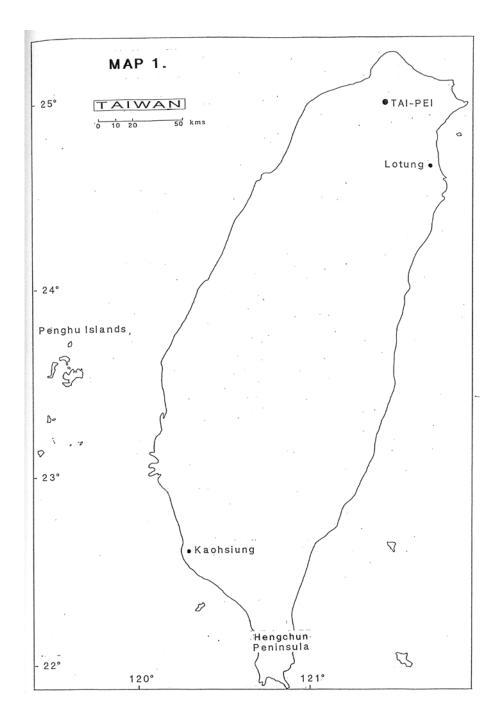
The purpose of this paper is to provide some additional information on the use of giant clam meat for food in Taiwan. Giant clam meat is now very difficult to obtain in Taiwan so the market situation is changing. Another important aspect of this report is to present some recipes used in Taiwan for preparation of giant clam meat. A recent survey of Asian restaurants in Brisbane and the Gold Coast found that while most were interested in the possibility of using giant clam meat in their cuisine, very few knew of any recipes for preparing dishes using giant clam meat (Tisdell, 1992). Successful marketing of giant clam meat might therefore depend on the dissemination of suitable methods for preparing giant

clam meat for eating. Lack of knowledge about this hinders sales of giant clams to the restaurant trade in Australia according to the experience of personnel of Reefarm, a commercial producer of giant clams near Cairns (Jeremy Barker and Bruce Stevens, personal communication, October, 1992).

Material used in this paper was collected in Taiwan in the period June to September, 1992, mainly as a result of contacts by Mr. Cheng-Ho Chen, a graduate of the National Kaohsiung Institute of Marine Technology and now a postgraduate student at the University of Queensland. He arranged for ten Taiwanese restaurants to be surveyed using the survey form attached as Appendix A to this report.

#### 2. Present Status Of Giant Clams In Taiwan And Import Of Tridacnid Clam Meat

Taiwan lies within the natural distribution of most species of *tridacnid* clams, including within the natural range of *T. gigas*. However, *T. gigas* has disappeared from Taiwanese waters, presumably because of its overexploitation for human use. *T. maxima* continues to exist and occurs around most of the Taiwanese coast. *H. hippopus* occurs only on the Penghu Islands and the Hengchun Peninsula (See Map 1). It is also possible that *T. crocea* continues to occur in Taiwan since it occurs in the nearby Nansei Islands of Japan. Because of the poor state of local stocks of giant clams, virtually all *tridacnid* clam meat has to be imported to Taiwan.



The Taiwan Customs Office includes imports of .giant clam meat under the category 'ganbei' which appears to include a range of marine molluscs. This means that it is difficult to obtain any detailed statistics on imports which relate only to *tridacnid* clams. Table 1 lists imports by quantity and value of 'ganbei' into Taiwan for the period 1977 to 1988 and then *tridacnid* meat. In the past, giant clam meat has been imported in fresh/frozen, dried and canned forms. Presently, import of fresh or frozen giant clam meat to Taiwan in prohibited but canned meat and dried meat is available. Illegal import of fresh or frozen meat occurs (Cf. Dawson and Philipson, 1989).

Table 1. Imports of Ganbei to Taiwan Value Year Quantity (N.T. \$'000) (Tons) 662 1977 23,985 1978 34 42,397 1979 33 46 72,461 1980 29,930 1981 16 1982 9 14,618 0 137 1983 12 1984 0 698 1985 3 76 13,728 1986 336 126,662 1987 1988 621 274,008 Source: Taiwan Fisheries Year Book, 1988

#### 3. The Knowledge of Taiwanese Consumers of Giant Clam Meat.

Awareness of Taiwanese of giant clam meat varies. Interviews with proprietors of ten Taiwanese seafood restaurants and some Taiwanese fishermen indicated that persons younger than twenty years of age have little knowledge of giant clam meat. This is partly a result of its recent very short supply, its high price and the fewer opportunities available to younger people than older people to try clam dishes.

Giant clam meat is rare and expensive and is considered a luxury. It is sold only in large restaurants or can be found at wedding parties. Furthermore, people in urban areas appear to be more aware of clam meat than those who live in rural areas, because most large seafood restaurants are located in urban areas. Moreover, people who live in areas near fishing ports appear to have more understanding of giant clam meat than people who live farther away, because some fishing vessels harvested giant clams before they were considered an endangered species, and consequently protected.

#### 4. Use of Tridacnid Clams For Meat In Taiwan

Although all portions of the meat of *tridacnid* clams except the kidney can be consumed by humans, people in Taiwan prefer to eat only the muscle of the giant clam, and not the mantle. The main demand is for the adductor muscle of the giant clam. The mantle of the giant clam was used in the past as feed for livestock or poultry. However, there is some demand for the mantle for dishes for human use as indicated by some items in the list of recipes given later. Furthermore, there could be a demand for *tridacnid* clams for sashimi (see later).

A few former clam processing factories are located at Lotung in the north-east of Taiwan and in Kaohsiung in the south-west of Taiwan (See Map 1). They import and can the fresh/frozen muscle of clams and supply it to the domestic market. They are multipurpose seafood processing factories.

In Taiwan, people have been consuming raw seafood, or "sashimi" for a long time. The owner of the East Coast Seafood Restaurant stated that about 60 per cent of his customers order raw seafood. The owner of the King of Dragon Seafood Restaurant said that about 40 per cent of his customers eat raw seafood. Furthermore, the owner of the Changtayen Seafood Restaurant claims that approximately 70 per cent of his customers eat raw seafood. It would appear then, that a large proportion of people in Taiwan like to eat raw seafood. However, although young clams may be eaten raw, it is extremely difficult to find raw giant clam meat in Taiwan, because of lack of supply from natural sources. A number of restaurateurs believe that raw clam meat would be an attractive ingredient for them to use in their dishes if the supply of young clam meat was plentiful. A significant potential market seems to exist for the supply of meat from young clams for the sashimi- style market in Taiwan.

One of the Taiwanese clam traders interviewed pointed out that there is still market potential and demand for giant clam meat in Taiwan, even though the tariff on imported ganbei or compoy, which would include clam meat is high (approximately 50%). He also stated that people in Taiwan prefer fresh or frozen clam meat which has a better taste than dried or tinned clam meat. Since the giant clam became an endangered species, scallop meat has been imported by Taiwanese traders as a substitute for the adductor muscle of giant clams in the Taiwanese market.

# 5. Some General Comments Received from Interviewees About Demand for Giant Clam Meat in Taiwan.

Following are some general comments made by interviewees regarding the consumption and demand for giant clam meat in Taiwan:-

- ➤ The price of giant clam meat in Taiwan is relatively high. It would be difficult to expand the market for clam meat and maintain such a high price.
- Some people are concerned about eating large quantities of clam meat as the general belief is that it contains high levels of cholesterol and albumen, even though this belief may have no scientific foundation.
- Figure 6 Giant claim meat does not seem to be any more nutritious than other seafood. Therefore the incentive could be low from a nutritional point of view to spend money on claim meat, which is expensive in comparison with other types of seafood, especially fish.
- A possible reason for the high demand for clam meat in Taiwan despite its cost is that it is rare. This rarity plus its 'priciness' means that there is social influence on demand<sup>1</sup>. Nevertheless, some people do not wish to consume giant clam meat because they have never seen the meat of the giant clam, and are afraid of eating unfamiliar items.
- ➤ Possibly the main reason why giant clam meat is both well-known and very popular in Taiwan is that people feel that it is delicious.

#### 6. Chinese Taiwanese Recipes For Clam Meat

There are a variety of ways to prepare giant clam meat. Generally, it can be cooked with vegetables, used in soup or fried. The following recipes were provided by seafood restaurants in Taiwan, and seem quite delicious. Most involve use of muscle but some use mantle or dried clam meat.

<sup>&</sup>lt;sup>1</sup> This social influence may partly involve a 'snob effect' and a 'Veblen-effect' or another effect, the desire to treat a guest to something very special and costly as a gesture of social significance (Cf. Leibenstein, 1980; Tisdell, 1972, pp 117-180).

#### Recipe 1

Muscle meat is covered with cornstarch before deep frying. Fried muscle meat is put on butter lettuce and accompanied by salt and monosodium glutamate (MSG) mixed spice.

#### Recipe 2

Muscle meat is dipped for a few seconds in boiling water. The meat is then placed on a dish and surrounded by garnishes of ginger, garlic and lemon and dressed with mayonnaise, soy sauce, vinegar and oil.

#### Recipe 3

Muscle meat is covered lightly with cornstarch before dipping it in boiling water. It is then cooked with ginger, garlic and leeks.

#### Recipe 4

Muscle meat is cooked with ginger, garlic, parsley and leeks.

#### Recipe 5

Muscle meat is cooked with snow peas, mushrooms, garlic, white garlic and bamboo shoots which are mixed with cornstarch and topped with a sprinkle of pepper.

#### Recipe 6

Muscle meat is cooked with oyster mushrooms, bamboo shoots, parsley, prawns, fish balls and squid, and topped with oyster sauce, leeks and fish stock.

#### Recipe 7

Muscle meat is cover with cornstarch and cooked with fish balls, sea cucumber and broccoli.

#### Recipe 8

Muscle meat is cooked with a dry mushroom-based soup and leeks.

#### Recipe 9

Muscle meat is cooked with asparagus-based soup, and topped with chopped parsley.

#### Recipe 10

Muscle meat is cooked with a scallion (e.g. shallot/leek) based soup.

#### Recipe 11

Raw clam meat with soy sauce and mustard mixed accompaniment.

#### Recipe 12

Chili slice, rice wine, ginger slice and oyster sauce mixed combination with boiled clam meat.

#### Recipe 13

Stewed clam mantle with brown sauce.

#### Recipe 14

Clam mantle with bean paste.

#### Recipe 15

Steamed clam mantle with a mixture of soy sauce, ginger and chilli slice, vinegar and sesame oil.

Additional combinations involving the use of clam meat are shown in photographs 1 - 6 (taken by Mr. Yu Ko-Chien for this project). These are:

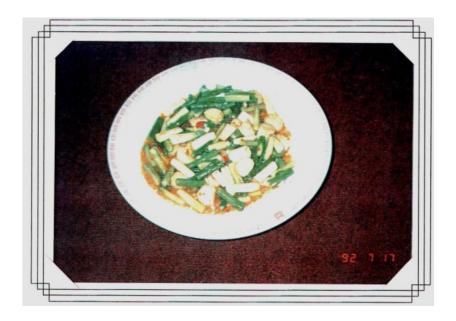
- 1) Stir-fried chilli with clam meat (muscle) pieces, asparagus and shallot.
- 2) Mixture of clam meat, mullet eggs and calamari.
- 3) Combination of clam meat, mullet eggs and seafood roll.
- 4) Chinese vegetables topped with clam meat, crab meat and jellyfish.
- 5) Deep-fried clam mantle with seasoned pepper, salt.
- 6) Stir-fried Chinese vegetables, mushrooms with dried clam meat.

In addition, as noted earlier, there is considerable scope in Taiwan for using fresh young clams raw as well as raw adductor muscle.

The above indicates that giant clam meat can be used in Taiwanese Chinese cooking in a variety of ways. In this cooking, use exists for

- 1. the adductor muscle,
- 2. the mantle and
- 3. dried clam meat.

# **PHOTOGRAPHS**



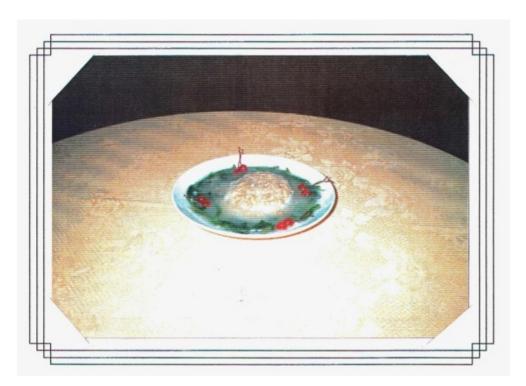
1. Stir-fried chilli with clam meat asparagus and shallots



2. Mixture of clam meat, mullet eggs and calamari



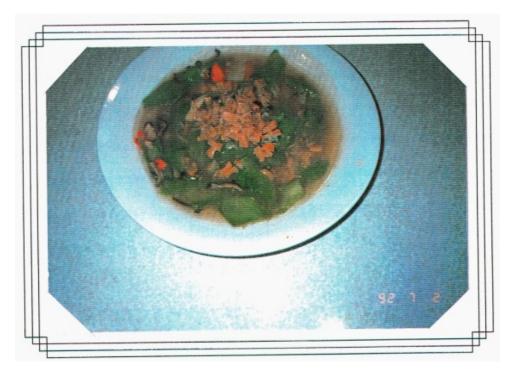
3. Combination of clam meat, mullet eggs and seafood roll



4. Chinese vegetables, topped with clam meat, crab meat and jellyfish



5. Deep-fried clam mantle with seasoned pepper and salt



6. Stir-fried Chinese vegetables, mushrooms with dried clam meat

#### 7. Concluding Comments

Taiwan remains a promising market for giant clam meat but amongst the younger generation knowledge of giant clam meat is beginning to disappear for the reasons outlined above. In the past, Taiwan relied mostly on import of giant clam adductor muscle from natural stocks to satisfy its demand for giant clam meat. But imports have been curtailed as a result of the depletion of natural stocks and the endangered status of these stocks.

While Taiwanese prefer the adductor muscle of the giant clam, it is clear that potential and actual Taiwanese demand is not limited to the adductor muscle. Several recipes use giant clam mantle and a number use dried giant clam meat. Furthermore, if a regular supply of fresh young clams happened to be available, it seems that there would be considerable demand for their use raw, that is, sashimi-style. This market would presumably be one that could be tapped by those engaging in land-based cultivation of *tridacnid* clams e.g. *T. crocea* or *T. maxima*. Such clams might be sold to satisfy this market when they are 2-3 years of age. This may prove to be more profitable for many clam farmers than holding clams longer in ocean growout conditions to satisfy the traditional adductor-muscle market in Taiwan. However, it is possible that there is room for both types of operations. e.g. land-based aquaculture operations to supply *tridacnid* clams for the Taiwanese raw seafood market and ocean growout to supply adductor muscle and some mantle fresh or dried for the Taiwanese market.

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# APPENDIX A.

# **SET OF QUESTIONS**

### USE OF GIANT CLAM MEAT IN TAIWAN FOR FOOD

1.	What use is made of the muscle of the giant clam for food? Indicate ways in which it is used or was used.			
2.	Please give some Chinese (Taiwanese) recipes (general recipes) for the use of giant clam muscle as food.			
3.	Do those who know giant clam muscle for food rate it highly? Yes/No			
	What evidence do you have for this?			
4.	What use if any is made of the mantle of the giant clam in Taiwan?			
5.	I understand that dried clam has been used in Taiwan. What is it used for?			

6.	Is the dried mantle used?	Y es/INC	Y es/No	
	Is the dried muscle used?	Yes/No Yes/No		
	Is the whole dried clam used?			
	What are the above used for?			
		•••••		
7.	Do people in Taiwan like to eat raw seafood, that is; seafood sashimi s	tyle?	Yes/No	
8.	Young clams may be eaten raw. Have people in Taiwan eaten them ray	w?	Yes/No	
	Would they be interested in eating young clams raw?		Yes/No	
9.	Giant clams may now be farmed. It there likely to be much interest in		Taiwan in	
	importing the meat of such clams for food?		Yes/No	

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1st. June, 1992

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