# Evaluation of the Market for Dried Seafood

*R J Naidoo, S L Slattery, H A Bremner*

DPI
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# 1. INTRODUCTION

## 1.1 Historical perspective

The historical role played by dried, smoked or salted fisheries products in meeting humanity's need to extend the shelf life of food is reasonably well documented. The presence of these products in the diet of various ethnic groups and their placement as actively traded commodities is important. It is therefore appropriate to consider a brief history of this important commodity when trying to establish the market potential of future products. As far back as 3,500 BC the Sumerians retained salted, smoked and dried fish as a staple food in their diet. To the rural sectors of ancient Egypt dried fish was considered an important commodity to trade, however the Egyptians considered only freshwater species fit for consumption. The salt water species were considered unclean by even the so called peasant classes.

After the sixth century BC, numerous processing and production centres of dried and salted fish developed in the Mediterranean. Trade however tended to be confined to the areas of production. This occurred around the Dnieper river, the south coast of the Black Sea to Cadiz and Malaga in Spain. The areas from the Indus to the Alps were also involved in dried fish processing.

The Second Punic wars resulted in Rome retaining majority control of the sea trading routes. The region from Spain to the Black Sea then became trading centres for dried and salted products. The expansion of Roman trade attracted large port and shipping investments, with both Ostia and Rome becoming large commercial centres for consumption and distribution of dried fish products.

In India, Asia and South East Asia dried fish products are traditional and varied. The product appearance however may not necessarily appear varied to the uninitiated observer. The same tradition has dictated culturally and historically the manner in which the dried product is expected to be prepared and presented. This is of importance when considered that some of the dried seafood products consumed may well have received elaborate pretreatment before the final semi-dried or dried product is arrived at.

## 1.2 Australian perspective

In 1803 Matthew Flinders identified the profitability of the beche-de-mer fishery in the far north of Australia. This apparently occurred when he first encountered a fleet of Macassan fishing boats in the Torres Strait region. These vessels made an annual voyage to northern Australia to collect trepang and turtle shell. From 1840-70's beche-de-mer was exploited in the Great Barrier Reef area to satisfy the needs of the local Chinese community. In 1874 the beche-de-mer fishery consisted of over 100 fishing vessels. By the early 1900's enough concern had arisen over the possibility of excessive fishing of beche-de-mer for a Royal Commission to be established. One of the key issues of the commission dealt with the necessity of investigating and regulating the beche-de-mer fishery.

Australia is therefore no stranger to the idea of identifying and exploiting dried fisheries products, likewise the fisheries industry is no stranger to the idea of governmental regulation.

## 1.3 Comparative advantage and disadvantage of the Australian fishing environment

Australia has a relatively long coast line with a variable continental shelf. Our waters are nutrient deficient which results in lower volume catches of seafood. The potential value of the deep water fisheries is largely unknown.

If a premium price can be associated with clean unpolluted fisheries products then this could well place Australia in a more favourable position. The demand for cleaner pollution free agricultural products could see appropriate flow-ons to Australian seafood products. With a 200 km economic zone and reasonably unpolluted waters, Australian fisheries products could be in high demand. Conversely the high harvesting and freighting costs involved in the fishing industry may well inhibit this possible opportunity.

# 2. TRADE FIGURES

## 2.1 History

All values present in this report are wholesale values unless otherwise stated. In recent times the Australia seafood market and value appears to be a ever changing one. The total value of edible seafood imported in 1969-70 was $37,787,000. By 1982 this figure had increased to $218,272,000. In 1969 exports of edible seafood products were valued at $38,976,000. By 1982 this value had risen to $306,484,000 and for the above period there existed a surplus in trade value between Australia and the rest of the world.

## 2.2 Recent trade figures - 1994

ABARE(1993-94) The Australian Bureau of Agriculture and Resources Economics statistics on fisheries production suggests that the overall value of Australian fisheries production for 1993-94 was up by 7% over the previous year. This occurred despite a reduction in actual landings. The fisheries of Western Australia contributed about 33% of production value, mainly in the areas of rock lobster and pearl production. The Commonwealth fisheries contributed about 18% of the production value in the areas of prawns and southern bluefin tuna. Tasmanian fisheries production revenue was up by 19% from the previous year mainly due to rises in abalone prices. Rock lobster and abalone contributed the greatest proportion to total revenue earnings. Aquaculture experienced a 16% increase in revenue over the previous year 1992-93. Pearl, oyster, salmon and tuna contributed the highest return in this expanding area. Shellfish products are the major growth areas for valuable return, with the value of fish also increasing but to a lesser degree. Japan is the largest buyer of seafood products from Australia while Hong Kong and Taiwan increased imports by 17% and 20% respectively in 1992-93. The value of our imports have risen by 11% for 1994-95. Increases have occurred across the fisheries spectrum, with Thailand supplying the largest portion of this market.

## 2.3 Brief economic forecast (ABARE suggestion)

The market review of dried seafood potential will certainly be dictated to by the current business climate and by the general economic indicators when considering investment for the short term aggregate supply. A brief forecast of economic conditions follows.

(ABARE, 1995) suggests that in the years 1995 and 1996 stronger growth should occur in Western Europe and Japan. This will offset a moderate growth in the United States while world growth should assume a more sustainable rate by the end of this decade.

Australian economic growth is assumed to be about 5.2% in 1995, easing to 3% over the medium term. The Australian dollar is assumed to average US75c, increasing to US79c in 1996-97 and then should ease to US78c by the end of the decade. The commodity price index is forecast to rise by only 3.2% in 1995 and 1.3% by 1996. This will result from a generally higher exchange rate in Australian dollar terms.

Mineral resources are forecast to recover over the remainder of the decade. Rural commodities are forecast to ease, however rural exports are forecast to rise significantly in the 1995-96 period. The progress of regional initiatives such as Asia Pacific Economic Co-operation (APEC) and associated trade liberalisation will have a great bearing on economic growth in Australia. ABARE (1995) estimates a real income increase of 3.4% for Australia based mainly on our apparent most favoured nation status with APEC. This expected growth will occur due to sales of goods and services. It can well be expected that dried seafood will play a reasonable role in this increased growth.

Lower interest rates and tax cuts in Japan are expected to strengthen private consumption in the 1995-96 period. Strong growth is possible from the Japanese economic sector due to the expected increase of surplus capacity.

Growth in the Asian sector is predicted to average around 7% in the medium term. This is assumed even with economic growth moderation taking place in China during the 1995-96 period. The real prime business lending rates in Australia are expected to rise by 1.1% to about 9.0% in the 1995-96 period remaining relatively high in 1996-97 and gradually easing to a 9.0% average towards the end of the decade. This does not account for any significant increases in unplanned inflation or a deepening of the deficit. Both these activities could force interest rates up and in part stifle the expected domestic growth figures.

The brief economic review expressed above will no doubt have an impact on the viability of Australian products in the Asian sector. The forecast strengthening of the Australian dollar in the 1995-96 period will make our products slightly more expensive to purchase on the open market and the forecast increase in interest rates will dampen some domestic consumption, however the predicted real income increase of 3.4% should stimulate some local spending on domestic goods and services. This may reflect kindly on the Australian dried seafood products.

The general trend in Australian imports in the smoked/dried and salted fish for years 1989-94 has seen a doubling in our import quantities from 250t to 500 t with a stabilisation in mean price between AUD$9.50 and AUD$10.50/kg over the same period. This either reflects an overall reduction in all seafood product prices over the respective period or an overall tendency to import low value dried seafood. The latter explanation is probably the most valid when observing the import data from the appropriate countries.

Quantities and value of imports from Spain, Iceland, New Zealand, Denmark, Norway and the United Kingdom have dropped substantially. Conversely imports from Singapore and Japan have doubled in quantity and in value over the last 5 years. Singapore has increased its exports to Australia from 21 t to over 27 t while the average price per kilogram from Singapore has risen from AUD$12 to $37.

An equilibrium, if not a slight surplus, of trade exists in Australia's favour. For the period 1992-94 Australia's export quantities to Singapore have risen from 18t to 28 t with a respective average price increase ranging from AUD$17 to $37/kg. For the same period, Australia's import price per kilogram of dried/smoked and salted fish from Singapore has never dropped below AUD$17.

## 2.4 Increasing the competitiveness of the dried seafood industry

The DPI Agribusiness 2000 Action Plan (Pullar, Perkins and Smith, 1994) identifies the following point, that world demand for fisheries products is increasing rapidly and consequently the average price can be expected to rise. The document also claims that Japan was the biggest importer of seafood products while the Asian Pacific region maintained a high consumption of seafood products.

Opportunities sighted for increased production include the use of 'production technology, innovative fisheries management and more efficient use of under utilised species'. From a Queensland perspective the ability to produce large quantities of a single species are very much limited. Agribusiness 2000 cites high quality dried products as one of the potential market opportunities.

The document also suggests that some of the factors which would affect our competitiveness in the seafood sector involved the supply of 'much higher quality, a lack of cooperation between operators, a better understanding of export markets and the importance of aquaculture'.

Industry should develop a more user friendly attitude to customers with a diversified and a mature approach to competitiveness involving a greater use of technology. Factors such as an understanding of the biological, marketing and pollution impacts are also necessary. The Agribusiness document noted 5 points in gaining higher prices for fisheries products. They involved a reduction in barriers, selling to a higher value market niche, adding value, improving packaging to produce higher quality goods and addressing the need for aquaculture. These recommendations would ultimately result in gaining a higher price, producing more or developing new products.

The DPI report "Seafood Trade and Investment, A Market Perspective" states that advances in technology practice will improve our competitive ability. The publication cites the energy efficient heat pump drier as an example of possible technology. It would appear that if we wish to achieve higher returns for a quality dried product then heat pump drying technology is one direction to take. In order to maximise on the heat pump technology, the 5 recommendations of the agribusiness action plan would also have to be addressed. An effort must be made to improve supply quality and quantity and to provide the appropriate packaging for products.

# 3. THE DRIED SEAFOOD MARKET

## 3.1 Difficulties sourcing trade information

The Australian Bureau of Statistics (ABS) code which provides the most amount of detail for imports is the 10 digit Harmonised Tariff Item Statistical Classification (HTISC). For Exports the ABS use a 8 digit Australian Harmonised Export Commodity Classification (AHECC).

HTISC and AHECC commodity codes provide the quantity of trade, the value of trade, country details, state details, and duty paid, rate of duty and nature of tariff (for import clearance).

Under this system dried sharkfins imported would be coded as 0305590025 and include the country of origin, quantity and dollar value involved. If one wished to find dried scallops imported into Australia the problem becomes more complex. The HITSIC code combines frozen dried, salted or in brine processed scallops under one code; 0307290015

The problem can become more acute when one is trying to establish Australian exports of dried seafood. The AHECC code for dried fish including dried sharkfin is the 8 digit number 03055900. Consequently, somewhere embedded in the information provided by this code is dried sharkfin. It is next to impossible to make recommendations involving dried sharkfin exports from this code. As can be seen, all sources of data have their limitations based on species and process involved.

Where a financial imposition or inspection service is placed on a commodity by a domestic importing or exporting government then it is highly likely that a record of that traded species is maintained. This area is where one may gain the most amount of information for species, process and quantity involved. Because of the confidentiality factor involving the value of products, pricing regimes are usually not available. These unknowns can usually be sourced through the marketplace via primary contact or through secondary sources such as *Infofish Malaysia*.

Numerous organisations exist which can provide the apparent information, usually starting at rates of at least $90/hr. It is therefore of utmost importance to define as precisely as possible the information you require. This should be carried out with a thorough understanding of the HTISC and AHECC system and in so doing realise that errors will exist in virtually all sources of information sourced. These errors will result for various reasons. Fluctuations in price will result from the differing base source figures inherent in the business cycle, distorting primary price feedback in an effort to protect a favourable price advantage and simple errors involved in recalling information. The prices given on the following dried seafood commodities were gained from primary sources such as producers and traders whilst some information is derived from secondary sources such as ABARE publications. In each case the values should be interpreted as the average potential possible for the commodity from Australia. The graphical figures attempt to cover the average price across variations within the species, thus the sharkfin value would reflect neither lowest or highest price.

## 3.2 Issues for marketing in Asia

### *3.2.1 Commercial planning*

The 1995 Rural Industries Research and Development Corporations (RIRDC) study (Neilbron and Larkin, 1995) into penetrating Asian markets stated six characteristics of food marketing in Asia which is of importance to commercial planning. These characteristics will greatly influence the manner in which dried seafood products are developed and sold in the Asian market.

1. Dualism occurs in products and markets of the agribusiness chain. The characteristics consist of modern products, facilities and institutions existing alongside traditional Asian foods and customs. The traditional Asian custom is by far the most powerful and persuasive.
2. The Asian food sector should not be looked upon as a market there for the taking. The food market is highly protected, culturally different and serviced by aggressive and powerful Asian conglomerates plus a few Western multinationals who have invested effort over many decades. In recent times powerful food companies have entered the region with strong support from their governments.
3. The growing Asian food consumption trend will be centred around domestic Asian food markets. A sizeable but much smaller market will be handled by Western food products.
4. The most attractive markets to Western companies will equally attract the greatest competition and aggression from international competitors.
5. The supermarket trend in Asia will not provide open opportunities for Western companies. The traditional persuasive influence of the retailing and distribution system, current official policies and consumer trends will not exhibit rapid change.
6. Strong and lengthy corporate commitment is required to gain a return on investment and current markets are unlikely to produce immediate returns.

### *3.2.2 Necessary procedures for market success*

The RIRDC report goes on to suggest five success factors for doing business with, and in, Asia.

1. **Exporting**: Companies have found that exporting to Asia assists in understanding the local market requirements.
2. **Detailed market research**: An understanding of what products would work best in a particular region is required. This should be carried out with the dual nature of the markets involved. The idea of improving or upgrading traditional products is important here for dried seafood. It is also important to recognise the issues of tariff costs which are associated with refined products and the higher cost of distribution and advertising in Asia.
3. **Supply chain management**: A detailed understanding of the pricing, marketing and distribution system is an extremely important aspect of success in Asia. Management of this process should be closely controlled if an organisation wishes to identify and capitalise on expanding opportunities.

4. **Strategic alliances**: These are important in building and maintaining a long term relationship in the Asian market sector. It may take the form of various agreements and usually follows exporting and precedes investment. Research and development, distribution agreements or licensing agreements are examples of such alliances.
5. **Investment**: Joint ventures can provide the necessary contacts and local knowledge required to expand a business operation off-shore. Numerous challenges arise from joint ventures with off-shore partners, least of which is the control and conduct of local operations. Joint ventures are usually carried out through necessity and should always have provision for withdrawal or takeover where limited liability is involved.

### *3.2.3 Strategy*

Neilbron & Larkin (1995) report that Australia should be very specific about market strategies. A country specific approach is necessary, with a concentration on major cities being the most appropriate stand to take.

### *3.2.4 Overlap/dual market approach*

If possible maximum overlap should be achieved in the traditional and modern market sector. Clear advantages lie with any company who can provide high quality branded products for the niche markets of Asia, although the Asian market is more suited to the low value-added product which is used in further on processing. This style may well suit small to medium processors in Australia and would be most suitable for the seafood drying sector serving both niche and traditional market.

### *3.2.5 Commitment*

Because of the large commitment necessary for covering all the numerous markets in Asia it is suggested that full effort is directed to very few markets rather than attempting to cover all the possible markets available. The patience, resources and commitment required of a company may well overtax it's resources and staying power if too many markets are targeted.

### *3.2.6 Government support*

Government policies and programs should recognise and target the dual food market segment of Asia. Australia currently targets the Western market segment, which is by far the smaller market share and by its nature an area of great competition from the international food sector. Asian companies and other international companies are strongly supported by their governments. Greater support from government is required for Australian food companies attempting sustained activity in the Asian market. The upgrading of traditional foods to suit the Asian consumer via packaging or processing technology and the targeting of agribusiness supplies necessary to achieve these ends is important.

### *3.2.7 Research and development*

Research and development at a more practical level which is directed towards local Asian requirements is needed. The size of the traditional market, the access and status of traditional markets, and the impact of the supermarket concept are important.

A knowledge of how to negotiate, gain and manage effective market chains in the Asian sector is needed. An understanding of what socio-economic effects will be created by the use of these traditional chains and how foreign organisations should manage this arrangement is required. The above recommendations of research are but a few important areas necessary to add and improve the process of trade with Asia.

# 4. DRIED SEAFOOD IN ASIA

## 4.1 Buying habits, consumer preference

Jack Maynard (1983) states that in Asia 'the market is no constraint to production - all dried fish products find their buyers. More exotic products such as dried squid, cuttlefish, beche-de-mer, scallops, oysters and abalone are always in short supply'. The chain of distribution in the Asian sector may well traverse five or more sectors of handling before arriving at the consumer. The chain of flow would start with the importer, who then sends the product to an auction house. Agents or dealers may then place the product in a warehouse or send the product to the retail sector finally culminating in the sale to the consumer. In some cases dealers may only deal in selected species. Auctioning of dried and salted seafood involves quantities of 300-500 kg lots, with hundreds of tonnes changing hands at each auction. The percentage margin of increase varies from country to country. Sri Lanka has the lowest mark-up, being in the region of 50% between importer and consumer. In Hong Kong this margin between processor and retailer is of the order of 300%. While recent information gained during the overseas study suggests that margins as low as 11% can exist on traded imported products for wholesalers.

Virtually all dried seafood markets contain dried anchovy, small shrimp and squid. In the more discriminating markets of Asia the quality grades of dried seafood can be placed in up to eight categories. Hong Kong is the most selective market with almost 70% of the market consisting of high value or gourmet dried products such as dried abalone, scallops, beche-de-mer, shrimp, sharkfin and squid. Much of the substandard products were sold to mainland China, however in recent times the southern provinces of China are buying directly rather than through Hong Kong and much of this product falls into the high value category. Only the very best products are sold in the Hong Kong markets and therefore command the highest prices.

Seasonal demand for traditional food products occur in Chinese communities and these are usually centred around celebrations and festivals (Rich B, 1995). As the bulk of the dried seafoods traded are traditional Chinese food products, processors should pay attention to the following dates and their significance in Asia.

The Chinese New Year is the most important of all celebrations and usually falls between January and mid February. The timing of the new year is dictated by the lunar calendar and celebrations can last up to one month in duration with the festival peaking over a two day period.

In the beginning of April Chinese families gather to honour their deceased relatives and this also causes a peak in demand. The northern hemisphere mid-summer months are peak trading months in some countries and territories such as Hong Kong. Another date for traditional demand is around the 15th of August when Chinese families celebrate the ghost festival. From September to October is the time for mid autumn celebrations and these involve events such as the dragon boats festival. Autumn is also the popular time for Chinese weddings and is associated with higher traditional demand.

In late December Chinese communities celebrate the winter solstice or Dong Zhui and this time is also associated with a traditional demand for dried seafood.

The majority of products from foreign sources involve the exotic high priced dried seafood such as beche-de-mer, sharkfin, abalone, cuttlefish, squid and high grade prawns and anchovies. Imports into the Philippines and Thailand of high value products are usually destined for international hotel chains or airline kitchens. These gourmet products tend to be in general smoked seafood products such as salmon and oysters. Malaysia imports some sharkfin and threadfin fillets, usually from Thailand and Burma. Singapore's main supplies of dried gourami (*Osphronemus gordmy*) and squid are from Thailand, India provides sharkfin and fishmaws, dried oysters come from Korea and finfish from Malaysia and Indonesia. Japan imports dried squid from Thailand and fish roes from Indonesia. Hong Kong takes by far the greatest quantity of dried seafood products and by far the best quality products. The Philippines ship large quantities of dried beche-de-mer and abalone to Hong Kong. Figures from the early 1980's show that the Philippines have the highest dried seafood consumption at 4.4 kg/capita followed by Hong Kong with 3.8 kg/capita, Indonesia, Malaysia, Thailand, Sri Lanka and Singapore follow respectively. These figures, however, do not reflect the value or quality size of the market. High consumption and high quality do not necessarily go hand in hand. The exception to this rule would be Hong Kong and as such is the most valuable when considering trade in dried seafood products. Mainland China should not be over looked for current and increasing trade.

## 4.2 The Japanese market

Ichiro Kano's (1989) article states that socio-economic factors have triggered off major structural changes in the seafood market in Japan. Riding high are top quality and value-added products. The article suggests that this could be due to higher demand for medium to top quality fish, reduced domestic production, lower transportation costs associated with a stronger yen and efforts made by overseas suppliers to target the lucrative Japanese market. Other reasons for increased consumption are related to an increasing domestic disposable income combined with a stronger yen. The emergence of smaller households of around 3-4 persons, a culture which values both traditional and imported equally, an arising busy social and business schedule which has little time for cooking and a greater emphasis on leisure activities including eating out also contribute.

### *4.2.1 Seafood trends*

Kano (1989) suggests that the market changes will last for many years. The author also notes that in the period 1980-87 a 12.8% rise in dried seafood consumption occurred. During the same period overall seafood consumption rose by 10.6% and Japan remained the highest per capita consumer of seafood products (70 kg), with an apparent reverse by young consumers from animal products to fish products. The number of people eating out rose by over 33%. This figure would suggest that the hospitality and catering market should be keenly addressed in the development of dried seafood products for Japan.

### *4.2.2 Product trends and forms*

Some examples of dried seafood which appear to be of increasing value are octopus, squid, cuttlefish and fish roe. Other trends include a decline in frozen fish consumption and increases occurring in other process areas such as surimi, dried, salted and canned products. This trend supports the use of the heat pump drier to produce value added dried products. This change is evident in the Tokyo central wholesale market, where the majority of imports are dealt with and also command the highest prices.

### *4.2.3 Market channels and overseas product*

The traditional long-chained association between importers and retailers is being challenged by trade houses and retail chains. This has effectively reduced the added cost of the traditional middle trader, consequently the final product price is much lower. The increasing cost of processing fish in Japan has led some retail outlets to develop appropriate lower cost products offshore using Japanese expertise.

### *4.2.4 Factors of change*

Social and economic factors have added to changes in buyer behaviour. Most shopping occurs at night with most people in the 20-40 yr age group purchasing their products in the supermarket. These products are usually prepacked products with the selection criteria involving issues of colour, cleanliness, size, apparent freshness, packaging and product brand. Product presentation is therefore a very important consideration when selling through the supermarket chains of Japan. There is also a small percentage of the population who are willing to pay any amount of money for particular products. It may well be assumed that particular dried seafood products may well fall into this category. The Japanese population has the highest on average life span and the consideration of what to eat and health implications continue to attract increasing numbers of consumers. The increasingly hectic life style has a direct implication on the demand for conveyance based products.

### *4.2.5 Final market segments*

The seafood consumption trend indicates the existence of two markets:

1. **The high value seafood market** involves the expensive species of seafood, where the domestic supplies have been rapidly depleted and imports are highly necessary to satisfy demand. The sourcing of these products by Japanese companies have and will continue to increase the price in the country of source. Some examples of this are scallops, abalone, fish roe, sea urchin roe and jellyfish.
2. **The value added products market** includes the ready-to-eat market. This line of production is moving offshore to lower costs. Examples of this area are the breaded products and artificially modified seafood products.

In Kano's (1989) opinion the demand for the high valued seafood will grow in size and value as local and world supplies of these species decline. The high production cost for local seafood processing could well force Japan to source these high value products offshore. In this area the heat pump drier in association with high quality input materials could well capitalise on this market.

## 4.3 The Hong Kong market

The Hong Kong dried fish market is the probably the most selective in Asia. The inhabitants of Hong Kong enjoy a high per capita consumption of dried seafood. A 1984 figure placed this level at about 4 kg/yr. Quality appears to be the most outstanding factor when considering the criteria of the Hong Kong buyer, price is not the first hand concern of the consumers. The affluent Hong Kong community buys product on a basis of value. These products consist mainly of high value dried/salted sharkfin, beche-de-mer, shrimp, abalone, oyster, squid and cuttlefish. The remainder of the consumption is made up of dried/salted marine fish.

Hong Kong's local production of dried seafood accounts for approximately 20% of domestic consumption. About 94% of this production was concentrated in finfish production. The remaining 6% comes from molluscs and echinoderms. Some of the dried fish species produced in Hong Kong include conger or pike eel, red snapper, grouper, croakers and golden thread fin. These locally caught species are usually of a higher then average grade.

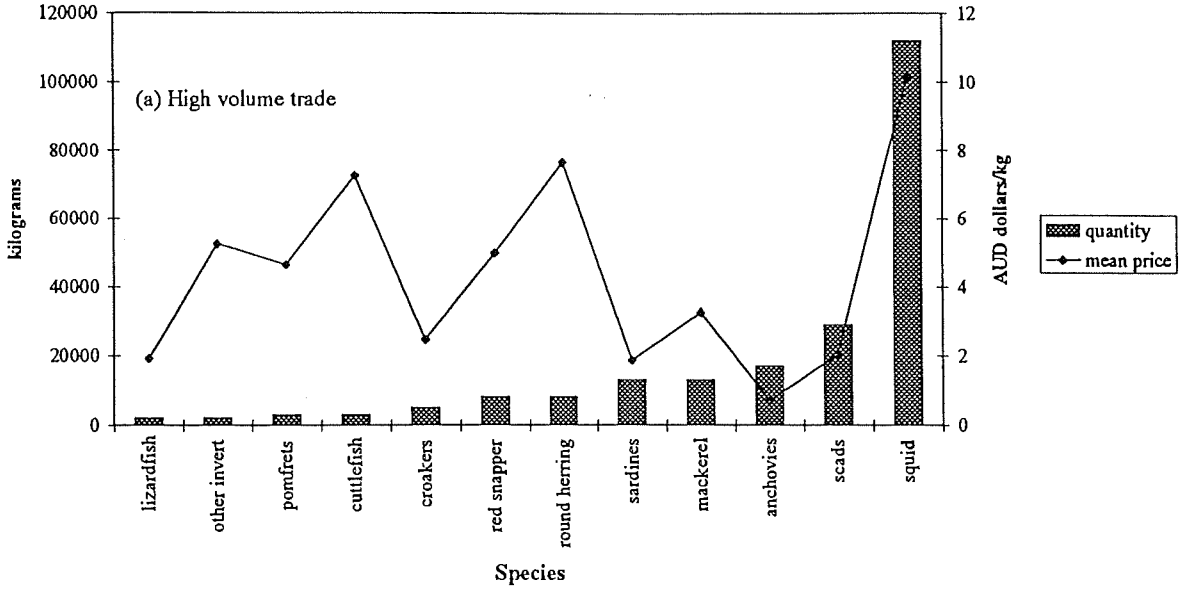
### *4.3.1 Marketing chain of dried seafood*

The marketing chain is fairly direct with the majority of importing and distribution carried out by private traders. The majority of the local dried seafood is auctioned through the Fish Marketing Organisation (FMO) at Aberdeen. A non-profit government organisation which is controlled by the Agricultural and Fisheries Directorate. The FMO not only provides facilities and auctioneers for trading in dried seafood products, it also provides free transport from landing point to markets, technical, administrative, marketing and business advice. The FMO take a 6% commission for sorting, auctioning, recording and accounting duties. The FMO also provides low interest loans to the fishing industry as part of their service. The FMO for the 1993-94 period traded 526 t in dried and/or salted fish products, for the same period the FMO traded more then 120,000 t of fish and their by products.

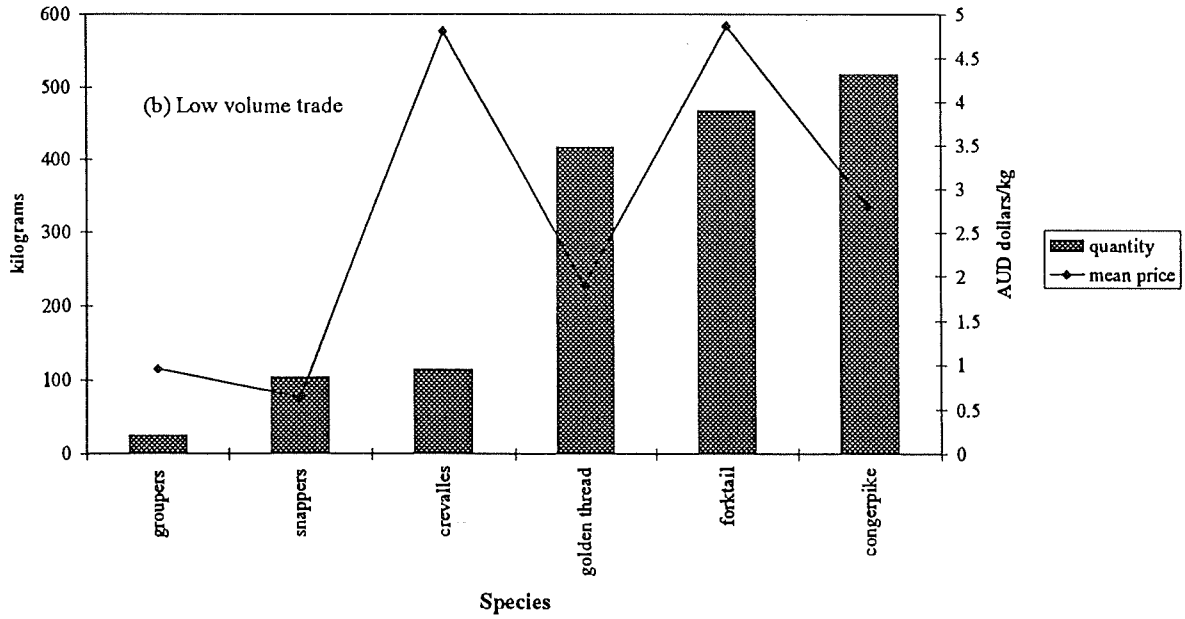
The owner of the product is usually represented at the auction by an individual who starts bidding at the lowest acceptable price. These products may consist of a combination of wet, salted or dried products. Processors usually purchase the wet product for drying and on-selling, whilst wholesalers usually purchase the best locally dried products and also sell imported products to retailers. Product considered of lower quality is quiet often sold into mainland China. The auctions begin in the middle of the morning and run for 340 d/yr. Approximately 6 t of dried and/or salted seafood are handled a day.

The following graphs (a) & (b) represent salted and dried fish traded at the FMO.

Salted/dried seafood traded at the Hong Kong fish markets for 1993/94.




Salted/dried seafood traded at Hong Kong fish market 1993/94.




## *4.3.2 Wholesalers and retailers*

The non-government wholesalers of dried seafood products in Hong Kong tend to be located in the area around Des Veoux Road West. The wholesalers will sell to both retail and hospitality outlets, with occasional sales to individual consumers. The retail sector tends to sell mainly in the public market. These markets are usually located in the areas where traditional consumption is quite high. The retail sector tend to buy their dried seafood stocks on a daily basis from the wholesalers, while some product is purchased infrequently and directly from the dried seafood processors. The wholesalers also import high value products.

These products are usually purchased during periods of high supply in the marketplace. They are then treated with the greatest of care, usually involving low temperature storage in an effort to maintain the prevailing state of quality. Wholesalers are also involved in re-exporting product, however most exporters are independent traders who have a direct relationship with processors.

### *4.3.3 Dried seafood imports*

The demand for dried seafood products in Hong Kong *exceeds* supply, Hong Kong is thus a net importer of dried seafood products. The value of Hong Kong's dried seafood imports far exceeds its domestically produced exports. Substantial quantities of dried seafood are also re-exported. The majority of Hong Kong's imports come from countries in the same region such as China, Vietnam, Thailand, Singapore and Japan. The domestic Hong Kong market receives the very best of the quality purchased, with over 80% of the market comprising of speciality products such as dried and/or salted sharkfin, beche-de-mer, oyster, abalone, squid, and cuttlefish. An environment exists where limited supplies have fuelled continuing price increases.

Dried and/or salted marine fish make up the greatest share in terms of volume. The major suppliers of these include North Korea and China, while other large players are Singapore, Bangladesh and Vietnam. Hong Kong is the world's largest market for dried and/or salted sharkfin, with Japan as the major supplier and contributions coming from Singapore, South Africa and Mexico. Hong Kong is also the most significant market for dried beche-de-mer. The major contributors of this commodity are the Philippines and Indonesia. Hong Kong receives significant supplies of dried or salted crustacea from Thailand and Vietnam, with shrimp the major proportion of this import. Overall Hong Kong receives most of its dried and/or salted products from Japan, Thailand, Vietnam and South Korea.

Hong Kong is Australia's largest market for dried seafood products. It is also one of Australia's highest value markets and one which has a fairly direct chain of supply and delivery. This market should be fostered through sustained and appropriate contacts with organisations such as the FMO of Hong Kong. Australia sends a varying volume of dried seafood into Hong Kong each year. In the period 1993-94 Australia exported 89.32 t to Hong Kong buyers.

### *4.3.4 Exports of dried seafood products*

Hong Kong also exports dried and/or salted seafood to various countries. Some product such as dried and/or salted red snapper, golden thread and conger/pike eel are mainly bound for Chinese communities in the United States of America, Canada, Singapore and Australia. Dried and/or salted crustacea are mainly destined for Japan and dried and/or salted molluscs are destined for the United States of America, Japan, Singapore and Macau.

### *4.3.5 Re-exports of dried seafood products*

Hong Kong re-exports a variety of seafood products such as dried and/or salted sharkfin, beche-de-mer, crustaceans and molluscs. The countries involved are Japan, China, North and South Korea and the Western Coast of both North and South America. The strategic location of Hong Kong as an historical trading port provides an appropriate distribution point for dried and/or salted seafood products. The major products traded in order of volumetric importance are sharkfin and beche-de-mer. The major buyers of sharkfin are usually China, Singapore and Thailand. Major buyers of beche-de-mer include China, Taiwan, South Korea and Singapore. Dried and/or salted crustacea are usually absorbed by China, the United States of America and Singapore. The United States of America and Singapore are also major markets for dried and/or salted molluscs.

### *4.3.6 Trends*

Hong Kong will continue to require dried and/or salted seafood products to satisfy demand. Domestic production is limited and aquaculture and wild caught supplies are inadequate in meeting local demand. These facts will require Hong Kong to continually source both raw and dried material off-shore. The strategic trading position of Hong Kong will assure the territory a continuing influence on the price structure of dried and/or salted marine products. This will no doubt continue partly because of tradition and in part because of established infrastructure. Although China is increasingly purchasing directly from supplying countries, the high volume required by China can only be effectively gained through the Hong Kong fish market. This will probably result in increased trade between both territory and country. Hong Kong will continue to influence the prices for dried and/or salted marine products in Singapore, Japan and China because of the territory's continuing demand for high value dried products.

## 4.4 The Korean Republic markets

The Republic of Korea is a major exporter of fisheries products on the world market. It has a rapidly increasing import market for fisheries products. The Republic has experienced strong economic and population growth in recent times. In the period from the early 1960's to the late 1980's the volume of fisheries imports has grown by a factor of 1200. The higher standard of living has resulted in a demand for fisheries products and has seen consumption rise to 50 kg/capita in the thirty years up to 1986. The Republic would appear to be following the consumption trends of Japan. With the Japanese consumption of fisheries products in the region of 70 kg/capita it is reasonable to speculate that the Korean trend will match the Japanese consumption. Some of the reasons for the increased consumption rate has been the higher and increasing disposable income and the introduction of new products to the marketplace.

In the period from the 1980-89 the retail price index for dried fish products in the Republic displayed a rise from 72 to 149 points. This figure compares with a general agricultural index rise from 94 to 119 points for the same period. On average fisheries prices had risen from 77 to 184 points for the same period (taking 1985 as the base index of 100 points for a standard

basket of commodities measured in wons). Part of the reason given for this rapid rise in value has been the high demand experienced by industry.

### *4.4.1 Imports*

In the decade up to the 1990 the Republic's imports increased by a factor of 6.9 times in terms of quantity and 6.3 in terms of value. The United States of America has been the major supplier followed by Japan. Other suppliers have been Canada, Chile and New Zealand. The countries of Taiwan, Malaysia, Philippines and Thailand are playing an increasing role in providing fisheries products to the Republic. Possible reasons for the large growth in fisheries imports could be lack of raw ingredient supply, rapid population and income growth and rapid increase in the value of Korean currency (won).

### *4.4.2 Reducing tariffs*

As part of the Republic's wish to protect the local fisheries industry, fisheries imports have always experienced a tariff. Since the 1980's the government has adopted an attitude towards trade liberalisation which has seen tariffs on some fisheries products reduced. The major dried products involved in this area would be dried cuttlefish and squid. These products in 1994 attracted a tariff of 10% and it would appear that these products are on the agenda for tariff reduction by 1996.

### *4.4.3 Trends*

In 1993 the domestic growth rate was placed at 3%, the population will grow at 1%, the per capita consumption at 1.5%, the non-food sector at 10% and fisheries exports at 6%.

Industrial output rose 14.1% in the first quarter of 1995. This is the highest rate since the last quarter of 1988. Per capita income is expected to exceed US$10,000 this year, compared with US$8,843 in 1994. Quotas exist on both prawns and squid, however low catches by domestic fleets are bound to result in a reduction of these levels. Products such as jellyfish are popular in Korea, however local catches are limited. If consumption trends follow the Japanese pattern then products such as salmon, tuna, skipjack, abalone, oyster and fish roe will probably be in demand. The Korean market no doubt warrants future or strategic concern for the Australian dried seafood producer wishing to look at processing squid or cuttlefish.

## 4.5 Singapore

Singapore's total production of fisheries products has steadily declined during the period from the late 1980's to the early 1990's. South East Asian Fisheries Developement Centre (SEAFDEC) figures show that the quantity of Singapore's local fisheries production fell by over 3,600 t between 1987 and 1991. The value of local production fell by 30%. The average value of the fisheries production for this period is between US$1-$2/kg. The figures tend to suggest that Singapore is involved in the value adding of fisheries products. For example, the

1991 balance of trade shows a surplus value of US$30,436,000. The value of Singapore's local production accounts for only US$14,068,000. This leaves a figure of US$16,368,000 unaccountable. This figure cannot be explained purely by importing or exporting fisheries products. For the year 1991, Singapore's quantitative imports exceeded its local production and exports combined. This reflects a domestic demand for fisheries products which is currently serviced from off-shore sources.

### *4.5.1 Re-exports*

Singapore's local aquaculture production has not increased in the period covering 1987-91. The countries of Singapore and Hong Kong both possess the reputation for on-trading fisheries products. This is reflected in a surplus of exports or more precisely the re-exporting of fisheries products. Singapore, like Hong Kong, does on-trade dried seafood products which have been bought from other countries. Australia is one of the areas that Singapore purchases from directly and no doubt indirectly. Both Hong Kong and Singapore exert a large influence on the price for traded fisheries products in the region. China will no doubt play an increasing part in this trade, as its large population places continuing demands on fisheries products.

Singapore unlike Hong Kong does not possess a fish marketing board. It does possess a Primary Production Department which regulates the importing and exporting of fisheries products. The department is included under the Singapore Ministry of National Development. Domestically the Hong Lim and Kreta Ayer food markets would display examples of the fisheries products available in Singapore.

# 5. DRIED SEAFOOD IMPORTED INTO AUSTRALIA

## 5.1 Import trade statistics

According to ABARE, in 1991-92 Australia imported 372 t of dried fish. The total value of that dried fish was $5,192,000 and the mean price was $10.42/kg. By 1993-94 this figure had increased to 486 t with a mean price of $10.68/kg. The figures show that the value of our dried fish imports is reasonably stable and not very high.

The ABARE figures indicate that Australia imports over 56% of its dried or salted fish from a large group of countries. These countries individually do not command a large enough share to warrant individual attention. The mean price for salted or dried fish bought from these countries is $10.90/kg. Australia imports 21% of dried or salted fish from Norway at a mean price of $8.85/kg. Our next largest supplier is Iceland with over 7% of the Australian market, selling at a mean price of $8.05/kg.

Overall Australia imports several hundred tonnes of dried fish each year at a relatively low mean wholesale price. Of greater importance is the consumption trends of those products which do command a relatively high price by Australian outlets. The figure used in this report was all dried seafood products commanding a retail price of $20 per kg or greater.

Dried crustacea or molluscs imported into Australia are not recorded as independent traded figures. They are grouped and embedded under the HTISC guidelines. This makes the search for statistics on imported dried crustacea and molluscs a difficult task. (See Appendix 1 figure 1 for graph).

## 5.2 Origins of imports

In the following section we shall review the statistics of selected countries and the processed seafood products that are imported into Australia. Where possible we shall attempt to identify possible opportunities for import replacement by Australian companies. The countries selected are Thailand, Norway, Japan, Spain, Taiwan, South Korea, Singapore, China, Hong Kong and the United States of America.

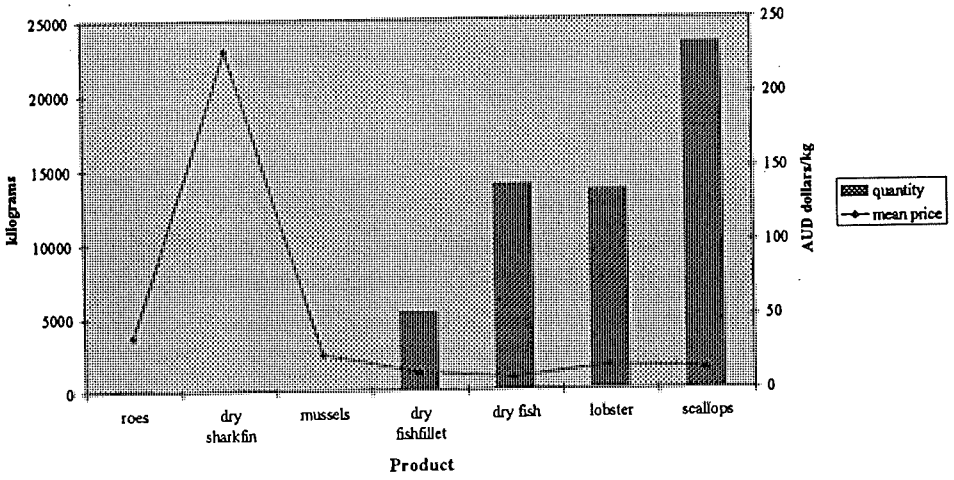
### *5.2.1 Thailand*

Preliminary figures show that from 1991-94 the prices for smoked, dried or salted fish imported from Thailand have increased by over 33%. For the same period the total volume imported has dropped by 15% and the final mean price was $8/kg.

Further figures show that Australia imported over 2,672 t of frozen, smoked, dried, salted and cooked seafood from Thailand for the 1993-94 period. The value of this trade amounted to $6,156,842. The products of value to the Australian industry are dried fish roe and dried fish including sharkfin and shrimp. In all the cases the high value products such as dried fish roes 90 kg at $37.30 kg, sharkfin 10 kg imported at $270.57 per kg and mussels 20 kg imported at

$32.53 per kg should be targeted for import replacement. This type of activity should help to maintain Australia's competitiveness in the processing sector. The high value commanded by many products quite often reflect the high degree of pre processing involved. This would be certainly the case with dried sharkfin from Thailand. At current face value it would not be economical to consider total import replacement of products from Thailand. It may be possible for Australian seafood driers to target the airline kitchens and international hotel chains in Thailand. The Thailand retail sector would appear to be to low price a market for Australian products to be commercially competitive. The following graph shows the breakdown of imports from Thailand. For further data Appendix 1 figure 2.

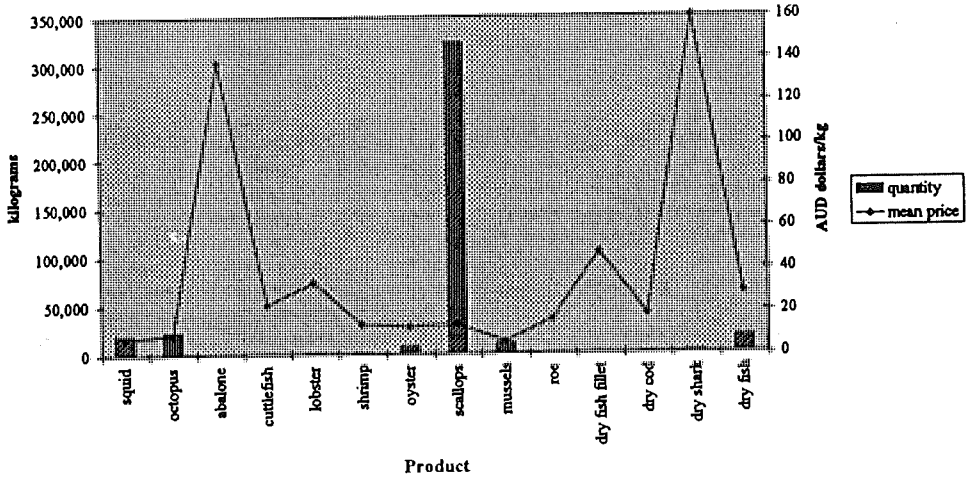
**Australian imports of selected frozen,smoked,dried,salted & cooked seafood from Thailand for 1993-94**




## 5.2.2 *Japan*

Australia also imports smoked, dried or salted fish from Japan. Over the period 1991-94, the volume imported has remained stable at around 21 t annually. During this period the value of these imported products has risen by over 23%. The mean price paid for smoked, or salted fish during 1994 was $40.81/kg. The following graph displays the volume and mean price of the different commodities traded. Further detail is present in Appendix 1 figure 3.

**Australian imports from Japan of frozen, live, dry, salted, smoked or cooked seafood**

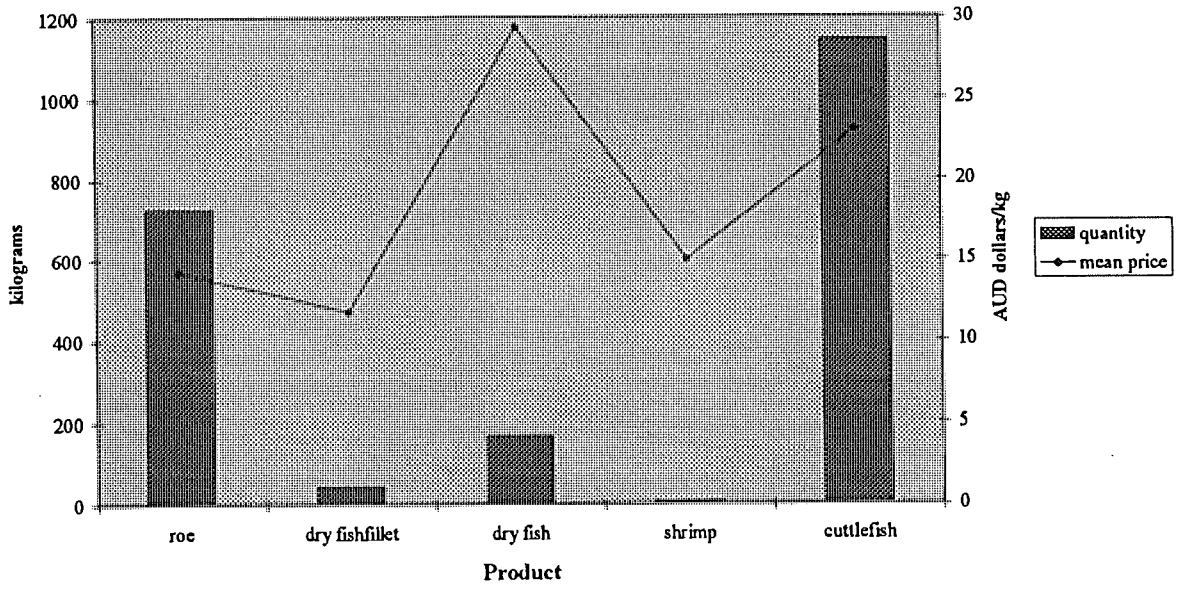


Sources of statistics show that Japan exported over 408 t of frozen, live, dried or salted seafood to Australia during the 1993-94 period. The total value of this export was just over $5,851,644. The imported products, quantities and value worth noting are sharkfin 1,867 kg traded at $159.81/kg, dried fish fillets 739 kg traded at $47.39/kg and cuttlefish 797 kg traded at $23.18/kg. The mean price for all products is just over $14/kg. A further review of Japanese products will occur at a latter stage in the discussion and recommendation section of this report.

### *5.2.3 Taiwan*

Australian imports of frozen, dried, salted, smoked and cooked seafood in 1993-94 from Taiwan was valued at $365,812. Over 1,408 t of seafood was traded with a mean price of just over $3.81/kg. The main products of interest are dried fish 166 kg traded at $29.41/kg and cuttlefish 1,145 kg traded at $23.01/kg. The following graph displays all products imported from Taiwan.

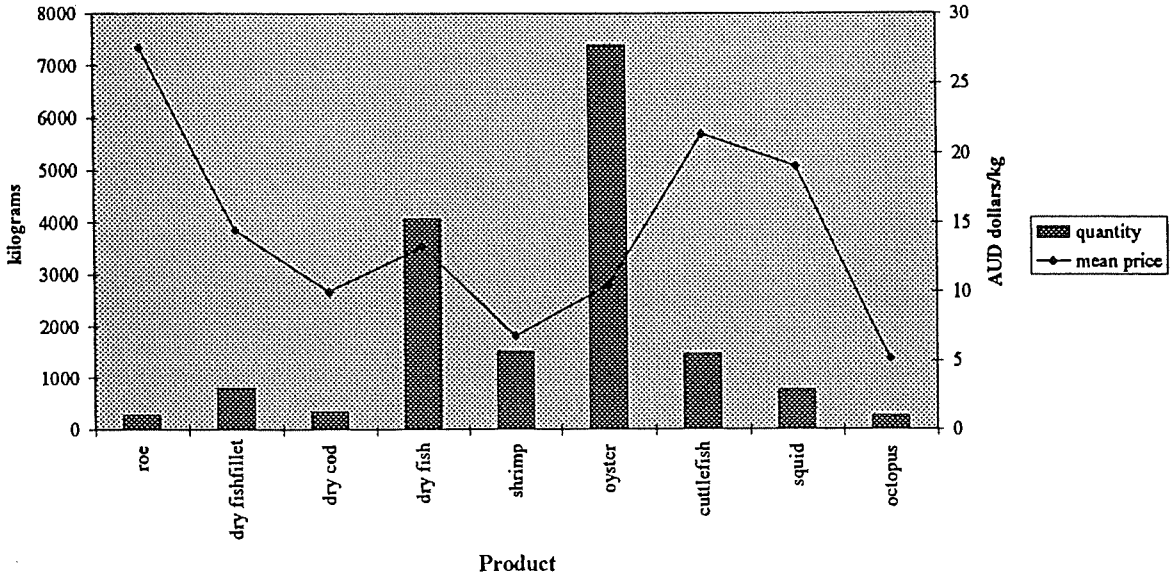
**Australian imports of selected frozen,smoked,dried,salted & cooked seafood from Taiwan for 1993-94**




### *5.2.4 Korean Republic*

Australia imported just less than 17 t of frozen, dried, salted, smoked and cooked seafood from the Republic of Korea in 1993-94. The total value of this trade was $211,367 and the mean price was $12.43/kg. The products to take note of are fish roes where 280 kg was traded at $27.50/kg, squid of which 767 kg was traded at $19.02/kg and cuttlefish totalling 1,466 kg traded at $21.35/kg as seen in the following graph.

**Australian imports of selected frozen, smoked, dried, salted & cooked seafood from Republic of Korea for 1993-94**

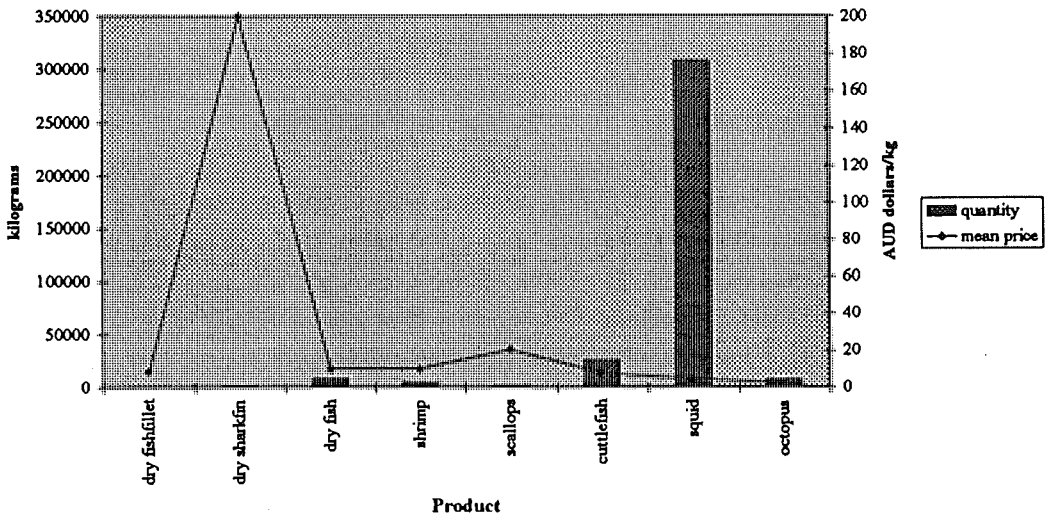



## *5.2.5 Singapore*

The Singapore trade statistics of imports and exports for 1994 show that Australia received 13 t of dried or salted fish products worth slightly in excess of $267,000. The Australian market is not of large quantity or value for Singapore. This low figure would indicate that import replacement possibilities for Singapore's would be very limited.

Further data shows that over 359 t of frozen, dried, smoked, salted or cooked seafood was exported to Australia during 1993-94. The total value of the seafood traded was $2,034,051. The high value products of interest to Australia are 1,090 kg of dried sharkfin traded at $200/kg and 1,994 kg of scallops traded at $20.68/kg. The trade in these and other commodities are displayed in the following graph.

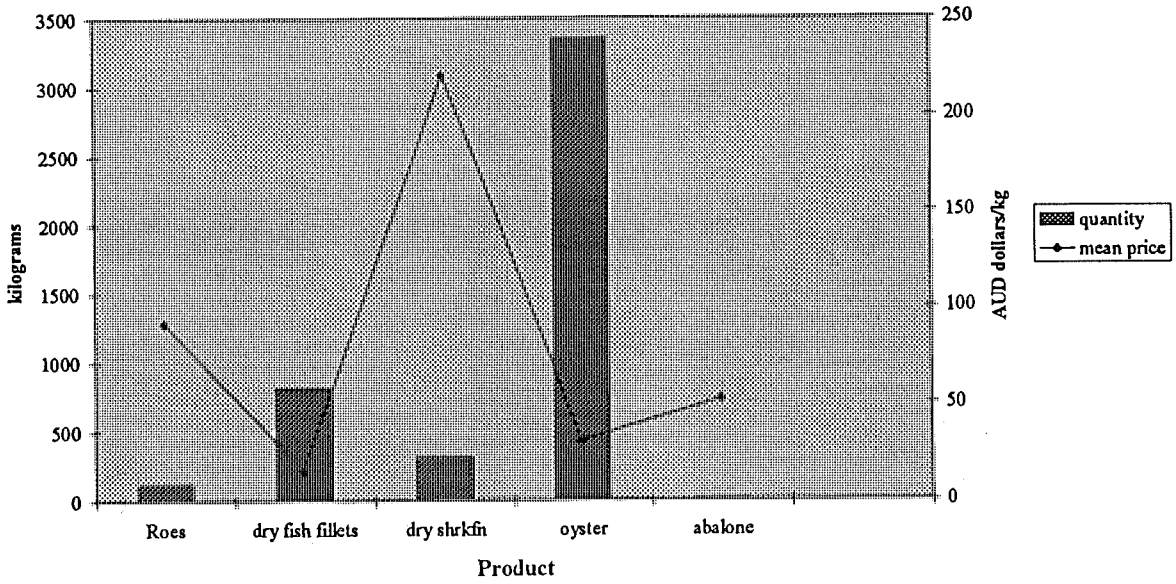
**Australian imports of selected frozen,smoked,dried,salted & cooked seafood from Singapore for 1993-94**



## 5.2.6 *The Peoples Republic of China*

Australia imported just less then 210 t of frozen, dry, salted, smoked and cooked seafood from China in 1993-94. The total value was $1,994,221 with a mean price of $9.50/kg. The high value products of interest to Australia are dried sharkfin 315 kg traded at $220.62/kg, fish roes smoked or dried 124 kg traded at $91.47/kg and oysters 3,352 kg traded at $30.61/kg. Once more the sharkfin value represents the high levels of processing carried out for the price paid and not simply dried fin. The following graph demonstrates the volume of trade for the various products imported.

**Australian imports of selected frozen, smoked, dried, salted & cooked seafood from the Peoples Republic of China for 1994**

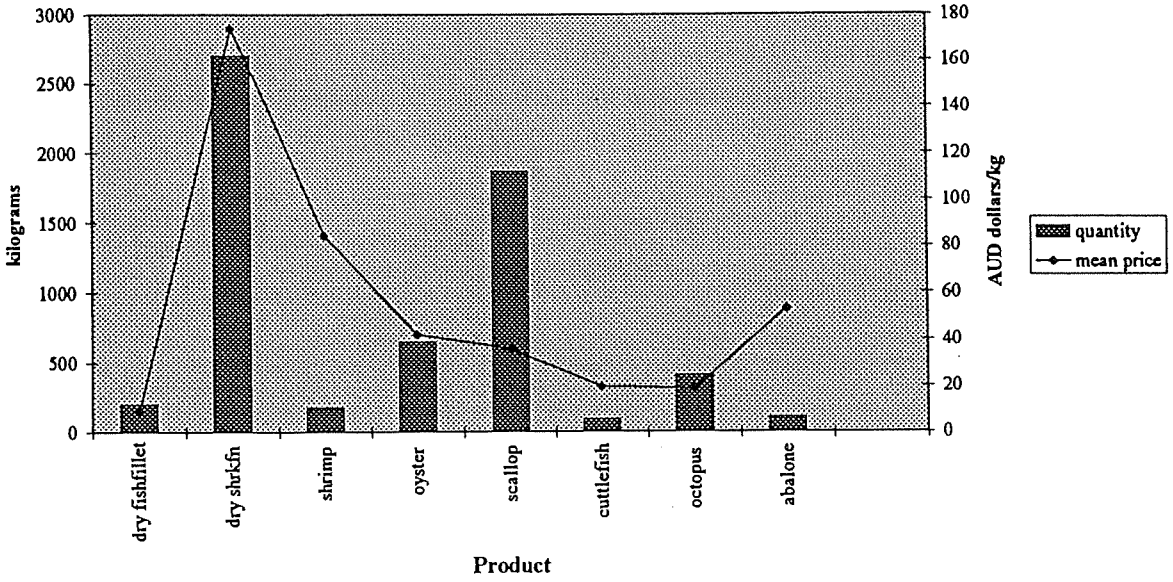



## 5.2.7 *Hong Kong*

Australia imported over 275 t of frozen, dry, salted, smoked and cooked seafood from Hong Kong in 1993-94. The total value of the seafood traded amounted to $1,964,720. The mean price was $7.14/kg. Hong Kong trades in the highest value dried seafood products.

With this in mind, the products of importance to Australian producers are dried sharkfin 2,698 kg traded at $174.12/kg, dried fish 12,875 kg traded at $18.70/kg, processed and including dried shrimp 178 kg traded at $84.41/kg, processed and including dried oysters 649 kg traded at $42.30/kg, processed and including dried scallops 1,860 kg traded at $35.80/kg, processed and including dried cuttlefish 90 kg traded at $19.54/kg, processed and including dried octopus, 407 kg traded at $18.61/kg and processed and including dried abalone 100 kg traded at $53.41/kg. The following graph demonstrates some of the products imported.

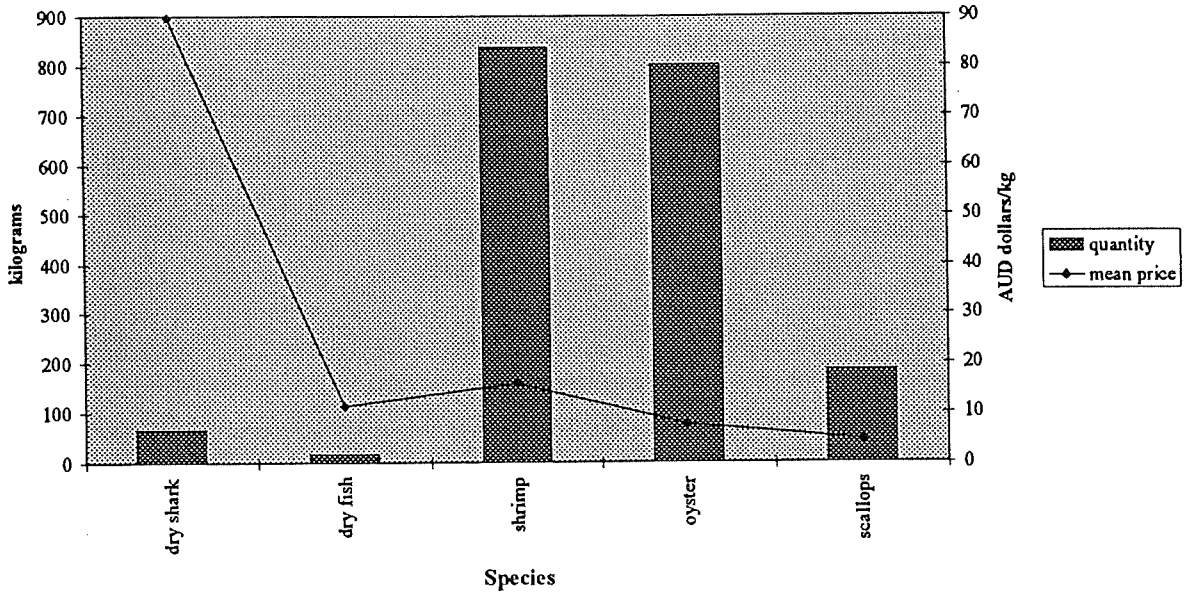
Australian imports of selected frozen, smoked, dried, salted & cooked seafood from Hong Kong for 1994




## *5.2.8 USA*

Australia's imports from the USA are in decline. From 1991 to 94 imports of smoked, dried and salted fish have dropped by over 84%. The value of their commodities has risen by over 67% for the same period. The decline in the market demand indicate that import replacement should not be pursued. Further information suggests that the dried seafood products worth noting from the USA are dried sharkfin and dried fish. Over 98% of the quantity of seafood imported from the USA can be attributed to squid which was traded at an average price of $1.43/kg. The USA did not appear to sell any sizeable quantities of dried seafood into Australia during the 1993-94 period. Insufficient dried product appears to be traded between Australia and the USA to warrant an import replacement approach. The graph below shows the commodities other than squid that are traded.

Australian imports of selected live,frozen,dried,salted,smoke and cooked seafood from the USA for 1993-94




## 5.2.9 *Norway*

The ABARE figures show that Norway is the single largest supplier of dried or salted fish to Australia. For the period 1991-94 Australia imported 516 t of dried or salted fish. The mean price paid for 1993-94 was $8.85/kg. The period 1992-93 was a peak year for dried or salted imports from Norway. In that period Australia imported 192 t of dried or salted fish. The mean price paid for product during this period was $9.40/kg. At the top of the value scale shrimps commanded a mean price of $87.74/kg but only 42 kg was imported. Dried fish fillets received the lowest price at $5.12/kg. Over 80 t of "other" dried fish, mainly cod, was imported with prices ranging from $9.50-12.91/kg. No similar fish exists in Australian territorial waters which could replace cod and as such is not a viable import replacement concern. Very small niche markets do exist for import replacement concepts, however the demand is for a few kilograms a month. The value commanded by Norwegian dried seafood products would not warrant any further investigation for import replacement purposes. (See appendix 1 figure 4 for graph).

## 5.2.10 *Spain*

Australia's import of dried or salted fish from Spain appears to be reducing. These have declined by more than 40% from 1991-94. In the same period the value of their commodities increased by over 23% with 1994 registering a mean price per kilogram of just $5.22. The price paid for Spanish dried or salted fish does not appear to warrant any further interest. (See Appendix 1 figure 5 for graph).

## 5.3 The cephalopod market and Australian imports

Hong Kong, Singapore and South Korea are net importers of cephalopods. Hong Kong from 1989-1992 showed an increased of 45% by quantity and 47% by value and Singapore recorded a 19% increase in volume with a 30% rise in value. China is importing directly from major supplies and is accounting for larger purchases each year. Japan is the largest buyer of dried cephalopods. Squid and cuttlefish are usually dried from fresh material with the dried form taking on many diversified products. Dried powdered cuttlefish are mixed with flour, additives and sweeteners to create new flavourings and products. The Japanese have taken to cephalopod snacks in quite a popular fashion, with a wide range of products being consumed.

Australia is importing more dried cuttlefish each successive year. To illustrate this point, in 1989 Australia imported 2314 kg of dried cuttlefish. Only 8.4% of this market attracted a wholesale value of $20/kg greater. This high value market was totally monopolised by Japan, while countries like Hong Kong provided the bulk of the market at a wholesale price of equal or less than $13/kg. The countries supplying dried cuttlefish to Australia for 1989 are present in Appendix 4 as figure 1A.

By 1994 as shown below the Australian market had grown to 5262 kg and over 74% of the market attracted a wholesale price of $20/kg or greater. China appeared unable to supply the requirement and consequently found its market share eroded. In the same period Korea, Taiwan and Japan met the market requirement and claimed the lions share of the market both of higher value and greater quantity. The data for this period is present in Appendix as 4 figure 1B.

The general trend in Australian imports of smoked, dried or salted products is:

1. declining volume in imports combined with
2. rising value per kilogram for the traded commodity.

The ABARE figures show that the value of most smoked, dried or salted fish products are not very high. The exception to this trend is australia's imports from Japan and USA.

# 6. SURVEY

## 6.1 Processing industry questionnaire

In the first quarter of 1995 representatives of the dried seafood processing sector were briefly surveyed in an effort to establish which species and products they felt should be addressed in our actual drying trials. In addition any barriers or incentives they felt were involved in developing the market were also investigated. About 25 companies listed in the Telstra yellow pages and the National Seafood Extension Advisory service (AUSEAS) were polled by phone, facsimile and personal interview. The replies from companies electing to be involved indicated that there were three areas of concern.

1. The first and major concern voiced by industry reflected the difficulty associated with gaining approval for solar drying facilities in Australia. This appeared to be of importance where the market price structure is apparently centred around the method of drying and where solar drying is perceived as being the method which delivers the preferred quality.

2. The second area of concern appeared to be what the industry considered to be to high a standard requirement for export processing plant facilities. The opinion expressed by respondents centred around the argument that profitability was greatly reduced in the processed seafood sector because of the high cost of implementing and maintaining these standards.

3. The third concern involved unreliable supply and price instability from the primary sector.

It must be stated that the number of respondents who selected not to be involved in the survey was quite high. The need to retain confidentiality and the companies' competitive advantage was most often cited as the reason for non-involvement in the survey. Of those responding to the survey, a high degree of interest was expressed in utilising the heat pump drying system for product trials with both existing and new product lines. Of those companies acquainted with heat pump technology, the major concern related to the high capital cost involved in purchasing the unit. This was followed by the apparent unknowns such as how to maximise the profit making potential of the drying system through appropriate improvements in product quality and the possible savings in current energy costs. It was suggested in discussion that if the heat pump drier could replicate the product quality of the solar drying method, whilst still achieving savings in time and energy costs, then the technology could be very beneficial.

Other suggestions included combining the functions of heat pump and solar drying systems in an effort to accelerate the drying process whilst at least retaining the quality provided by solar drying. This suggestion would use the most efficient aspect of both processes to accelerate the drying time involved whilst maximising throughput of raw ingredients. The economic appeal of the heat pump system would be enhanced by the above suggestion.

**Since this survey a number of companies have purchased heat pump driers specifically for drying seafood.**

The second area of concern was addressed by the 1982 Senate standing committee on trade and commerce review of the fishing industry. Concern was expressed by some industry representatives associated with the use of export standards. The claim was made that the cost of applying these high standards to lower value fisheries products made their products uncompetitive. This was especially so when the buyer had requested a low cost low quality product. Industry maintained that the market place was the best determinate for product standard and Government intervention should be left to deceptions in product claim.

Further anomalies existed in the processing sector, with industry stating that if a processing plant providing the domestic market wished to export surplus fisheries product, they would be unable to unless the plant was upgraded. Industry argued that the domestic plant should be able to export to any country which approved of the plants health standards and found them acceptable for that product and country requirements. Industry cited a case of a trawler company previously fishing for mackerel in the waters of the United Kingdom, the product was then exported to Nigeria at high volume, low price. In the continuing maintenance of its contract with Nigeria the trawler company commenced fishing in Australian waters for a similar species of fish. The company found that if it wished to continue exporting to Nigeria from Australian waters it had to invest a further $150,000 to upgrade the vessel.

The fisheries industry suggests that the export regulations should be defined on the basis of the marketability of the resources, rather then the type of fishing vessel involved in the species exploitation. In defence of their activities the Australian Quarantine Inspection Service (AQIS) stated that it is only through complying with the demands of the authorities in the importing country that certification and extra inspection are carried out. AQIS stated that these standards are usually carried out within the World Health Organisations standardised forum. This is conducted by the Codex Alimentarius Commission which was established to create uniformity and to minimise standards between countries.

The third area of concern expressed by seafood driers was also addressed by the 1982 senate committee review of the fishing industry. The committee reported that domestic marketing was one of the industries major shortcomings and stated that a low consumption of fish can be largely attributed to poor marketing. The report cited that lack of coordination of marketing at a national level as an issue which needed to be addressed and further suggested that this might be difficult to achieve while the industry remains unprepared or divided on the fundamental issues of national marketing. Inclusive in the committees argument was the continuing reluctance of the States to surrender their independence in this area of fish marketing control. This subsequently worked against Australia wider effectiveness.

The committee's recommendations involved the establishment of a national marketing board. The report went on to state that stability varied within sectors of the local fisheries market, with the most stable markets considered to be those in export oriented sectors. It was in the areas of import replacement that the problems arose. This occurred through a lack of appropriate sales channels, insufficient price levels to support fishing and non-established grading and quality standards to justify and operate a minimum price level. These topics were of basic concern to the fishing industry and should be addressed as soon as possible. The committee suggested that the national marketing board would have four functions of responsibility, commercial marketing, industry stabilisation, coordination of industry and regulation of industry. The advantage of a national marketing board for those involved in further processing such as the drying of seafood would be mirrored in the functions of the

board. They could expect to receive quality graded material, at a stabilised price, in known quantities.

The stability of input supply price, quality and quantity should also create a similar stabilised environment for investors, with appropriate economic returns flowing to investors, consumers and the national economy. Despite the possible long term benefits that a national fisheries marketing organisation could award the industry, the Australian Fisheries Industry Council decided to oppose the establishment of the marketing board, stating that such Government action would flow against the generally accepted ideals of free enterprise.

## 6.2 Domestic retail survey

A review of dried fisheries products available in Australia was carried out at various retail outlets in Brisbane, Melbourne, Sydney and Perth. The outlets were all listed in the white and or yellow pages of the local phone books. In each case investigated dried fisheries products could most easily be accessed and purchased in businesses with an Asian or Indian subcontinent approach to client needs. These outlets were usually centralised in areas where many exotic products are traded. To the casual observer the clientele appeared to possess a sound knowledge of the product. This suggested a skill which could only have been gained through specific international travel or the maintenance of ethnic ties. It was therefore not uncommon to view a very cosmopolitan flow of buyers.

The majority of products surveyed held a retail value below $20/kg. This was not surprising as the average wholesale price of dried seafood imported into Australia for 1994 was $10.50/kg. Conversely the average price for Australian exports for 1994 was $34/kg. As an economic base line only products with a retail value of $20/kg or more were looked at closely as having import replacement potential due to the high cost of raw materials and processing in Australia.

Many proprietors referred to a 'clean' or 'not so clean' product. The basis of pricing usually involved the perception of 'cleanliness', with higher quality products commanding a better price. In many cases the proprietor claimed that this differentiation did affect the clients choice of purchase. The case of dried fish was quoted as an example. There the 'cleaner' or better quality canned product from the Maldives out-sold the cellophane packed product even though the price was greater. Many retailers also stated that their major clients were in fact from the hospitality industry. The quality demanded by this sector tended to dictate what was also sold at the shop front.

### *6.2.1 Brisbane*

The Brisbane survey revealed the most specific information regarding the quantity, retail value and type of dried seafood. This survey by no way endeavours to reflect the entire spectrum of dried seafood involved in trade, it simply reflects what was most accessible in the form of cooperation from outlets. In Sydney, the investigation was least successful in attaining the cooperation of retail outlets, consequently the least number of products were surveyed in that city. Brisbane's dried seafood involved products traded from specific cultural and geographic

areas of the Pacific, India, South East Asia and Asia. The scope of countries covered a wide range of ethnic groups. The dried products varied from finfish to kelp, and covered a diversity of retail prices, from $8.50/kg for Kutta (*Chorineus lysan*) to $256/kg for Kelp (*Laminaria*) and Nori (*Laver*). The products worth noting in the Brisbane survey apart from the latter are, katsuobushi at $248/kg (retail), dried squid, sole and shrimp retailing at $25.50/kg.

Below is a table presenting the data obtained through visiting various Brisbane outlets.

**Table 1 Brisbane survey of the amounts of dried seafood products imported and their price at retail outlets with the country of origin**

| Company | Imports (kg) | Species | Value $ (retail) | Price $/kg | Origin |
|---|---|---|---|---|---|
| A | 18,500 | Anchovy & ponyfish | N/A | N/A | N/A |
| B | 300 | Squid/sole & shrimp (freshwater) | 12,750 | 42.50 | Thailand |
| C | 750 | Anchovies & shrimp (freshwater) | 14,063 | 18.75 | China/Thailand /Philippines |
| E | 800 | Squid | 36,125 | 14.00 | Melbourne (China) |
| D | 10,000 | Kelp/Nori<br>Katsuobushi | 2,560,000 | 256.00<br>241.00 | Japan |
| F | 150 | Kutta (*Chorineus lysan*) | 675 | 8.50 | Sri Lanka |
| G | 1,300 | Kutta (*Chorineus lysan*) | 11,050 | 8.50 | Sri Lanka |
| G | 56 | Maldives fish | 2,184 | 12.50 | Maldives |
| G | 234 | Maldives fish (canned) | 3,900 | 16.67 | Maldives |
| G | 52 | Split fish (vacuum packed) Blue sprat | 1,040 | 20.00 | Malaysia |
| G | 130 | Bombay Duck (*Harpodon nehereus*) | 1,300 | 10.00 | India |
| G | 416 | Brown shrimp | 7,800 | 18.75 | India |
| G | 416 | Jawala (glass shrimp) | 7,800 | 18.75 | India |
| G | 520 | Sprat (estuarine blue) | 5,240 | 12.00 | Sri Lanka |
| G Subtotal | 3,224 | | 45,324 | | |
| **Total** | **(33,724)** | | **2,664,927** | | |

Dried split fish was the only dried and vacuum-packed fish obtained in the retail survey The product is stored at ambient temperatures and is packed in a transparent plastic material. No reference was made to the name of the fish other then 'split fish'. In questioning various people in the dried fisheries retail and processing sector it was agreed that the raw ingredient is most probably *Hyperolophus translucidus* of the Family **Clupeidae**, more commonly known as the glassy sprat. The other fish which could well show some potential is the blue sprat (*Spratelloide robustus*) also of the Family **Clupeidae**. Though no information appeared to be available concerning the processing involved with this product, it is believed that this type of product is usually consumed by cooking in a base sauce such as a curry.

The quantities of dried seafood retailed in the Brisbane survey does not reflect a large and vigorous trade. Company G, which represented a traditional ethnic food outlet had a mean retail price for dried seafood of just over $14/kg. The outlet would average sales of about 62 kg/wk. The average weekly sales of dried seafood sales would be $868. Retail outlet margins usually range from 11% for high value products to 30% for low valued products. As the majority of products traded by company G are below $20/kg a margin of 30% is probably appropriate to apply to this organisation's weekly revenue for dried seafood. Therefore company G would have a gross profit of $260.40/wk. If we apply the 30% figure to establish what price processors/wholesalers would be selling their products at, then we can see that a wholesaler could expect about $13.25/kg for a product such as dried shrimps. This price would be far too low for local processors who are purchasing raw ingredient supplies at $5.00-$8.00/kg.

All the outlets surveyed in Brisbane presented their dried seafood in packaged form. The sizes varied from 23 g packs to 1 kg packs. In pack sizes up to 500 g, the packaging material usually consisted of a semitransparent cellophane based material. Where the product size exceeded 500 g, the packaging tended to be double layered opaque polyethylene bag. On some occasions products were presented in canned form. These products were usually considered high quality products and commanded a higher price than the plastic or cellophane wrapped product. Very rarely products were presented in vacuum-package form. The only example discovered in the Brisbane survey was the so called 'split fish'. These products tended to be small in size and quantity but usually higher in retail price. For most dried packaged products it would be preferable to have a low barrier packaging material which would not retain any condensate produced by the freshly dried product. The exception to this may exist where the final dried product form may be quite hydroscopic in nature and therefore warrant protection from moisture up take. For products in this situation canning or vacuum-packaging would be suitable for retaining the quality.

Some of the dried prawn products inspected approached the $20/kg retail price margin, but as expressed above the raw ingredient cost for Australian products cannot compete with the $1.00/kg prices paid for prawns in Taiwan. These prawns are usually very small in size and are not necessarily species related. Australia has limitations on catching prawns which are undersized. It would not be considered viable from both an economic and statute point of view to dry small prawns in Australia.

The price of dried fish observed during the survey appeared to be well below that of economic viability for carrying out the activity in Australia. The only exception to the rule was split fish or blue branded sprat which are not caught commercially in Australian waters. Other sources of information indicate that the retail value of this fish in Asia is extremely low.

The Brisbane survey shows that the highest value and most quantity of products traded involved Japanese dried seafood. The two most outstanding products were kelp/nori and katsuobushi (boiled and dried fish meat), these products exhibit retail values in the region of $256 and $241/kg respectively. Company D uses in the region of 2 tonnes of katsuobushi and 8 t of kelp annually. The company expressed an interest in purchasing Australian manufactured products but found the quality of currently Australian produced kelp and katsuobushi to be below the market requirement.

### *6.2.2 Melbourne*

Melbourne presented a different image to Brisbane regarding retail values for dried seafood. The majority of products surveyed in that city had retail values above $20/kg. This tends to indicate that Melbourne either paid more for their dried seafood or preferred higher value products. The following table shows the brand name, source and retail price of various commodities available.

**Table 2 Melbourne survey of dried seafood products at retail outlets**

| Brand name and country of origin | Dried commodity | Retail price per kg |
|---|---|---|
| Unknown | Cuttlefish | $30.00 |
| *Kangaroo* Thailand | Shrimp | $24.17 |
| *New Eastland* Cambodia | Shrimp (shell on) | $27.66 |
| Hong Kong | Squid (whole) | $19.34 |
| Hong Kong | Octopus | $27.50 |
| Hong Kong | Cuttlefish | $27.50 |
| Hong Kong | Cuttlefish | $29.00 |
| China | Squid | $27.00 |
| Thailand | Sole | $22.50 |
| Philippines | Mullet | $16.00 |
| Macau | Squid | $42.50 |
| *Shuey swing* Taipei | Cuttlefish | $49.40 |
| *Kangaroo* Thailand | Cuttlefish | $44.71 |
| *Jane-Tone* | Cuttlefish | $45.88 |
| *New Eastland* Cambodia | Squid | $31.00 |
| *New Eastland* Cambodia | Squid-strips (Goldfish brand) | $40.00 |
| *New Eastland* Cambodia | Jewfish (small) | $17.14 |
| *New Eastland* Cambodia | Octopus | $27.50 |
| *New Eastland* Cambodia | Anchovies | $15.00 |

The dried seafood which appeared to be most valuable was cuttlefish. The retail price/kg ranged from $27.50-$49.40. The mean price exhibited was $37.75/kg. The higher priced dried cuttlefish tended to be marinated products which were packaged in snack size presentations of 20-40 g. This type of product would be an ideal import replacement product for local industry to develop. Dried marinated cuttlefish would be an example of the style of product which emanates from the traditional market place of Asia. The RIRDC report on penetrating Asian markets suggests that this traditional market product is the area that the Australian agri-food business should target. The giant cuttlefish (*Sepia esculentia*) and the pharoah's cuttlefish (*S. pharaonis*) could be used for the fresh material.

Dried squid, sole and shrimp also retailed above $20/kg in Melbourne. Dried squid retailed between $19.34 and $40.00/kg. It would appear that opportunities do exist for dried squid. At the time of the writing this report, at least one processor was developing dried squid for the local market. The processor's concerns revolved around a consistent and reliable supply of fresh or frozen squid. The Australian Mitre squid (*Loliga chensis*) and north-west pink squid (*L. edulis*) could be used for this purpose.

Dried sole commanded a retail price of $22.50/kg which would tended to indicate that some commercial benefit would exist in the drying of various forms of sole harvested from Australian waters.

Dried shrimp retailed at $24.17-$27.66/kg. The product was presented shell on, but as in the case with Brisbane the size of the prawns was quite small. For Australia to capitalise on the dried shrimp market, an acceptable local substitute would have to be found and at a price which is suitable for the processor.

As in Brisbane the packaging material consisted of cellophane or polyethylene base material. The small snack size commodities were usually packed in printed cellophane bags while products in excess of 500 g were packed in heavy duty polyethylene bags.

### *6.2.3 Sydney*

Sydney proved to be a very closed market operation in terms of permitting investigation of product and gaining information. Virtually all the packaged dried seafood products observed in the Chinatown area were below $20/kg. The majority of product on the shelves appeared to be dried shrimp. Some dried fish was present, however no pre-packaged goods of a high value were represented.

**Table 3 Sydney survey of dried seafood retail outlets**

The following table lists the products for which prices were obtained.

| Brand name and country of origin | Dried commodity | Retail value per kg |
|---|---|---|
| Unknown - open product | Beche-de-mer | $9.95 |
| Unknown - open product | Beche-de-mer | $24.95 |
| Unknown - open product | Beche-de-mer | $37.95 |
| Unknown - open product | Abalone | $187.00 |
| Unknown - open product | Abalone | $992.00 |
| Unknown - open product | Sharkfin | $17.00 |
| Unknown - open product | Pipefish | $190.00 |

The highest retailing products were dried abalone which sold for between $187 and $992/kg. These products were not pre-packed in known quantities but available for sale by the unit. The purchaser had to approach the counter, ask for an amount, which was then weighed out and sold individually. Small and dark abalone were retailing at a lower value whilst larger and lighter coloured samples were sold for much high prices. Greenlip abalone (*Scismotis laevigata*) appeared to be the type of abalone used for all the samples on display. One processor suggested that all the dried abalone presented for sale in Chinatown were probably from his own production. Beche-de-mer was also sold as individual dried products. The lower priced products appeared to be amberfish (*Thelenota anax*), blackfish (*Actinopyga miliaris*) and curryfish (*Stichopus variegatus*) whilst the medium priced product appeared to be prickly redfish (*T. ananas*). The high value product appeared to be sandfish (*Holothuria metrialtyla scabra and H. scabra var. versicolor*).

Pipefish was also on display in Sydney. This product was usually available behind the oriental medical stand. The process of gaining basic information from the sales personnel proved quite difficult, however it was possible to establish that the product was for sale and was used in powdered form to increase an individual's stamina. The dried pipefish appeared to be double-ended pipefish (*Syngnathoides biaculeatus*) which retailed for $187/kg. A minimum quantity of 5 g needed to be ordered before a sale would be made.

Very small amounts of dried sharkfin were on sale at $17/kg. The fins appeared to be smaller than 10 cm and to have received a minimum amount of processing. The low retail price for sharkfin came as quite a surprise considering the high prices paid for sharkfin on the international market. The proprietor stated that the fins were from a local source.

The Sydney survey tends to suggest that the higher valued dried products for sale came directly from local sources. This also indicates that a processing and buying relationship exists at the local level. The processors interviewed appeared eager to expand and diversify their market drying operations in an effort to supply local and overseas demand. In confidence, the processors interviewed expressed an interest in exploiting various marine resources which currently were not commercially targeted. The processors stated that in some cases the management status of the resource was as yet undecided.

### *6.2.4 Perth*

Perth proved to be an extremely well provided market for dried seafood products. Once more the survey revealed that Asia was the major supplier of dried seafood to Australia. The western seaboard also reflected retail prices which were quite high in comparison to the eastern seaboard. The following table lists the products on sale, brand name and country of origin and retail prices.

**Table 4**

| Brand name and country of origin | Dried commodity | Retail price per kg |
|---|---|---|
| *Asian-Savoury World* Korea | Anchovy | $35.22 |
| *Hangtai-Marine Products* Hong Kong | Cuttlefish (whole shell) | $28.25 |
| *Deer Brand* Thailand | Shrimp | $31.27 |
| *Hang Tol* | Glass shrimp | $13.27 |
| *Lorenzana food* Philippines | Slipmouth/Ponyfish | $15.42 |
| *Filtacte* Philippines | Ponyfish | $13.22 |
| *Hang Tai* Hong Kong | Whole squid | $27.50 |
| *Hang Tai* Hong Kong | Split quid | $21.81 |
| *Hang Tai* Hong Kong | Split fish | $31.65 |
| *Monika* Philippines | Whole mullet | $19.75 |
| *Bamboo* Malaysia | Anchovies | $19.75 |
| *Bamboo* Malaysia | Shrimp | $7.90 |
| *Pontiac* Indonesia | Split/headless/jew fish | $25.00 |
| *Eagle man* Malaysia | Gudgeon | $24.00 |
| *Hang* | Jellyfish | $9.91 |

| Brand name and country of origin | Dried commodity | Retail price per kg |
|---|---|---|
| *Pankaj* India | Bombay duck | $11.75 |
| *Combined foods* Thailand | Split anchovy | $17.50 |
| *Sun & dragon* Thailand | Fishmaw (swim bladder) | $43.75 |
| *Siam tropical products* | Fishmaw (swim bladder) | $51.75 |
| *Flying-Goose* Thailand | Fishmaw (swim bladder) | $64.91 |
| *Mon-Feng* Hong Kong | Fishmaw (Conger eel) | $98.00 |
| *Hangtai* Japan | Cuttlefish (with shell) | $24.75 |
| *Hangta* Japan | Scallop | $190.00 |
| *Oriental Merchant* Macau | Small/split/head on squid | $34.75 |
| *Monika* | Split vacuumed packed crevalle | $17.50 |
| *Oriental gourmet food* Hong Kong | Squid (5 pieces) | $32.50 |
| *Hangloon* Hong Kong | Squid | $32.50 |
| *Hang Tai* Hong Kong | Congee maw | $114.50 |
| *Capital T* Hong Kong | Anchovies | $13.50 |
| *Burma* Burma | Fish mergui | $42.14 |
| *Pankat* India | Bombay duck | $11.90 |
| *Phillip* | Herring | $10.57 |
| *Capital* Hong Kong | Ikan sepot | $13.97 |
| *Capital* Hong Kong | Beche-de-mer | $48.90 |
| *Hang-loong* Hong Kong | Skinned boned stock fish (1st grade) | $26.33 |
| *Nan-fong* Thailand | Split-glassy squid | $25.00 |
| *Central* Japan via Hong Kong | Cuttlefish (bone in) | $22.50 |
| *Hong-Loong* Hong Kong | Head on split sole | $34.75 |
| *Nan-fong* Thailand | Headless anchovy | $14.00 |
| *TQ* Vietnam | Gourame (Kho ca sac) | $14.00 |
| *Hang-loong* Hong Kong | Split octopus | $34.75 |
| *Ladybird* Hong Kong | Shredded cuttlefish | $22.00 |
| *Ladybird* Hong Kong | Small-bulk prawns | $29.90 |
| *Hang-loong* Hong Kong | Gongee maw | $111.50 |
| *Songlins* Hong Kong | Fish maw | $23.53 |
| *Hindustan jawala* India | Glass shrimp | $15.00 |
| *Hang-loong* Hong Kong | Stockfish | $23.75 |
| *Oriental merchant* Macau | Small-glass squid | $15.00 |
| *Cathay Pacific* Hong Kong | Mackerel | $11.45 |
| *Indo* Malaysia | Mergu fish (Ikan kurau) | $25.33 |
| *HK Tung Lee Co* | Whole fish | $26.00 |
| *HK Tung Lee Co* | Ca man kho | $26.00 |
| *Golden Deer* | Very large fillet merculi | $21.33 |
| *Hang Tai* | Split sole | $26.00 |

Anchovy retailed in a price range from $13.50-$35.22/kg. The lower priced packs of anchovy came from Hong Kong and Thailand whilst the highest priced anchovy came from Korea. Mid-priced products came from Malaysia. The products were sold in quantities of 100-200 g and usually came in cellophane based packaging material. This area represents an opportunity for import replacement using the Australian caught anchovy (*Engraulis australis*). At least one processor working with this project is actively pursuing this market.

Other products of importance were dried cuttlefish which ranged in price from $22-$28.25/kg. The higher valued products were whole shell-in dried cuttlefish imported from Hong Kong and Japan. The lower price cuttlefish was shredded in form and labelled from Hong Kong. The packaging material was usually cellophane or polyethylene based and the product was sold in 200 g quantities. The whole dried shell-in cuttlefish could be an area worth pursuing by local producers. Australia's giant cuttlefish (*Sepia esculenta*) and pharaoh's cuttlefish (*S. pharaonis*) could be exploited for use in this area.

Dried squid exhibited a large range of retail prices from $15.00-$35.00/kg. The lower value product was small glass squid which are packaged in Macau whilst the higher value product was the medium sized head-on squid packaged in Thailand. The packaging was usually cellophane based with a total pack weight of 200 g. Dried whole squid could also be an area for local processors to target. Shredded squid would involve more processing costs for Australian processors. The Australian product would be in direct competition with Asian suppliers who clearly have an advantage in economies of scale. The Australian Mitre squid (*Loliga chinensis*) and north-west pink squid (*L. edulis*) could no doubt be used for this purpose.

Dried shrimp ranged in price from $7.90-$31.27/kg. The shrimp were usually very small in size and glassy in appearance, the packaging consisted of cellophane and was presented in 150 g quantities. The size of the shrimp used in processing excludes this product for Australian processors. The added disadvantage is that the raw ingredient can be purchased for $1.00/kg in Taiwan.

Different types of dried fish were retailing for prices well above $20/kg. These included split fish, jew fish, gudgeon and fish mergui. Hong Kong, Malaysia and Burma appeared to be the main suppliers of these types of fish. Retail prices ranged from $24-$31.65/kg. The packaging material was cellophane based and the total pack weights ranged from 150-200 g. Various types of gudgeon and jewfish inhabit Australia's waters, however regular supplies of both species are relatively unknown and are not currently targeted by commercial fisheries. In some States such as Queensland commercial fishing of freshwater fish is prohibited by law. Under these circumstances it would be unwise to recommend investment or commercial pursuit of this area unless supplies could be easily obtained.

Dried fish air bladder or swim bladder (fish maw) retailed from $43.75-$111.50/kg. The lower valued product made no reference to the species of fish involved and was usually packaged in Thailand. The higher value product retailed in the area of $100/kg and came from the conger eel. This product would be one direction worthwhile pursuing for both the flesh and maws. These products are packaged in cellophane based packaging material and sold usually as individual bladders per pack.

## 6.3 Overseas sector Hong Kong & Taiwan wholesale and retail market

This sector was appraised by visiting wholesale and retail outlets and manufacturers in Hong Kong and Taiwan. The report arising from the tour accompanies this review and is titled "Tour of Hong Kong and Taiwan importers and manufactures of dried seafood".

There is a high demand for Australian seafood, particularly fresh or frozen, in Hong Kong and Taiwan. As these are then processed locally there is a lower demand for it dried. Many individuals interviewed had an impression that Australia could not successfully produce dried seafood because of labour costs. Since the start of the project the number of requests that have been received from Australian processors for information about drying seafood and for access to the heat pump drier indicates that this form of processing can be economically viable.

One successful aspect of this trip will be the introduction of Queensland producers of seafood directly to buyers overseas. Most company representatives interviewed during this trip requested details of Australian suppliers of seafood. These requests will be passed on to processors and fishers.

Another important aspect of this trip is the collation of actual retail prices which Australian producers can use to help make decisions about processing and to estimate the maximum price it is possible to obtain for their goods.

Interest was shown in the use of alternative technology to replace traditional sun drying and brochures from a manufacturer of heat pump driers were requested. These requests will be passed onto a Queensland manufacturer of heat pump equipment. This interest by overseas manufacturers indicates that the drying of seafood using this technology will result in products suitable for the Asian market.

While most products were similar for both countries some differed. In Hong Kong even though refrigeration facilities are common in the home there existed a preference for dried seafood. The order of preference was for live seafood first followed by fresh chilled then dried. Frozen seafood was not high on the list for the home buyer. In Taiwan there was more demand for fresh or frozen although dried seafood was still a major commodity being sold.

The most valuable commodities were abalone (A$500-1500/kg) followed by scallops (A$100-250/kg), seahorses and pipefish (A$400-650/kg), fish maw (A$20-250/kg), prawns (A$20-60/kg) then oysters (A$30-60/kg) and gastropod meat (A$15-70/kg). Very little of the other products available were sold for less the A$10/kg.

# 7. AUSTRALIAN EXPORTS OF DRIED SEAFOOD

Australian exports of seafood exceeded our imports for the period 1993-94. Australia imported $586 million worth of seafood whilst for the same period we exported $1.24 billion dollars worth of seafood. Our export growth exceeded import growth by 3% for the 1993-94 period. Rock lobster, prawns and abalone are the big growth areas for export. Prawn imports grew by 5% in quantity and 14% in value for the 1993-94 period. Japan, Hong Kong and Taiwan appear to be our major clients for seafood whilst Thailand is our main supplier.

During the 1993-94 period Australia exported a total of 228.9 t of dried seafood, in 1993 the amount was 128.7 t whilst the 1994 total was 100.2 t. Hong Kong was the biggest buyer of dried seafood products from Australia at the time. The figure was over 88 t, with the major share of 51.64 t traded in 1994. Dried seafood accounted for 1.23% of all Australian seafood sales to Hong Kong for the 1993-94 period.

Singapore imported just over 22 t of dried seafood from Australia in 1993, followed by 60.7 t in 1994. Singapore is Australia's second largest customer for dried seafood. Our next largest customers were New Zealand which imported over 17 t of dried seafood and Taiwan in 1993-94 received over 13 t. Japan accounted for just over 3.4 t of dried seafood purchases from Australia during the 1993-94 period, with over 2.7 t traded in 1994. Malaysia imported 1.66 t of dried seafood from Australia during 1993-94 with 1.165 t traded in 1994. Indonesia purchased 0.5 t of dried seafood from Australia during 1994 with no trade registered in 1993. China purchased 0.1 t of dried seafood from Australia in 1993 and purchased a further 0.72 t in 1994. Canada purchased 0.1 t of dried seafood in 1993 while no trade was registered during 1994. The United States of America purchased 0.224 t of dried seafood in 1993 and only a further 0.06 in 1994. Tonga imported 0.048 t of dried seafood from Australia in 1994 while no trade was registered for 1993.

## 7.1 Australian dried seafood customers

Only the most recent information is available; it is depicted in a detailed colour graphs which can be seen in Appendix 2.

### *7.1.1 Hong Kong*

In 1993 Australia exported 36,975 kg of dried seafood to Hong Kong and in 1994 this figure was 51,642 kg. By far the most prolific product traded in the above years was sharkfin. The total quantity bought by Hong Kong in 1993 was 29,641 kg while in 1994 the figure was slightly lower at 22,141 kg. The mean wholesale price was $78/kg.

One of the main sources of market data about dried seafood is the journal Infofish. This publication quotes sharkfin wholesale prices on the basis of the colour and types of fins traded. The dorsal fins appear to command the highest price, followed by the pectoral fin and tails. The major factor affecting price is the size of the fin. Prices for sharkfin can be as low as $10/kg for black sharktails under 10 cm and as high as $175/kg for fins 40 cm or greater in

size. Sharkfins in the 20-30 cm mid size range are generally sold for $78/kg. The retail value of the dried sharkfin ranged from $200-$313/kg. This would tend to indicate that a sales margin between 38% and 44% exists between the Australian export sector and Hong Kong retail sector. Hong Kong also imported 59 kg of dried shark meat in 1994. This was probably in the form of jerky which wholesales in Australia for $18-22/kg. The retail value of this product in Hong Kong is unknown as the retail survey failed to detect it in the market place. A local processor stated that the offshore wholesale price would have to be lower than the domestic wholesale price, due to competition from our Asian neighbours.

Beche-de-mer was second only to sharkfin in quantity of dried seafood traded from Australia. Hong Kong imported 5,548 kg of dried beche-de-mer in 1993 from Australia increasing to 24,798 kg in 1994. A mean price of $30/kg was found for the wholesale price of beche-de-mer. Infofish Malaysia indicates a range of prices present for dried beche-de-mer from $2.67/kg for lollyfish, 3 inch and up, to $55.56/kg for Scabra of 4 inches and up. The price of beche-de-mer is size and species related. A survey of beche-de-mer processors suggested a recommended wholesale price of $30/kg. In August 1995 the data from the Hong Kong retail market indicated that prices of $78/kg for medium size beche-de-mer and $84/kg for large individuals were possible. This would tend to indicate a sales margin between exporter and retailer of 61-64%.

Hong Kong imported 262 kg of dried pearl meat in 1993 and 239 kg in 1994. Commercial processors of dried pearl meat quoted a raw ingredient price of $50-60/kg and wholesale $274/kg. No retail prices were obtained for pearl meat in Hong Kong during the recent survey. Hong Kong also imported 218 kg of pipefish in 1993 and 60 kg in 1994. Commercial processors of pipefish quote a range of prices depending on the size of the dried fish. A wholesale price of $250/kg would represent the mean for pipefish, although samples 30 cm or greater command a much higher price. Retail prices for dried pipefish in Hong Kong are $660/kg for large pipefish. This reflects a margin greater than 31% between exporter and retailer.

Hong Kong imported 115 kg of dried abalone in 1993 and a further 179 kg in 1994 from Australia. Commercial processors claimed a mean wholesale price of $450/kg. The species, colour and size of the abalone appeared to be the determining qualities for price. The survey of the Hong Kong retail markets in August 1995 identified a price range of $566-$2,400/kg.

Hong Kong imported 11 kg of dried oyster in 1993 and further 68 kg in 1994. No local wholesale price is available for dried oyster due in part to the extremely small quantities processed in Australia. However, the Hong Kong August trip found a range of retail prices from $28-62/kg. If a margin of 30% is taken as the mark up between exporter and retailer then the export price could range from $20 to $40/kg. This margin would be seen as uneconomical for most Australian processors.

A trend exists within Australian exports of dried seafood to Hong Kong. The largest shipments occur around the northern hemisphere summer. July is usually the period when most trade occurs with further peak periods through autumn. This coincides with the wedding period for September to November and for the Chinese New Year from January to March. While trade is relatively consistent for sharkfin and beche-de-mer throughout the year the major demand for all other types of products occurs around the times mentioned above.

In August 1995 the Hong Kong Trade and Development Council stated that no quotas or tariffs were placed on dried seafood products entering the territory from Australia. This greatly enhances the flow of unrestricted trade between Hong Kong and Australia for this commodity. (See appendix 2 figure 1A & 1B Australian exports to Hong Kong graph and appendix 3 for export by species)

### *7.1.2 Singapore*

In 1993 Singapore's total imports of dried seafood from Australia amounted to 22,184 kg and in 1994 this figure grew to 60,703 kg. Singapore's largest purchase of dried seafood product from Australia is beche-de-mer. In 1993 14,311 kg of beche-de-mer was imported from Australia followed by 53,575 kg in 1994. The average wholesale price of beche-de-mer obtained from Australian commercial processors was $30/kg. Infofish Malaysia reports a wide range of prices from $2.67/kg for lollyfish to $66.67/kg for Scabra of four inches and greater. Singapore like Hong Kong on-trades much of its seafood, though some traders claim better prices in Singapore currently.

Singapore imported 7,616 kg of dried sharkfin from Australia in 1993. This was followed by 6,731 kg in 1994. The mean wholesale price for dried sharkfin was $78/kg. This figure represents the mean price for the size graded sharkfin falling into the range of 20-30 cm. Dried sharkfin 40 cm or greater obtained average prices of $175/kg, while conversely sharktails less than 10 cm in size commanded a price as low as $10/kg. It should be noted that considerable variation in price occurs because of fin type and size. No retail value for this product in Singapore was available. The Infofish Trade News often reports the price and market areas of Singapore, Hong Kong, Malaysia and Thailand as the same. It is quite reasonable to expect that the retail prices are similar.

Singapore also imported 142 kg of dried sea dragon in 1993 and 94 kg in 1994. The wholesale price for sea dragon was about $290/kg. Once more the size of the product will dictate the price gained. Singapore also imported 49 kg of pipefish from Australia in 1994. An average price of $250/kg was stated by processors as acceptable for mid sized pipefish. Price for this species is also sized related. Sizes range from 10-30 cm and greater than 30 cm. The value of samples 30 cm and greater is much higher.

Singapore imported 110 kg of dried abalone in 1993 and 122 kg in 1994. The mean wholesale price was $450/kg. Due to the varying size and colour of abalone involved, wholesale prices can be as low as 180/kg and as high as $650/kg. No retail price for dried abalone was obtained for Singapore, however it would be safe to assume a price range similar to Hong Kong. Singapore also imported 112 kg of dried pearl meat from Australia in 1994. A mean wholesale price of $274/kg is what local processors recommend as indicative of the market. Singapore also exhibits the same purchasing behaviour as Hong Kong with peak periods in the middle of the northern summer, the middle of the autumn period and just before years end in preparation for Chinese New Year.

From information provided by the Singapore Trade Development Board, it would appear that most dried seafood products exported from Australia are free of tariffs and quotas. (See appendix 2 figure 2A& 2B for Australian exports to Singapore and appendix 3 for export by species)

### *7.1.3 Taiwan*

Australia exported 1170 kg of dried seafood to Taiwan in 1993 and a further 11,538 kg in 1994. For 1993, 580 kg consisted of dried beche-de-mer and this grew to 10,048 kg in 1994. The average wholesale price for this product has been suggested as $30/kg. This price represents a price recommended by local processors involved in the export of dried beche-de-mer. As mentioned previously the price of beche-de-mer varies considerably with species, size and quality. During the recent investigation of dried seafood in Taiwan, no retail prices for dried beche-de-mer were obtained. There is however a tariff rate of 20% or $16.43/kg (whichever is greater) charged by the Taiwanese local authorities on imported beche-de-mer. This tariff rate will directly impact on the quantities which will be imported from Australia.

In 1993, Taiwan imported 528 kg of dried pipefish from Australia and a further 659 kg in 1994. The mean wholesale price of pipefish was $250/kg. This value is dependent on size and quality of the fish with samples 30 cm or greater commanding a very high value. No retail prices were available for pipefish from the recent survey. Taiwan also imported 93 kg of dried sea dragon. Seadragon has an average wholesale value of $290/kg, which is dependent on size and quality. No retail price was available for dried sea dragon.

A tariff level of 42% is exercised on all small dried fish by Taiwanese authorities. This factor will again impact on the final retail value and influence the wholesale price obtained by Australian processors.

Taiwan also imported 62 kg of dried sharkfin in 1993 plus a further 602 kg in 1994. The mean wholesale price of dried sharkfin was $78/kg. No retail price for sharkfin was obtained from Taiwan. The local Taiwanese authorities exercise a 17.5% tariff on sharkfin products which would affect both demand for Australian product and local retail prices.

Taiwan imported 136 kg of dried oyster from Australia in 1994. No local wholesale or retail price was obtained for dried oyster. An estimated retail price of between $36 and $79/kg would not be uncommon considering that a 42.5% tariff is levied by the Taiwanese authorities on dried oysters.

As stated the tariffs applied to dried seafood imports can greatly affect the chances of selling high priced dried seafoods into Taiwan. Even so, with relatively high tariff levels the quantities of pipefish and seadragon sold into Taiwan are still high when compared with non-tariff states such as Hong Kong. (See appendix 2 figure 3A & 3B for Australian exports to Taiwan and appendix 3 for export by species)

### *7.1.4 Japan*

Japan imported 701 kg of dried seafood in 1993 and a further 2,647 kg of dried seafood in 1994 from Australia. The only dried seafood import in 1993 was mullet roe. A further 1,375 kg of dried roes were exported in 1994. The mean wholesale price was $60/kg. Dried mullet roe can command extremely high prices in Japan with one processor claiming prices as high as $1,000/kg for the best product. The conditions necessary to achieve this quality of product are extremely difficult to replicate. To the knowledge of the authors and at the time of this report no local processor has been able to produce that standard of product. No current retail price information is available for dried mullet roe in Japan, however the

Taiwanese survey did indicate retail values ranging from $37-60 (including 17.5% tariff) per pair of roes. The packs were sold as discrete vacuum-packed samples with colour and size being important characteristics for price. Japan levels a tariff on hard fish roes ranging from 4% to 12%. The actual rate of tariff is dependent on the species of fish from which the roes originated.

In 1994 Japan imported 1,272 kg of dried abalone from Australia. The average wholesale price for dried abalone was $450/kg. It is possible to get a much higher price for better quality, however $450/kg represents an acceptable margin for varying quality dried products. Some processors were gaining wholesale prices up to $650/kg for dried abalone. No retail Japanese prices were available for comparison however prices in Hong Kong ranged from $566-$2,400/kg. Japan also levels a tariff of 10% on all abalone entering the country. (See appendix 2 figure 4A & 4B for Australian Exports to Japan and appendix 3 for exports by species)

### *7.1.5 The Peoples Republic of China*

China imported 101 kg of pipefish and 720 kg of beche-de-mer from Australia in 1993. Pipefish had a wholesale average price of $250/kg whilst the beche-de-mer wholesale price averaged $30/kg. China did not purchase dried seafood products from Australia in 1994.

### *7.1.6 Indonesia*

Indonesia purchased 504 kg of beche-de-mer from Australia in 1993. The average wholesale price per kilogram was $30. No dried seafood products were imported from Australia in 1994.

### *7.1.7 Tonga*

Tonga imported 48 kg of beche-de-mer from Australia in 1993. The average wholesale price was $30/kg. No dried seafood was imported from Australia in 1994.

### *7.1.8 USA*

The United States of America also imported dried seafood products from Australia during the 1993-94 period. A total of 184 kg was sold. This included 64 kg of dried abalone, 92 kg of dried sharkfin and 28 kg of dried banana prawns being traded over the two years. The average price of the abalone was $450/kg. Sharkfin wholesaled for $78/kg and dried banana prawns had a wholesale price of at least $40/kg. The latter would have returned a minimal profit to the processor.

# 8. DISCUSSION

Most evident is the high value of Japanese imported dried fisheries products. This is a wide range of dried seafood commodities which could be economically produced by Australian processors. These include the boiled and dried fushi (fish) products such as katsuobushi (boiled and completely dried fish meat), saba-bushi (mackerel), iwashi-bushi (sardine), kinko (beche-de-mer) and hoshi-awabi (dried abalone). Factors which can affect the profitability of these markets include the final yield and the entry price that a monopolised market will pay for foreign products. These two issues must be addressed before considering import replacement or exporting.

## 8.1 Small tunas & pilchards

Katsuo-fushi or dried bonito sticks are a Japanese speciality. The raw ingredients which can be used for fushi are bonito, albacore, big eye tuna, mackerel, and sardines. The process involves cutting, boiling, smoking and drying fish fillets. Thin flakes or shavings of the product are used in preparing soups and broths. These products retail at $241/kg.

Of the varieties of fish used, bonito is considered to impart the best flavour to soups and their bases. Slight variations in processing style exist throughout Japan and the product type resulting from these variations will dictate which market area it is most appropriate to sell in. For example the Tokyo area prefers the shizuoka produced style whilst Osaka, Kyoto and Kobe district prefers the kochi style.

### *8.1.1 Raw ingredient*

The quality of the dried fish produced is dependent on the oil quantity and freshness of stock. Bonito with an oil content of 4-5% is considered to result in a final product which is blackish brown, soft texture, bitter tasting with a bad flavour. Bonito of 0.5% and less are considered to produce a product of poor taste and flavour. Ideally, the fat content should be between 1 and 2% for processing. If unfresh bonito is used, then the product tends to become elongated and this is used as an indicator of quality. The price paid for the fish is dependent on the quality, size and colour of mould on the fish surface. The final yield is in the region of 20%, thus making the product somewhat expensive.

### *8.1.2 Seasoned dried fish*

Small fish such as sardine, small sea bream, small flat fish and jack mackerel are all used in a split, eviscerated pre-seasoned, dried product. The drying is traditionally carried out in the sun. An agar, gelatine and glucose or wheat flour is used in an effort to provide a brilliance to the surface. The raw products should all have a low fat content to be acceptable and produce the appropriate quality. Suitable sources of raw material are listed below.

The species below are available in Australian waters and represent the raw material which might be deemed acceptable for Japanese dried fish stick products. Oil content must be evaluated if a local producer wishes to manufacture any stock for import replacement or the Japanese market.

1. Skipjack tuna (*Katsuwonus pelamis*) is also known as striped tuna and oceanic bonito. Catches in 1991-92 were around 6000 t. The price in 1993 for skipjack of less than 2.3 kg was $590 a tonne and $840 a tonne for larger sizes. Catches of above 1000 t have been recorded annually.

2. Albacore (*Thunnus alalunga*) is usually a by-catch of the more valuable yellowfin tuna and big eye tuna. Albacore prices fluctuate between $1.50 and $3/kg. Annual average catches are in the region of 1300 t with peak periods involving quantities in excess of 2500 t occurring. No commercial fisheries currently target albacore.

3. Jack or horse mackerel (*Trachurus declivis*) catches are greatest off Tasmania ranging between 6000 t and 38000 t. Prices can range between $80-$110/t. The Tasmanian season usually lasts between October and May. Two subpopulations exist, one in the west and two in the southeast. Catches of ten's of tonnes to less than a thousand tonnes have been recorded in New South Wales and South Australia.

4. Leaping Bonito (*Cybiosarda elegans*) inhabits the inshore coastal areas of Western Australia, Northern Territory, Queensland and New South Wales. During mid-winter sizeable shoals of these fish feed on glassy sprats, garfish, pilchards, anchovies and herring.

5. Pilchard (*Sardinops neopilchardus*) is also known as blue pilchard and sardine. Annual catches are between 7000 and 8000 t, mainly off Western Australia. The average price in the Sydney markets in 1992 was $1.54/kg. Current prices are about $1.90/kg.

## 8.2 Pipefish & seahorse

Pipefish species include the double ended pipefish (*Syngnathoides biaculeatus*), ladder pipefish (*Festucalex scalaris*), messmate pipefish (*Corythoichthys intestinalis*), ring-backed pipefish (*Stipecampus cristatus*) and Port Phillip pipefish (*Syngnathus phillipi*). The fish can be found in New South Wales, Queensland, Northern Territory, Victoria, South Australia and Tasmania.

These fish are not consumed as a form of food but as a traditional medicine and as such it is usually sold in dried powered form on a per gram basis. Pipefish are available in most waters of Australia. They tend to be found around eel-grass, bladder-weed, staghorn coral, brown algae and various marine grasses. The product value is dependent on size and colour, with greater length and whiter colour commanding higher value. The retail value for this product was $500/kg in Brisbane.

## 8.3 Seadragon

Seadragons are highly modified seahorses, which resemble the plant life with which they associate. Two species are currently known, the leafy seadragon (*Phycodurus eques*) and the weedy seadragon (*Phyllopteryx taeniolatus*). The seadragon is found in the waters of southern Western Australia, South Australia, Victoria and Tasmania. The leafy seadragon grows to 250 mm in length whilst the weedy seadragon grows to 450 mm in length. Although this fish gains a high price dried it is of higher value as an ornamental aquarium subject.

Again this specimens product is consumed more as a traditional medicine than a food. Premiums are paid on dried greater than 300 mm long. Prices range from $180/kg to $290/kg for samples up to 300 mm in length.

## 8.4 Anchovies

Anchovies exhibit a variation in prices as a dried product. The prices ranged from $13.50/kg to $35.22/kg. Brisbane and Perth exhibited dried retail prices in the region of $20/kg or greater. The countries of supply range from Hong Kong to Korea.

### *8.4.1 Raw ingredient*

The species available in Australia. Annual catches of Anchovy (*Engraulis australis*) in Australia currently appear to fluctuate between 50 and 100 t a year. The wholesale price for the raw ingredient landed in Sydney is about $1.99/kg. In Australia, the anchovy can be fished all year long, however most catches occur between March to September. Most anchovies are processed in the form of paste or canned. It would appear that a niche market exists for quality dried anchovy in Sri Lanka, Hong Kong and Japan. It is quite possible that a reasonable price can be gained in the Republic of Korea mainly due to the fact that the highest priced dried anchovies recorded in the survey originated from Korea.

## 8.5 Split fish and sprats

Dried split fish is produced vacuum-packed in Malaysia and retails at about $20/kg in the Brisbane area. No reference was made of the name of the fish other then 'split fish'. This fish is most likely the glassy sprat and or blue sprat.

### *8.5.1 Raw Ingredients*

Both the glassy sprat (*Hyperolophus translucidus*) and the blue sprat (*Spratelloides robustus*) are available in Australia. The almost transparent glassy sprat is an inhabitant of the shallow sandy bays of southern Queensland and northern New South Wales, and grows to a length of about 25 mm. The blue sprat can be found in the coastal inlets of southern Queensland, New South Wales, Victoria, Tasmania, South Australia and southern Western Australia. The blue sprat grows to a length of about 10 cm and does not appear to be fished commercially but are

sometimes caught during the targeting of anchovy (*Engralus australis*). If blue sprat is a commercially viable by-catch of the anchovy fisheries industry then there may be an opportunity for both products to be utilised for the dried seafood market. Enquiries have already been made from the commercial sector regarding the status of this particular fisheries, its management status and the current policy of exploitation in Queensland.

## 8.6 Sole

From the domestic survey dried sole retailed at $26/kg.

### *8.6.1 Raw Material*

Australia processes various types belonging to the family Soleidae none of which appear to be targeted commercially. A possible selection for use for drying in Australia would be black sole (*Achlyopa nigra*) which grows to a length of 35 cm and inhabits the waters of Western Australia, Northern Territory, Queensland and New South Wales. It is a heavy bodied species usually taken by trawlers. No commercial or management figures appear available for this fish. There are a number of flounder species which would also be suitable.

## 8.7 Fishmaw

Fishmaw is the swim bladder of fish. The size and thickness of the bladder is relative to the size of the fish harvested. The retail value of the maws vary greatly with the conger or pike eel maw commanding the highest price in Australian supermarkets. Brisbane figures show retail prices of $159/kg. The maw from eel is left intact and sold cooked. Other types of maw product are dried and cooked or straight dried for the market place. The preferred form for export is a product of white colour and flat in shape. The final product can be purchased on a per gram basis and is used in soups. It is also deep fried like the eel where it puffs up in a similar manner to prawn crackers and is eaten as a snack food. Once more the raw ingredient access supply is most important. Much of the maw imported into Hong Kong comes from Nile perch. The best maw is produced from very large fish, 20 kg and larger. Currently one source of raw ingredient supply could come from barramundi and can be purchased for $5.40/kg in Brisbane.

## 8.8 Fish roes (karasumi)

Virtually all our dried fish roe goes to Japan. Mullet (*Mugil cephalus*) is the main source of dried roe, although sawara (*Scomberomorus niphonus*) roe is also used. The product is salted or brined for 10-12 h, followed by draining and drying in the sun. During fair weather the process may take 20 days to achieve the final product. This style requires a final product which is amber in colour and preferably large in size. The quality of dried fish roe required to gain high prices is very difficult to achieve and for this reason a somewhat low average export price was placed on Australian product. The retail value of fish roe in Taiwan ranged from $37-$60/pair of vacuum-packed roes. The Japanese name for dried fish roe is karasumi and

has a very long tradition of processing in Japan. The product is often presented in elaborate packaging as a gift reflecting a degree of respect. Thin shavings of the karasumi are consumed at individual sittings and are considered a delicacy. Attempts will be made to dry fish roe in the heat pump system, however it is known that the product is extremely sensitive to airflow and changes in temperature.

Over 5000 t a year of mullet is caught in Australian waters, the main target being the roes which can command prices of $1.50/kg, unsorted and greater for well handled and sorted. Damaged fish roes are not used for the drying process and are often used for fish bait. Prices for mullet roe in Australia varies greatly with the supply. Australian mullet roe are comparatively small by Asian standards. It is bought when production from the northern hemisphere fisheries has finished for the season. Mullet flesh can be purchased for less then $1/kg. A market does exist in Sri Lanka for dried mullet, however the value of the product is currently unknown. The price of mullet flesh varies with quality and demand.

## 8.9 Shark

### *8.9.1 Sharkfin*

Dried sharkfin is exported from Australia in large quantities. The value gained from the fin depends on the degree of refining of the sharkfin. The greater the yield in fibres the more valuable the product. The technology used in Australia is quite advanced and often uses heat pump driers. The drying of sharkfin would be an obvious choice for any group wishing to look at a large and profitable market. Sharkfins can be sourced currently in reasonable quantities to dry for both the local and offshore market. It is the extremely refined sharkfin that Australia tends to import. This can be seen by wholesale prices of $200/kg or more. The preparation to this stage is very labour intensive. There are two kinds of dried sharkfin, white and black dried sharkfin. The white fin is preferred and the quality of the caudal fin is considered superior to the pectoral fin. The sharkfins are washed in a dilute sodium chloride solution followed by freshwater. The final dried yield is 1-2% of the total body weight and 30-40% of the raw fin weight. The value of the fin varies with the type, size and degree of refinement. This product like beche-de-mer, is an important area for the current processing industry.

### *8.9.2 Shark meat*

Dried shark meat is another product which could be attempted. The product requires steps of marination and presentation to command a higher price than product from our Asian neighbours. In South East Asia the dog shark (*Scoliodon palasorrah*), cat shark (family *Orectolobidea*) and many of the medium sized sharks are considered good eating in dried form. Shark sizes of 50 cm to 1 m are considered best by some Asian groups. The margin on dried shark is not an extremely large one and this product would not show returns on a par with other products such as sharkfin or abalone, however it could be a useful way of dealing with the flesh of large shark which cannot be marketed in Australia due to heavy metal limits. The dried shark meat wholesale value is in the range of $12-$15/kg.

### *8.9.3 Shark cartilage*

The dried powdered cartilage of shark has traditionally been a product used by the Chinese. Tanikawa (1985) described the preparation of shark cartilage. The cartilage is boiled in hot water to remove the meat followed by drying in sun. The cartilage of amber colour is considered of good quality. Dark brown material is considered of inferior quality. Recently the use of shark cartilage as a medicinal treatment has gained much exposure and will no doubt serve to push the value of this product up. Dried powdered shark cartilage can command wholesale values from $180 - $350/kg.

## 8.10 Other dried fish

Many types of fish are dried and consumed in Asia. Some of these were detected in the survey of Australian supermarkets. Examples from Davidson (1976) are the sprat, also known as round herring or rainbow sardine (*Dussumieria acuta*), gizzard shad (*Nematalosa* or *Dorosoma nasus*), round or mackerel scad (*Decapterus russelli*), thin crevally (*Atropus atropus*), the scad (*Atule mate* or *Caranx mate*), blackfin crevally, banded scad (*Alepes melanopptera*), crevalle jack or dusky jack, (*Caranx sexfasciatus*), pony fish, also known as silver belly or slipmouth (*Leiognathus splendens*), croaker or rosy jewfish (*Otolithes ruber*), black pomfret (*Formio niger*), dolphin fish (*Coryphaena hippurus*), rake-gilled mackerel (*Rastrelliger kanagurta*) and short-bodied mackerel (*R. brachysoma*). Ribbon or scabbard fish (*Trichiurus haumela*) are an important dried fish in China although of low value.

Information from the Hong Kong fish markets (FMO) shows that the wholesale price paid for dried fish is generally low. It would be unwise to consider selling dried fish into Hong Kong, unless a specialist high value niche market exists. We have not been able to establish if such a market exists in Hong Kong.

A market does appear to exist for the import replacement of dried fish. This can only be considered in the retail sector area where commodities are $20/kg or greater. Care must be taken to avoid Asian products where they clearly process an advantage in the economies of scale. The niche market approach by local processors would appear to provide some clear advantages for Australia in the areas of quality and value.

## 8.11 Shrimp & prawns

The proprietors of most Australian outlets referred to dried shrimp as being a freshwater variety. In subsequent discussions with other proprietors it was established that these very small glass-like shrimp also inhabit the brackish waters of the countries of production. It proved impossible to establish the exact name of the shrimp involved, however the two most common types used in South East Asia, appear to be *Acetes indicus* and *A. japonicus* of the Family Sergestidae. The prawn is known as mui ha in Hong Kong and China, reborn in Indonesia and udang bubok or udang geragau in Malaysia. This product is usually used to make shrimp paste or shrimp powder. There does not appear to be commercial records of this shrimp in Australian waters.

The other commonly used shrimp for drying in South East Asia are (*Palaemon concinnus*), (*P. pacificus*) and (*P. styliferus*). This last species is cultivated in some parts of Asia and is also found in brackish waters. The shrimp is called ha kung in Hong Kong and China, udang batu in Indonesia and udang bubokj and udang geragau in Malaysia. This shrimp is cooked traditionally and is sold in whole dried form. Once more this shrimp does not appear in commercial catches from Australian waters.

It is difficult to identify any Australian shrimp or prawns similar to these species. Australia does posses however a variety of prawns which could be of possible commercial benefit in dried form. The coral shrimp (*Parapenaeopis cornuta*) is caught in commercial quantities in India.

### *8.11.1 Raw Material*

In Australia the Coral prawn (*Parapenaeopis cornula*) is available from New South Wales up the eastern coast and around the northern coast of Australia to Exmouth Gulf in Western Australia. This prawn is often found in river mouths and estuaries out into tidal inshore waters. Because of low yields and difficulty to peel this prawn does not command high prices in Australia and could be used for drying.

The brown rough prawn (*Trahypenaeus fulvus*) is found in northern Australian waters, from Shark Bay in Western Australia through the Northern Territory and down to Moreton Bay in Queensland. It is taken from waters to a depth of 60 m and is of commercial significance in Malaysia. The product is sold as bay prawn in Queensland and is considered to be mainly non-commercial in Australia.

Other species which may warrant attention are the School prawn (*Metapenaeus macleayi*) and the Western school prawn (*Metapenaeus dalli*). None of the above mentioned prawns appear to exceed a length of 110 mm at maturity. The prawns are harvested in significant quantities, usually fairly close to shore, and they do not currently command a high value in the market place.

It has been established that processors in Taiwan access their raw ingredient supplies as low as $1/kg. Further more, they tend to exploit a wide variety of species and sizes of prawn. It would be inappropriate to recommend the exploitation of small prawns where the possibility exists that this activity might impact negatively on the juvenile stocks of our current mature high value prawn market trade. The low raw ingredient cost and large economies of scale which Asian operators already possess in this area would not make this drying option advisable. Attempts will be made to dry selected under-utilised species such as the coral prawn, however the target market will be the United States. Larger dried prawn products do currently exist in the United States, retailing at about $54/kg. This could be a market worth targeting rather than the small prawn size, high quantity market of Asia. The best quality of any kind of dried shrimp is a product of uniform size, curved shape and light red colour. A moisture content of 15% is required for product going to Asia. Flavours are usually added during a cooking stage and the main components usually are sugar, soy sause and monosodium glutamate. The heat pump drying trials will include the production of prawns for the high quality market. (See Appendix 6 figure 2)

## 8.12 Abalone

Greenlip abalone (*Haliotis laevigata*) and blacklip abalone (*H. rubra*) are two species of abalone commonly available in Australia. The greenlip abalone commands a higher price on the open market, though recently the value of both has declined. The retail value of dried abalone in the domestic survey ranged from $180/kg to just under a $1000/kg. Prices were much higher in the retail sector of Hong Kong, where prices reached over $2000/kg. Catches of greenlip abalone amount around 900 t annually, whilst blacklip catches are about 2000 t a year. Wholesale meat prices range from about $16/kg for blacklip to $100/kg for greenlip.

There is a 30-40% yield of abalone flesh once shucking and cleaning has occurred. High quality dried abalone is one product worthwhile investigating using the heat pump drier. The 'meiho' or amber coloured dried abalone commands the highest price. The simplified Japanese drying process involves the salting of the abalone meat for 3 to 7 days followed by a boiling for 5 mins. The product is then sun dried for 7 to 10 days. Raw ingredient supply can be a problem for processors and as with many other areas of seafood the aquaculture industry may well be part of the solution to addressing future raw ingredient needs of processors.

## 8.13 Scallops

Dried scallops can fetch very good prices. Perth retail prices were $75/kg and in Hong Kong from between $28 and $258/kg.

### *8.13.1 Raw Material*

There are a number of species available in Australia. The Australian southern scallop (*Pecten fumatus*) and the saucer scallops (*Amusium balloti*, *A. balloti balloti* and *A. pleuronectes*) are the most obvious selections for drying. Scallop meat can be purchased from $10/kg upwards. In 1992 the wholesale price range varied from $10-$15/kg. Currently the wild resources are considered to be overexploited and other supplies in the future may well have to be sourced from aquaculture.

### *8.13.2 Processing*

The process commonly used in Asia for drying scallops follows. The scallops are usually boiled in sea water for 5 to 8 mins to open the shell. The muscle is then removed by hand and washed with freshwater to remove sand and broken shell. The meat is then graded into LL, L, M, S and SS sizes. If the meat is removed fresh from the shell after harvesting, then they are usually boiled in batches of salt water for 20-30 mins. The waste water is retained and used as a flavouring material whilst the meat is sun dried during the daylight hours and equilibration occurs at night. The period required is up to 10 days. The final product should be yellowish white in colour and yield 3.5-5% from the raw shellfish weight. This form is considered to be of a high quality standard. Other styles such as black dried meat yields a higher return of 7.5-8.5% but are not considered to be as high in quality. Recent retail prices in Brisbane for small dried scallops were $159/kg and $190/kg in Perth. Gaining adequate raw ingredient

supply is the major problem for industries involved with scallop processing. This form of processing scallops may have to rely on the aquaculture industry if processors are to gain greater stocks for processing.

## 8.14 Pearl meat

Pearl meat or the adductor muscle which closes the shell of the pearl oyster is worth investigating for the local and Asian market. The flesh itself can be purchased frozen for between $40-$60/kg and occasionally $80/kg. The final dried product can attain values of $274/kg. The flesh is used by the restaurant trade currently, but large enough quantities exist to warrant quality drying. Most pearl industries are dedicated to the revenues received from pearl sales and view the flesh and shell as by products. Pearl oysters (*Pinctade maxima*) and (*P. margaritifera*) are spread throughout the north of Australia and down to Carnarvon in Western Australia. The aquaculture industry would be an ideal supplier of adductor muscles from oysters which have produced pearls.

## 8.15 Other gastropods and bivalves

Various dried mollusc and gastropod products are on sale in Hong Kong. The retail prices range from $16/kg to $69/kg. Abalone is no doubt the most important and has already been discussed and will be included in heat pump trials. Another outstanding product worth recommending is known to Chinese consumers as top shell (*Trochus niloticus maximus*). The flesh of the trochus shell is consumed in dried form by the Chinese community and is called sek tao law in Hong Kong.

Other products made from members of this group is the flesh of the giant clam (*Tidacna gigas*) whose large adductor muscle can be dried for the Asian market and is called wan man ho in Hong Kong and the flesh of the surf clam (*Paphia undulata*) which is dried and used in soup dishes from Thailand and is called locally hoy lai, hoy huaan. The flesh of oysters (*Crassostrea sp.)* which is sun dried for the Hong Kong market and called locally mau lai.

Other products would be mussels (*Perna viridis*, *Mytilus smaragdinus* and *Mytilus viridis*). These products are usually boiled and then dried in the sun. They are thought highly of in southern China. The local name in Hong Kong is chang hau. The razor shell clam (*Solen grandis*) is called chi kap law in Hong Kong and is consumed in dry form. All of these products have flavours added before drying.

## 8.16 Squid

Dried squid is a very popular food item in Asia. It is consumed in a variety of ways from main meals to snacks. The domestic survey found that squid retailed at differing prices, the majority of which were above $20/kg.

### *8.16.1 Raw Material*

The *Loligo*, *Sepioteuthis* and *Nototdarus* species are caught in relatively large numbers in Australian waters and these species can form the staple of any drying process in Australia. Total catches of around 1800 t a year were prevalent in the early to mid 1990's and wholesale prices can start from $1.80/kg.

Arrow squid is probably the most appropriate raw material to use for processing as it best resembles *Sloani pacificus* and are of the same family. The names of the finished product are usually dependent on the species of squid used in processing. The various forms of Japanese dried squid include biko-surume due to its pierced head and skinned dried squid and mizu-surume which is also known as the bag-shaped squid. The method of drying is usually sun drying, with some artificial applications explored. Squid should be dried within 5 h of catching to be considered a first grade product. Too rapid drying of fresh squid can cause a darkening which detracts from the squids quality and value. Dried squid should have an amber colour and is graded on freshness, appearance, colour, flavour, size. The water content usually falls between 18 and 22%.

## 8.17 Cuttlefish

Dried cuttlefish has good potential for Australian processors. The information gathered by the authors identified high retail prices and a trend towards the consumption of higher valued dried cuttlefish. Dried cuttlefish retailed in the Australian domestic survey from between $22.50 and $49.40/kg. The higher valued cuttlefish usually involved a marinated presentation. Dried whole cuttlefish in Taipei retails for $24/kg.

Cuttlefish occurs mainly as a by-catch in Australia where it tends to be used for bait and some human consumption. In 1989-90 183 t of cuttlefish were caught in New South Wales, though catches up to 8400 t have been registered in Western Australia. The two species caught in Australian waters are the giant cuttlefish (*Sepia esculenta*) and the pharaoh's cuttlefish (*Sepia pharaonis*). The pharaoh's cuttlefish is preferred to squid because it has a softer flesh. Smaller cuttlefish are dried whole and then deep fried before eating. Powdered cuttle is used extensively in traditional Asian medicines. The goldsmiths of Burma also use the interior of the shell in jewellery manufacture. This resource should warrant investigation in heat pump drying trials. Whole cuttlefish can be bought in Australia from between $2-$3/kg wholesale, the raw material can also be landed fob in Australia for $2.30/kg from India. Traditionally the whole cuttlefish is split and the eyes are removed. After washing, the product is then solar dried for 7-8 days. The final water content should be 18-22%. The final product should possess an amber colour.

## 8.18 Octopus

From the domestic survey prices were found ranging from $27 to $35/kg. These prices suggest that it would be economically viable to dry octopus in Australia provided that raw material can be accessed at reasonable prices.

### *8.18.1 Raw Material*

Species available in Australia. The four species of value to Australian fisheries are the southern octopus (*Octopus australia*), maori octopus (*O. maorum*), pale octopus (*O. pallidus*) and gloomy octopus (*O. tetricus*).

## 8.19 Beche-de-mer

Beche-de-mer is a very obvious choice to pick in terms of maintaining or improving our current standing. Though not a great deal of beche-de-mer appeared on our domestic retail survey, it is a very important export commodity. The sandfish (*Holothuria scabra*), black teatfish (*H. noblis*) and white teatfish (*H. fuscogilva*) are the high value species. The other lower valued species can be utilised in powdered form to supply the market demand for traditional Asian medicines.

Beche-de-mer is carefully eviscerated and cleaned in a low concentration salt solution. The product is then placed in boiling salt water which is lowered to 95°C for 1-1.5 h, then removed, straightened and cooled. The beche-de-mer is roasted at 70°C and then dried in the shade for 5 days.

For the Japanese market, the best dried beche-de-mer is bright blackish brown in colour, the skin should be left on and be covered in tiny bumps or papillae. If the final dried product has white powder on the surface then this is considered inferior. The product is in great demand but is very much dependent on a reliable raw material supply. Demand for raw material definitely exceeds industry supply and this issue was raised consistently by processors surveyed. A solution to this problem may very well depend on the aquaculture industry and its ability to address the future processing needs.

## 8.20 Kelp

Dried Laminaria is one of the most important sources of food in Japan and is considered to be an essential ingredient of dietary good health. Both the dried product and the powered stock is used by Japanese consumers. Most of the flavour comes from the sodium glutamate present. Laminaria inhabit the cold waters off Japan, 90% of production originating from Hokkaido and the balance from Kurile Island and Sakhalin. There is quite a large variety of products made from laminaria listed by Tanikawa (1985). Some examples of the products and the species used to make them include rishiri-konbu (*Laminaria ochotensis*), rishiri-enaga-ori-konbu, (*L. longipedalis*), hosome-konbu (*L. religiosa*), mitsuishi-konbu (*L. angustata*), atsuba-konbu (*L. coriacea*), naga-konbu (*L. angustata var. longissima*), kukinaga-konbu (*L. longipedalis*), yayan-konbu, (*L. fragilis*), oni-konbu, (*L. diabolica*), chijimi-konbu, (*L. cichoriaides*), kagome-konbu (*Kjellmaniella crassifolia*), nekoashi-konbu (*Arthrothammus bifidus*) and many others. The Japanese harvest season begins mid-July and continues until November, the northern hemisphere's summer to autumn period. Laminaria is grown at a depth of about 7-8 m. The considered age of maturity is 2-3 yr and a sickle is used to separate the main body of the Laminaria from the roots. The survey revealed an average retail price for this type of dried product was around $256/kg in Brisbane.

### *8.20.1 Raw ingredient*

Laminaria less then one year old are not harvested. Only good raw and mature samples which have been dried relatively well are considered acceptable. The fronds must be rotated with out twisting to equalise drying and under good conditions the product can be dried in 1-2 days. The dried Laminaria is graded on the basis of colour, size and appearance. The best colour is a brilliant darkish brown or dark green which is usually indicative of a product successfully dried in one day. The size and thickness should be uniform and the surface smooth. Product which has taken longer then two days to dry usually has wrinkles and scratches present and may display white powder distributed on the surface.

### *8.20.2 Style of dried Laminaria*

Numerous styles and shapes of the final product exist, however they can be categorised under five forms:

motozoroi-konbu - dried Laminaria bound at the base.
ori-konbu - dried Laminaria folded.
nagakiri-konbu - long cut dried Laminaria.
bo-konbu - bound rod shaped dried Laminaria.
zatsu-konbu - poor quality dried Laminaria.

### *8.20.3 Food source*

Dried Laminaria have three main uses, for so called 'plain dishes', for use in stock making and further processed. The most popular product, mitsuishi-konbu, is used as a plain dish because it results in a soft and good tasting product and is easily cooked. Nagakiri-konbu, kukinaga-konbu and atsuba-konbu follow as the next most popular product for this purpose. Rishiri-konbu, ma-konbu and mitsuishi-konbu in order of acceptance are considered excellent for fish stocks with rishiri-konbu being considered the best for its refined taste and transparent appearance. Virtually all Laminaria are considered useful for further processing, some of the products include Laminaria cake, tea and vinegared or powdered and rolled.

### *8.20.4 Australian alternatives*

Australia's representative of the broad leather like Laminaria is Ecklonia and it is found at the same water depth. It is a relative of the giant kelp of Victoria, Tasmania and New Zealand.

1. From the family Alariaceae, *Ecklonia radiata* or brown kelp would appear to be the most appropriate kelp to use in an attempt to replicate the Japanese Laminaria products. It is estimated that 3000-32000 t of dried kelp is already produced in Australia annually.

2. *Undaria pinnatifida* or Japanese kelp is a species introduced to Australian waters. This exotic species has proliferated around the coast of Tasmania and would appear to be available in commercial quantities ready for harvest. This product is termed wakame or

dried Undaria. The volume of production in Japan is almost equal to that of Laminaria. Wakame is made into two products, shio-nuki-wakame or desalted dried Undaria and shio-boshi-wakame or salted dried Undaria. The desalted dried Undaria is by far the most popular of the two. The yield for wakame is between 6-8%. The resulting dried fronds are 30 cm in length and are usually packed in cellophane bags, wood or paper boxes. The product is used in a soy bean paste soup called miso-shiru. It is also crushed and spread on boiled rice. The main use is to consume wakame as part of the many ready-to-serve meals involving pastes and soups. It may be possible for Australian dried wakame to be packaged and sold in such a manner as to target the increasing Japanese hospitality and catering market.

## 8.21 Nori (laver)

Nori or laver *(Porphyra tenera)* is a red algae which grows best in the winter months. The product involves a process of crushing the laver and then drying. Asakusa-nori is traditionally considered a first class dish. Other names for the product is kuro-nori or black dried nori. Besides the species P. yezoensis, members of the genera Monostroma and Enteromorpha are used. The demand for nori has increased considerably in recent times resulting in many new areas of cultivation. Nori is harvested by hand during the winter months and washed in fresh ocean water. It is pounded to remove impurities and then washed with freshwater. The fronds are then finely chopped with two knives. The pieces are mixed with 15 times its weight freshwater. It is then mixed until homogenous. The product is drained onto frames and then dried in the sun. The best nori is jet black in colour and lustrous when dry. The product is stored in air tight containers and is a breakfast stand-by.

Nori is used in various ways including rolling in vinegared rice, vegetables, egg and fish products warming over an open fire and then dipping in soya sauce. Other processed products include seasoned nori paste or tsukuda-ni-nori, roasted nori or yaki-nori and seasoned and roasted nori or ajitsuke-yaki-nori. The nutritional make-up is quite important. It has a moisture content of about 16%, a protein content between 25% and 30%, a carbohydrate content between 7% and 18%, it contains vitamins A, B, C and D and is also a good source of iodine.

Species available in Australia.

1. In Australia the red alga from the genus Porphya does grow in the mid-tidal areas. They appear at certain seasons as browny-green bunches of oiled silk. The fronds appear to have no definite shape and it tends to lose its colour in the hot sun. It would appear that this genus grows in Australia and it would no doubt be limited to the colder waters on the southern coast of Australia. As this genus is not mentioned as one of the types currently harvested off Australia, it would be prudent to establish the quantity available for production. This species could well be valuable in producing nori for the local and Japanese market.

2. The other genus which appears to be available in Australian waters is Enteromorpha. It has gained some commercial value in the Sydney area. The quantity available and its suitability for nori is yet to be established.

# 9. CONCLUSION

There would appear to be quite a few areas worthwhile pursuing with regards to dried seafood. The most viable commodities to target with the heat pump drier, in order of value, are dried abalone (A$1500-1500/kg), followed by seahorses/pipefish (A$400-650/kg) scallops (A$100-250/kg), and fish maw (A$20-250/kg) as the most important. Other products such as prawns, oysters and gastropod meat will also be valuable to processors. The basic rules appear to be that the product must command a reasonable wholesale price and it must have a high quality niche market which a heat pump drying processor can exploit. The raw material must be available in reasonable quantities. Processors concerns tend to be the high cost of installing an export approved plant, the availability of sourcing raw material of the necessary quality, quantity and price and also the difficulty of obtaining rapid management decisions about exploiting previously non-commercial resources

Australian processors need to obtain supplies at economically appropriate prices from local sources and/or offshore suppliers. The key to success is quality and quantity harvested and being landed in Australia at a competitive price within a reasonable time. An example of this can be seen in the supplies of raw cuttlefish. The processor can opt to purchase cuttlefish at advantageous rates from overseas countries such as India or buy direct from local markets if the price becomes more favourable to the processor. Furthermore, many offshore suppliers are willing to guarantee suitability of their product quality for the domestic requirements of Australia. If a lack of coordination continues to stifle raw material availability, then processors would have little choice but to buy offshore.

Although the Asian market is our major customers for dried seafood, the North American dried prawn market should not be ignored. It would appear that the larger Australian prawns such as the coral prawn would be more suitable in the US. This and the domestic market are worthwhile exploring. The dried fish industry, though a very large one in Asia, is not a high value market and as with the prawn industry is well established and low cost in nature. Any attempts to target this market should only be carried out where evidence exists of a high quality, high value niche market. The exception to the above situation is the Japanese market for boiled, dried, powdered fish which commands a higher value then standard dried fish. One should also remember that the supplies from traditional manufacturers of this product will greatly affect the market entry price of any Australian product. It may be necessary to initially accept a lower price for this type of product just to establish an acceptable market presence. The main stay of the current Australian dried seafood industry appears to be sharkfin, beche-de-mer and fish roe. These areas can be improved in an effort to obtain best quality and value possible from the resources available. This aspect is already being addressed by the increasing numbers of processors installing heat pump units. They will need the support of research groups.

As suggested by previous reports, strong efforts must be made to pursue successful aquaculturing of species necessary to provide enough raw material. Examples of this would be abalone, beche-de-mer, pearl, oyster, pipefish, gastropods and bivalves. The use of by-products such as shell, cuttle, bone, skin, post-boil broth and eviscera should always be adopted when processing seafood. Greater attempts should be made to improve the postharvest practices for raw material supplies. Virtually all quality dried seafood requires raw

material treatment of the highest standard. This is quite understandable when the finished product values run into the hundreds and thousands of dollars per kilogram.

Packaging is an important consideration for local import replacement and Japanese products. Quality presentation is of the greatest importance as the first taste is with the eye. This would not appear to be so in Hong Kong, Taiwan and other Asian countries. The tradition in those markets dictates that products are sold in the main unpackaged. Greater efforts appear necessary to bring the Australian dried seaweed product up to acceptable standard. The harvesting of Japanese kelp and other seaweed varieties from our southern waters should be addressed. A local seaweed buyer and processor reflected that the local product was unacceptable for the hospitality markets both locally and offshore. The claim was made that although attempts were made to buy local dried seaweed all attempts had never received suitable supply, consequently all seaweed products for Australian consumption were imported.

Attempts should be made to replicate and where possible improve upon the quality produced by solar drying. This shall be achieved through the use of the heat pump drier and when necessary in association with traditional methods. The objective would be to accelerate the drying process with minimal losses of quality involved. Smell appears to be an important factor in the purchase of dried seafood. This can be retained most effectively using the heat pump drier.

Asia consists of a dual market involving a relatively small western food market plus a large traditional food market. Extended commitment is necessary for sustainable returns on investment. The countries of Korea, Taiwan, Hong Kong and Singapore are all following the seafood consumption trend of Japan. They all have strong retail development which will result in a concentration of supermarket outlets. More double income families are emerging in Asia resulting in a demand for snack foods. Less time is available for preparing meals and as a result a greater number dine out. Dietary awareness is on the increase including a demand for convenient foods of an eastern style. Asia will share in 32% of the worlds GDP by the decades end. Household earnings are rising for all Asian countries while the above mentioned countries are spear heading the growth. Because of these economic changes the demand and therefore value of dried seafood will increase in the future. The traditional markets will act as guides to buying trends. The traditional periods of high consumption in Asia are the Chinese new year, the mid summer month of July and the autumn period which includes the wedding period.

Of our traditional trading partners, Taiwan appears to have the most protectionist policies with tariffs averaging 40% on seafood products. Japanese tariffs exist to a lesser degree running at between 5% and 15% on some selected seafood products. Hong Kong, Korea and Singapore do not appear to exercise tariff protection on dried seafood products from Australia so these countries should be targeted for exporting Australian product. Australia may need to address the issue of exploiting some marine species which are currently not targeted for commercialisation. The blue sprat is gaining interest both onshore and offshore and appropriate steps will have to be taken to manage the exploitation of these species.

**POST SCRIPT**

Samples of dried seafood were sent to the overseas contacts made during the recent study tour for appraisal. The suitability of heat pump drying has already been proved with international interest being stimulated based on the quality of the samples produced at IFIQ.

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# APPENDIX 1 - AUSTRALIAN IMPORT TREND OF DRIED SALTED & SMOKED FISH FROM 1990 TO 1994

Figure 1 - Australian total imports

Figure 2 - Australian imports from Thailand

Figure 3 - Australian imports from Japan

Figure 4 - Australian imports from Norway

Figure 5 - Australian imports from Spain

# AUSTRALIAN IMPORTS OF DRIED SALTED & SMOKED FISH
## (Weight & mean price per kg)

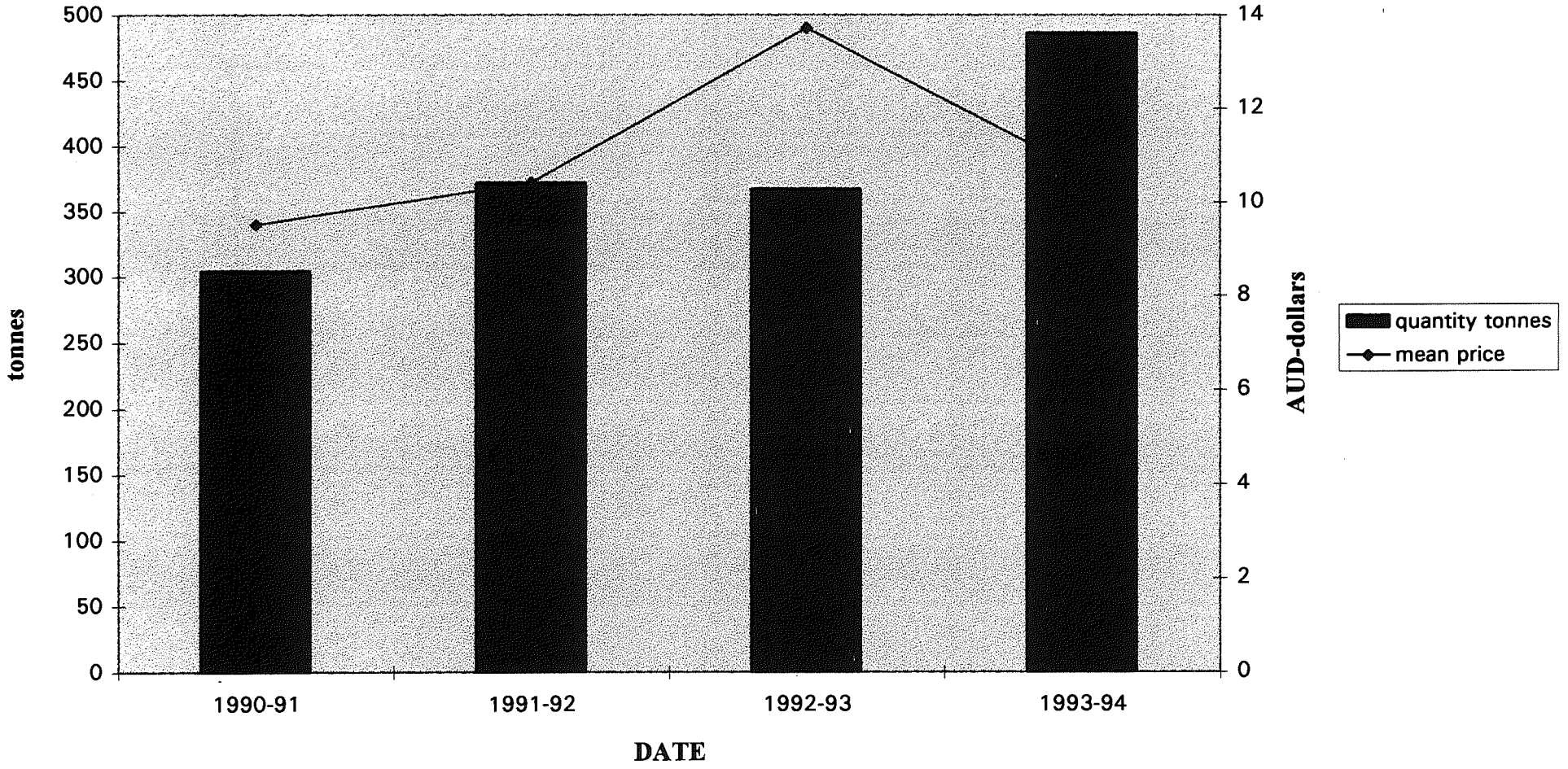


Figure-1

# AUSTRALIAN IMPORTS FROM THAILAND OF DRIED SALTED & SMOKED FISH (Weight & mean price per kg)

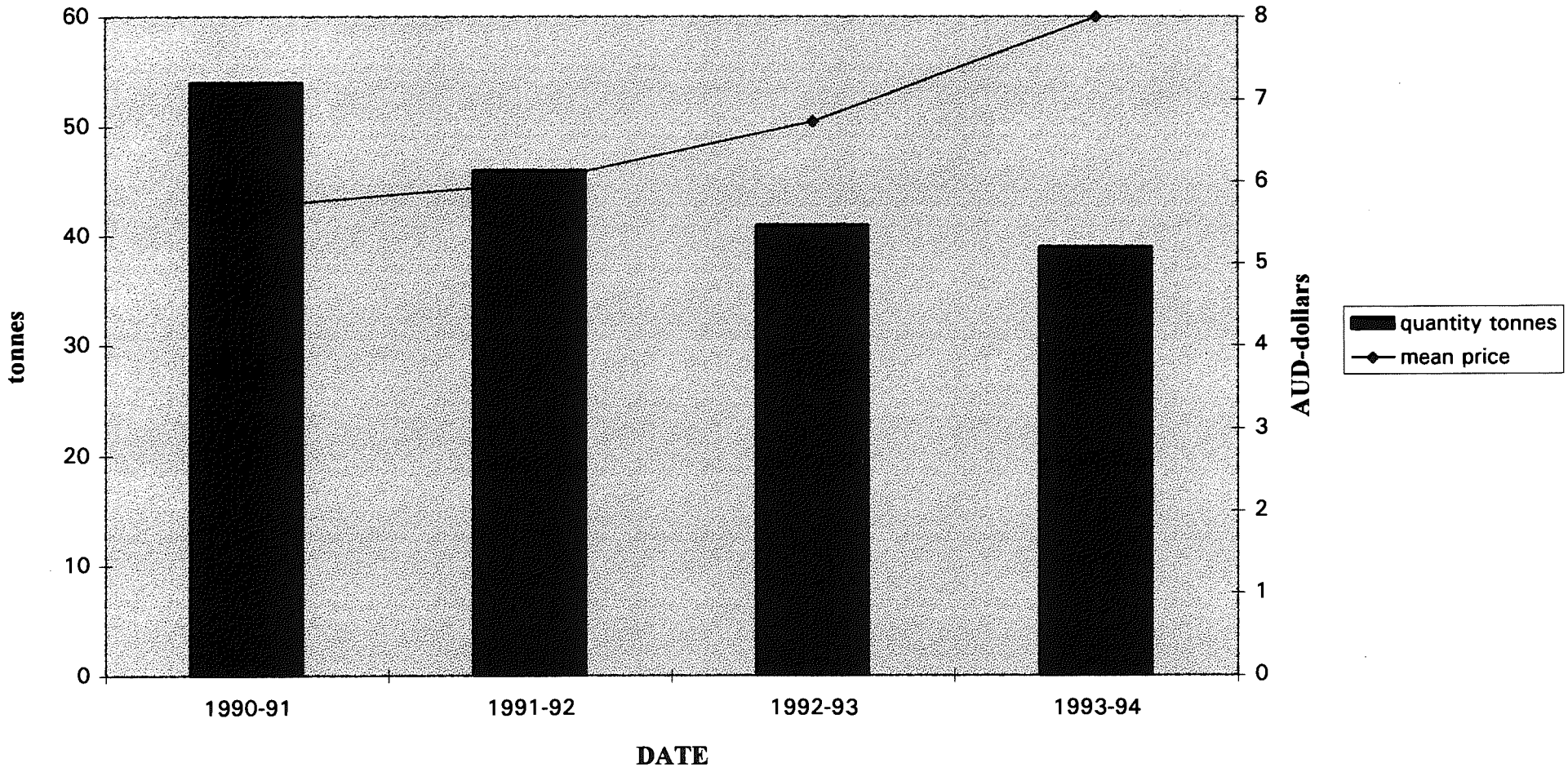


Figure-2

# AUSTRALIAN IMPORTS OF DRIED SALTED & SMOKED FISH FROM JAPAN (Weight & mean price per kg)

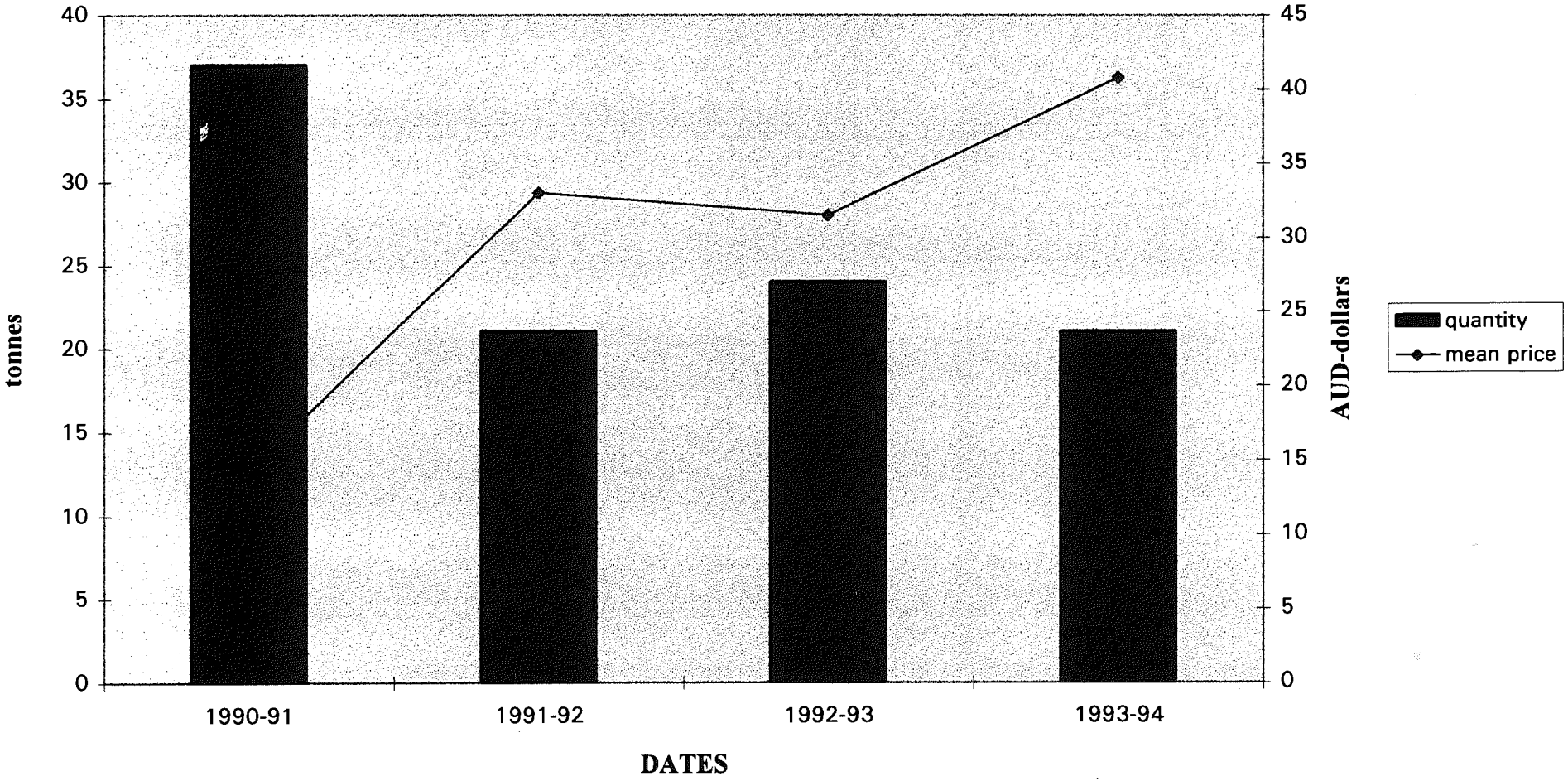


Figure-3

# AUSTRALIAN IMPORTS FROM NORWAY OF DRIED SALTED & SMOKED FISH (Weight & mean price per kg)

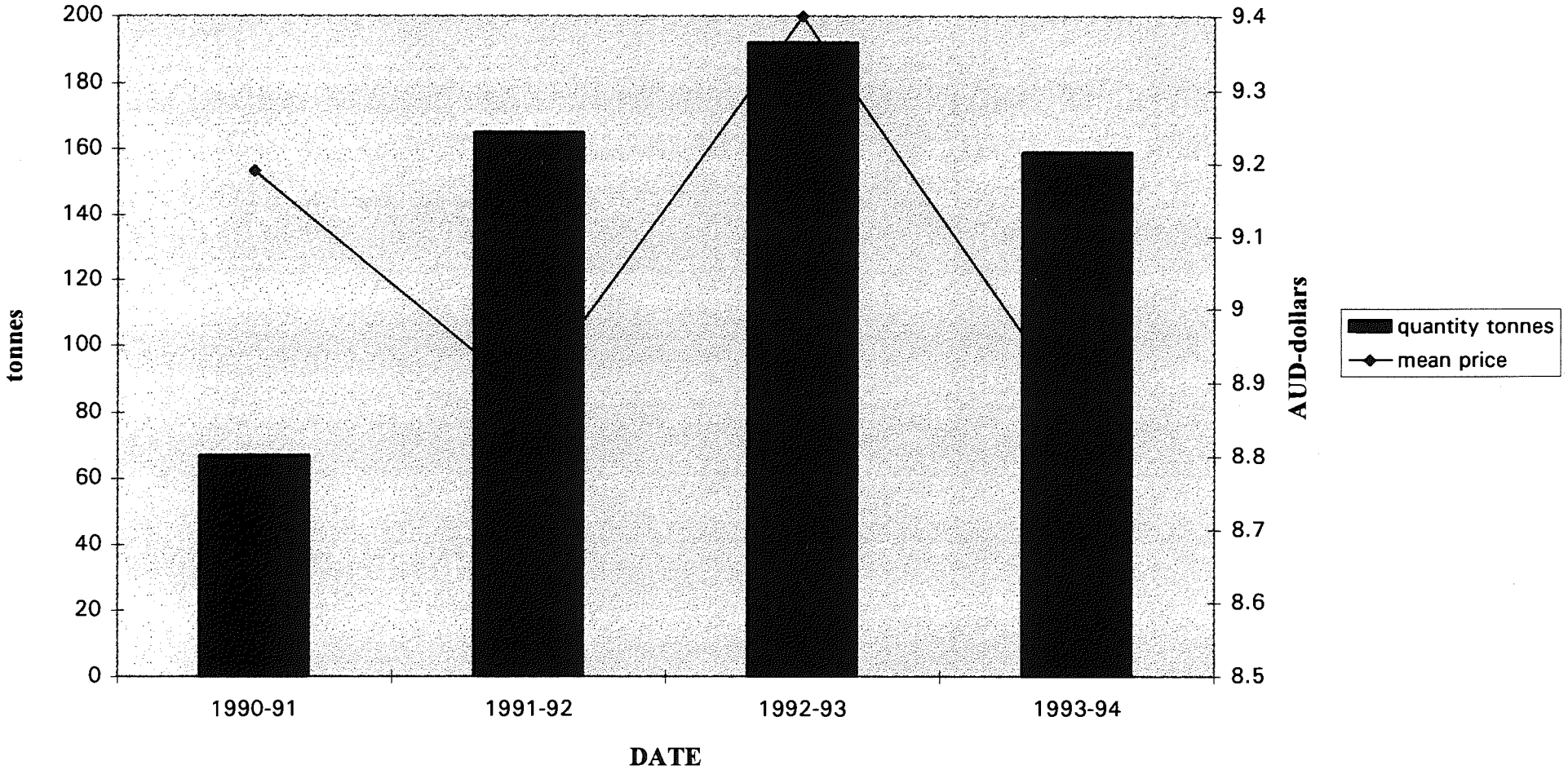


Figure-4

# AUSTRALIAN IMPORTS FROM SPAIN OF DRIED SALTED & SMOKED FISH
## (Weight & mean price per kg)

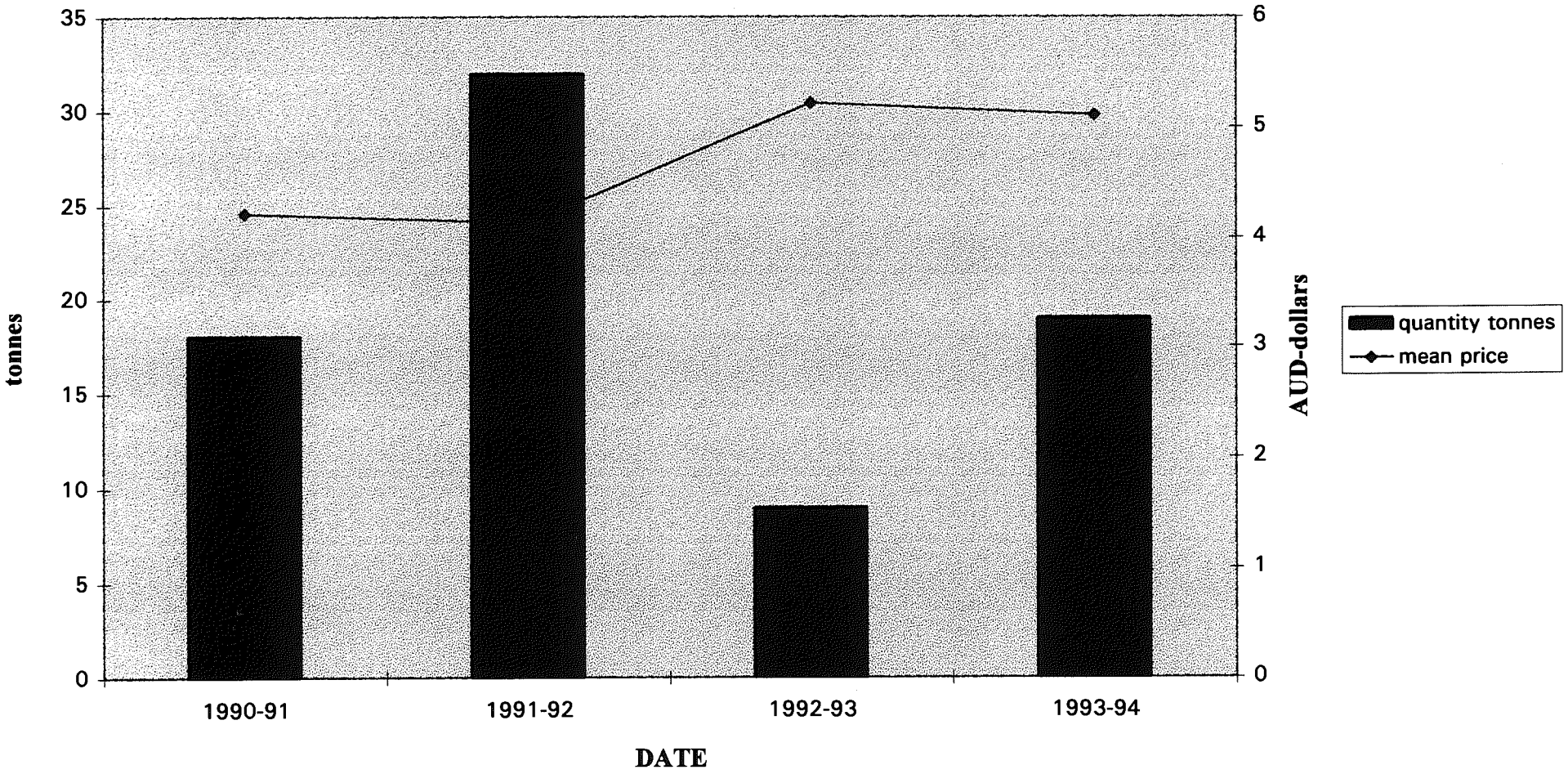


Figure-5

# APPENDIX 2 - AUSTRALIAN EXPORTS OF DRIED SEAFOOD BY DESTINATION FOR 1993 TO 1994

Figure 1A - Hong Kong 1993

Figure 1B - Hong Kong 1994

Figure 2A - Singapore 1993

Figure 2B - Singapore 1994

Figure 3A - Taiwan 1993

Figure 3B - Taiwan 1994

Figure 4A - Japan 1993

Figure 4B - Japan 1994

Figure 5 - Malaysia 1993 & 94

Figure 6 - China & Canada 1993 & 1994

Figure 7A - Isolated Australian exports for 1993

Figure 7B - Isolated Australianexports for 1994

# AUSTRALIAN EXPORTS TO HONG KONG OF DRIED SEAFOOD FOR 1993

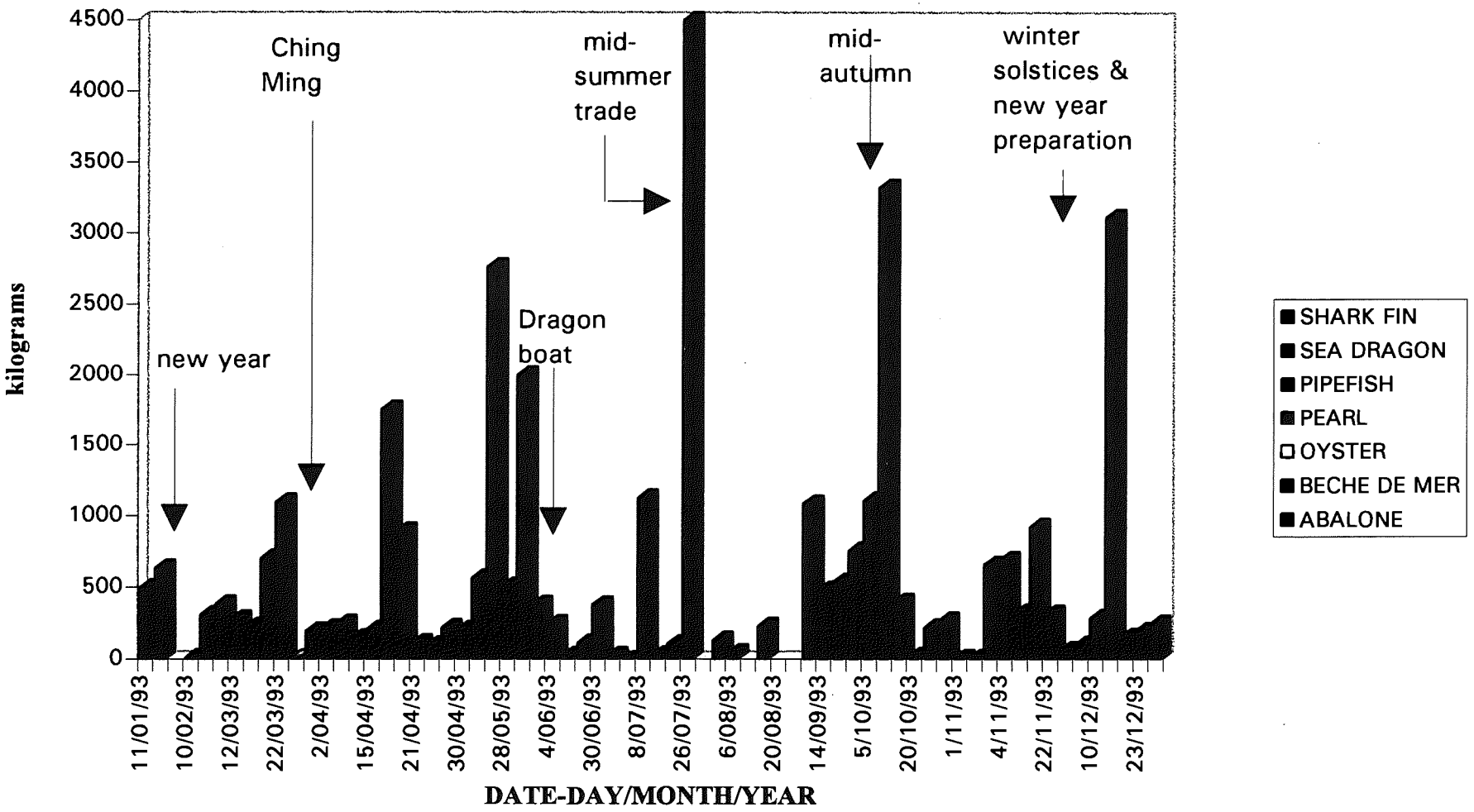


Figure-1A

# AUSTRALIAN EXPORTS TO HONG KONG OF DRIED SEAFOOD FOR 1994

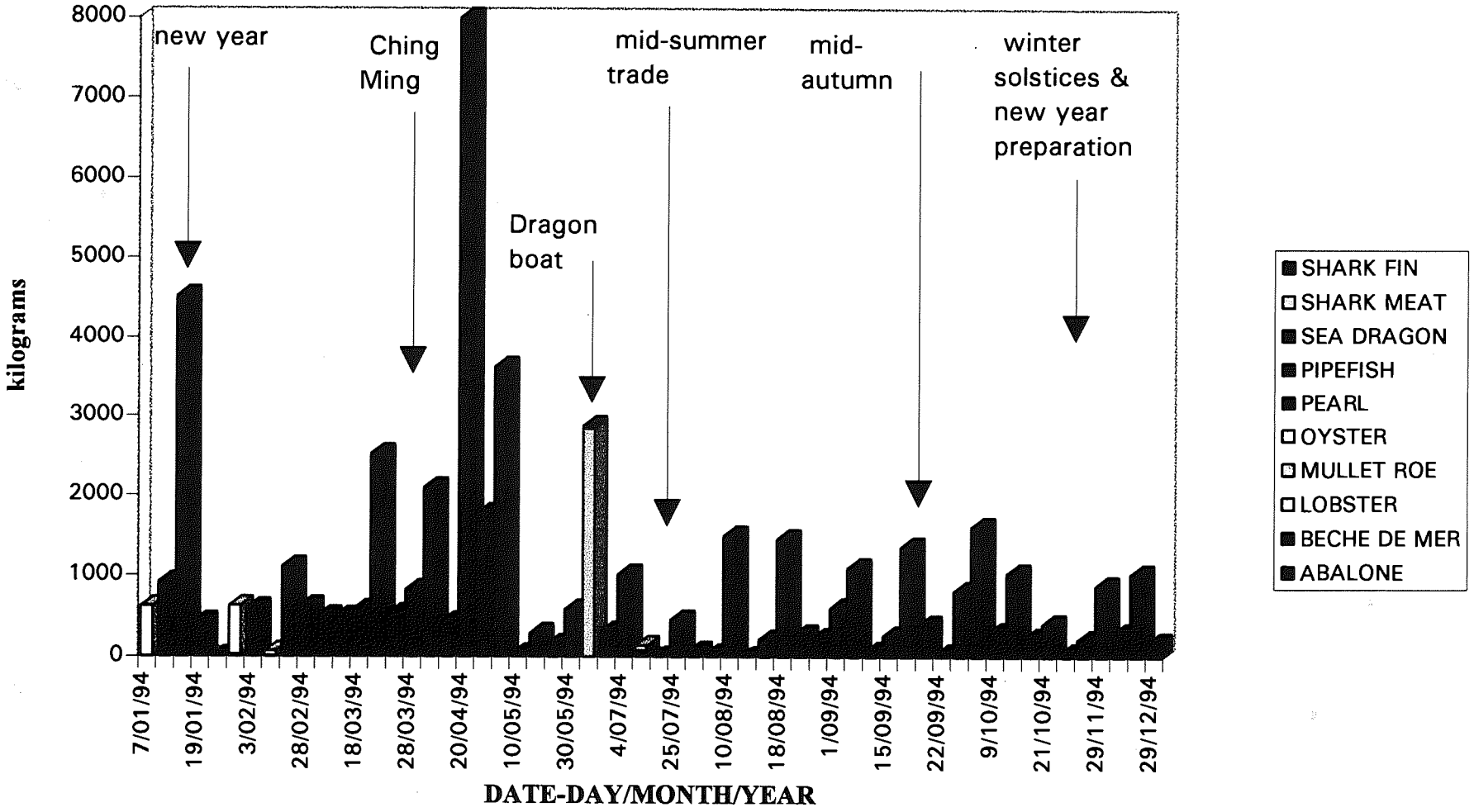


Figure-1B

# AUSTRALIAN EXPORTS TO SINGAPORE OF DRIED SEAFOOD FOR 1993

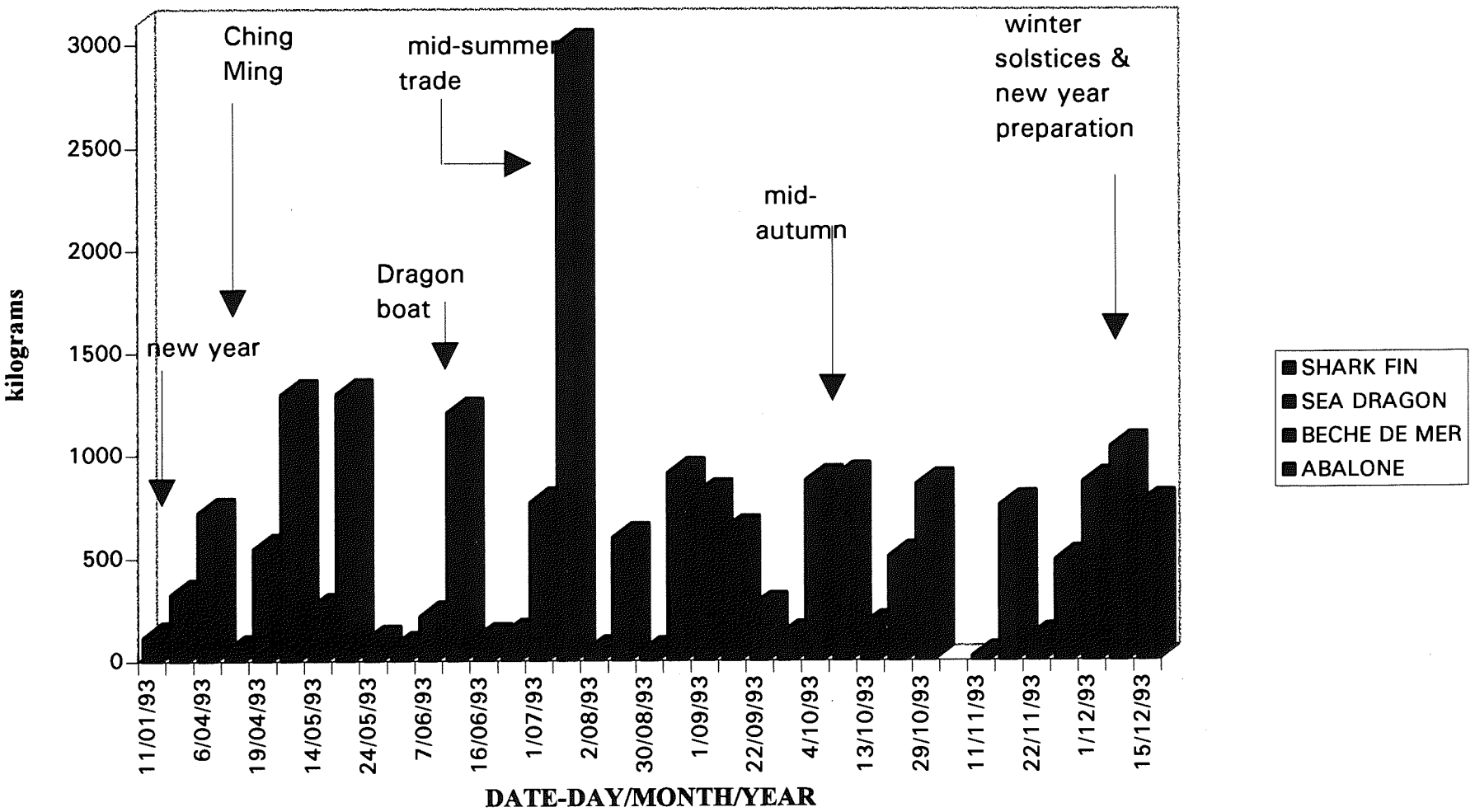


Figure-2A

# AUSTRALIAN EXPORTS TO SINGAPORE OF DRIED SEAFOOD FOR 1994

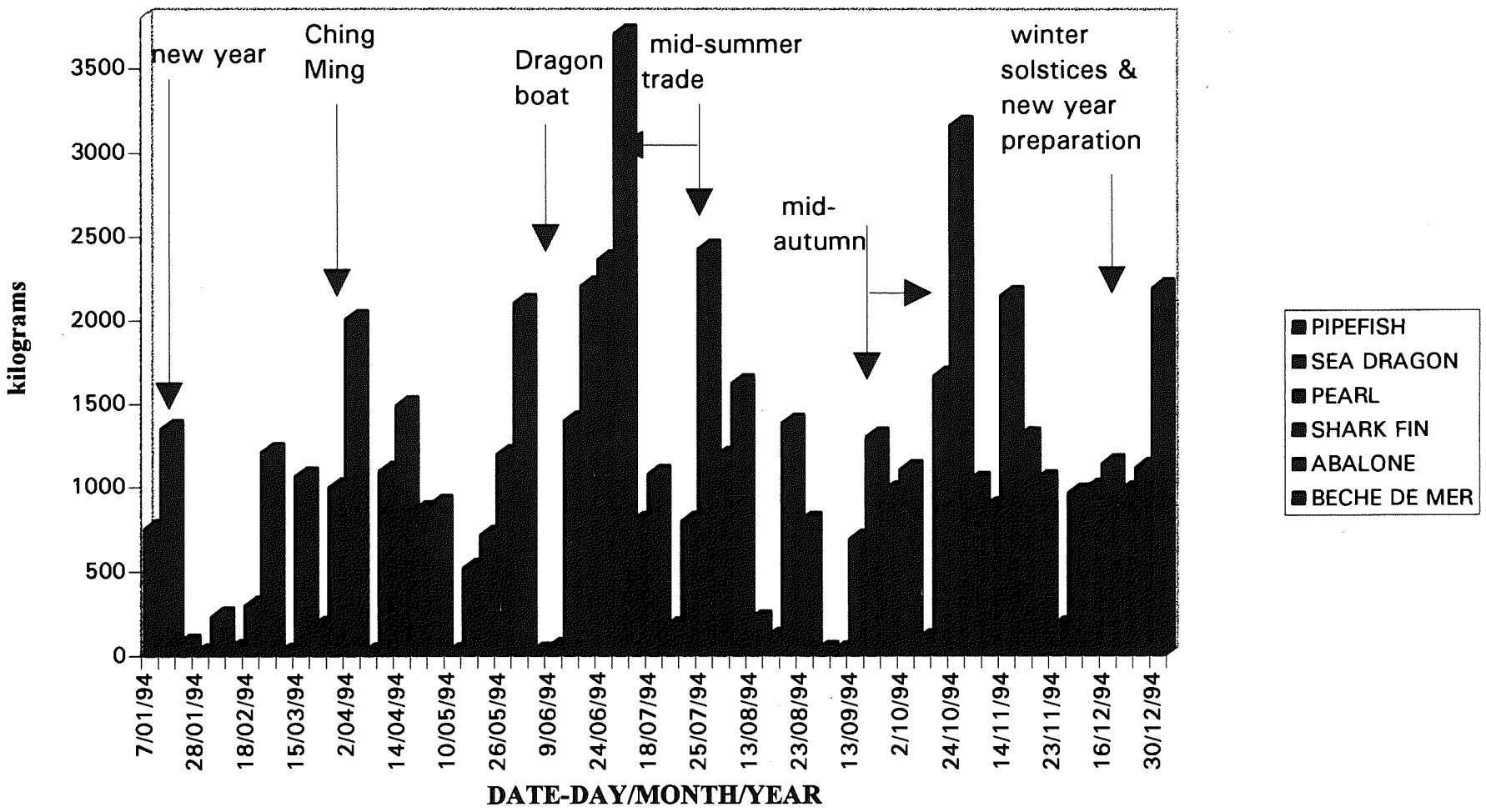


Figure-2B

# AUSTRALIAN EXPORTS TO TAIWAN OF DRIED SEAFOOD FOR 1993

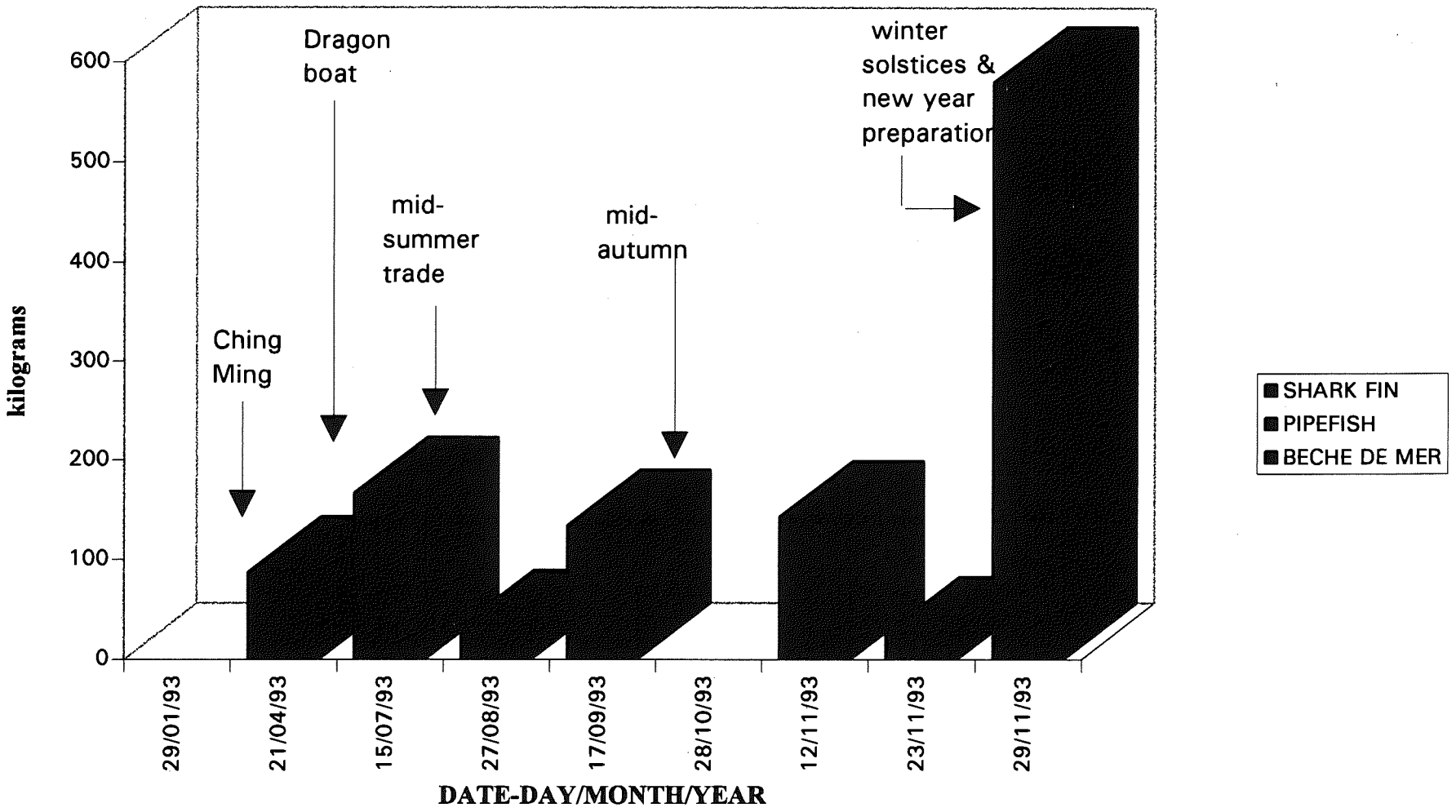


Figure-3A

# AUSTRALIAN EXPORTS TO TAIWAN OF DRIED SEAFOOD FOR 1994

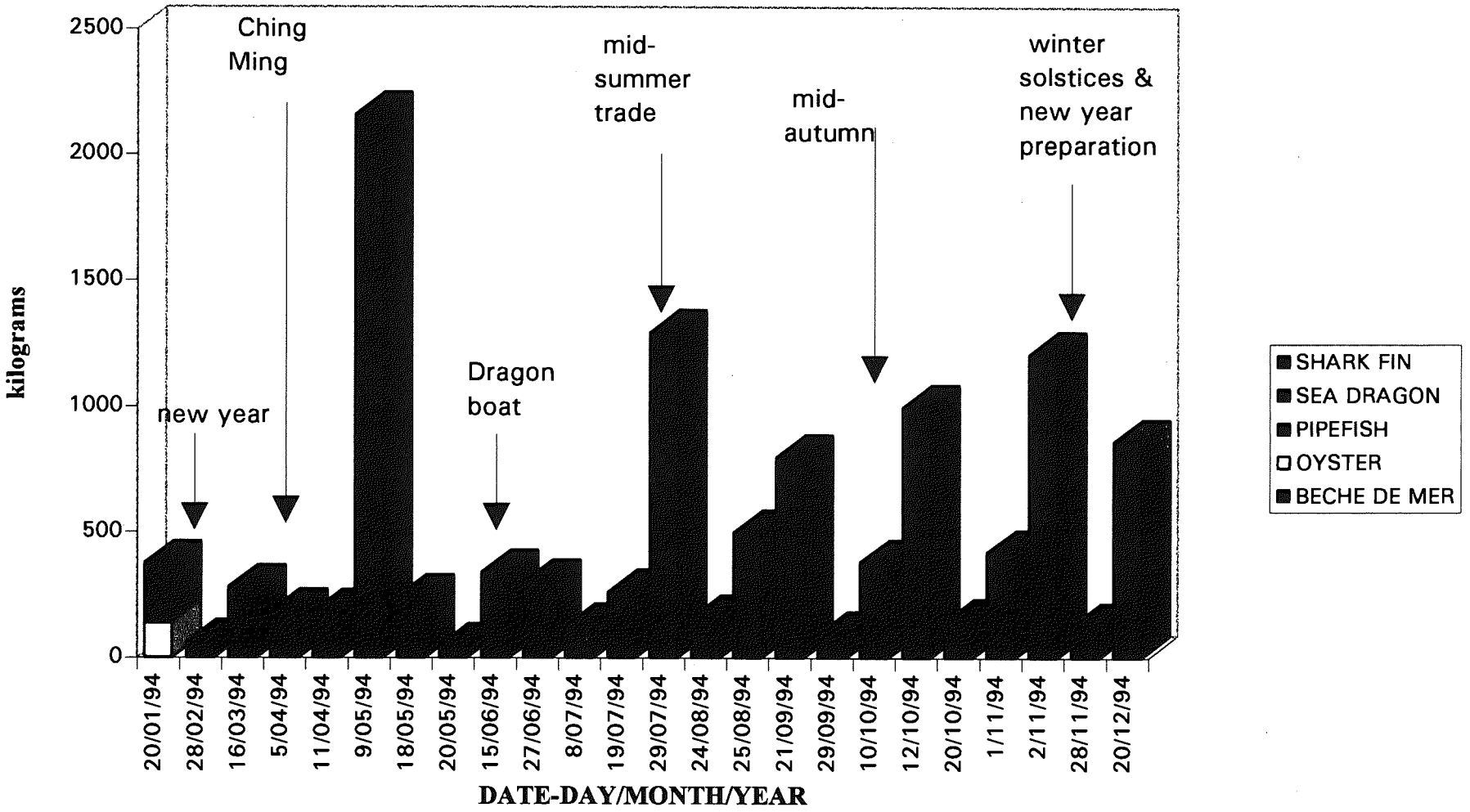


Figure-3B

# AUSTRALIAN EXPORTS TO JAPAN DRIED SEAFOOD FOR 1993

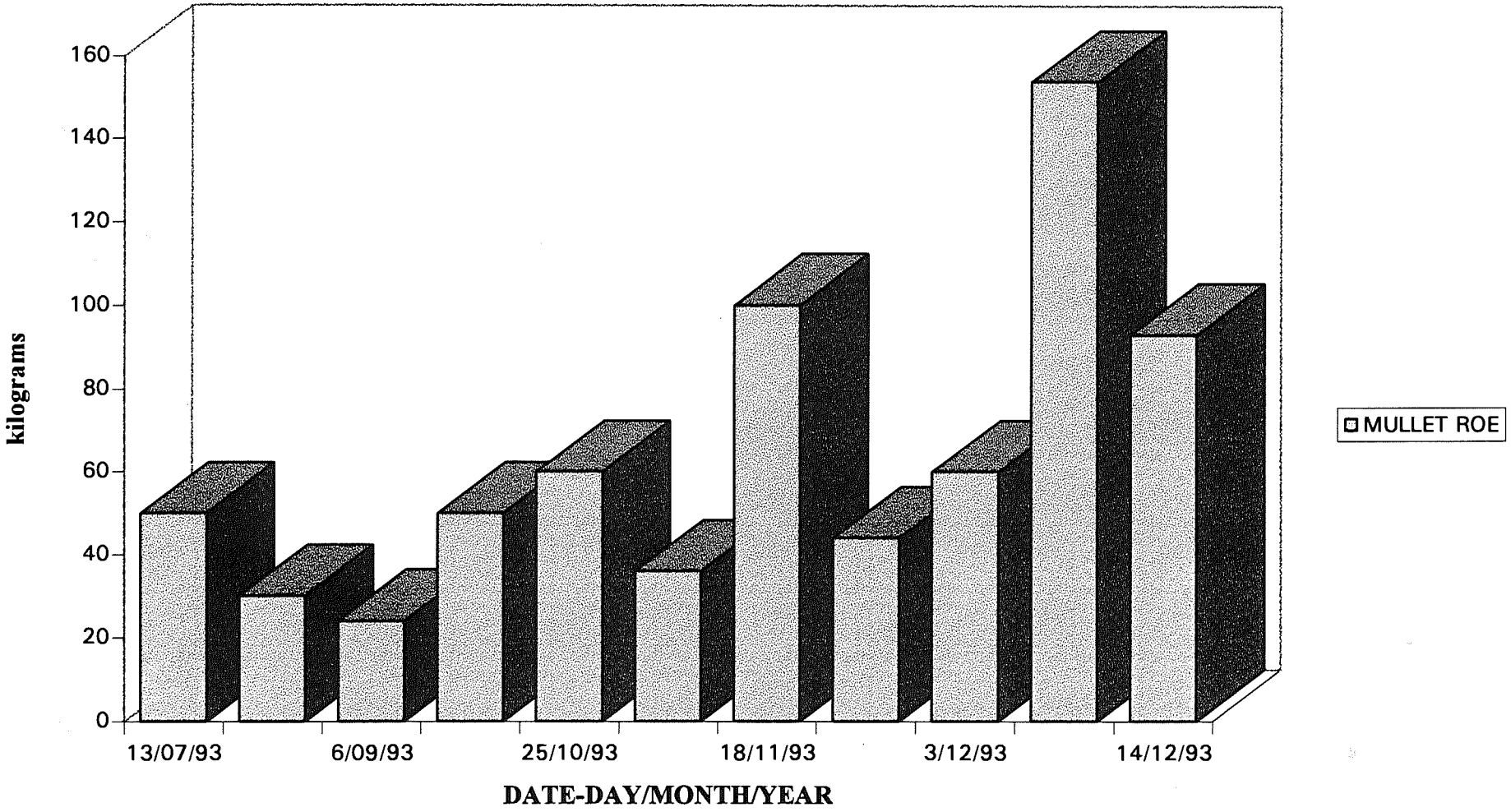


Figure-4A

# AUSTRALIAN EXPORTS TO JAPAN OF DRIED SEAFOOD FOR 1993

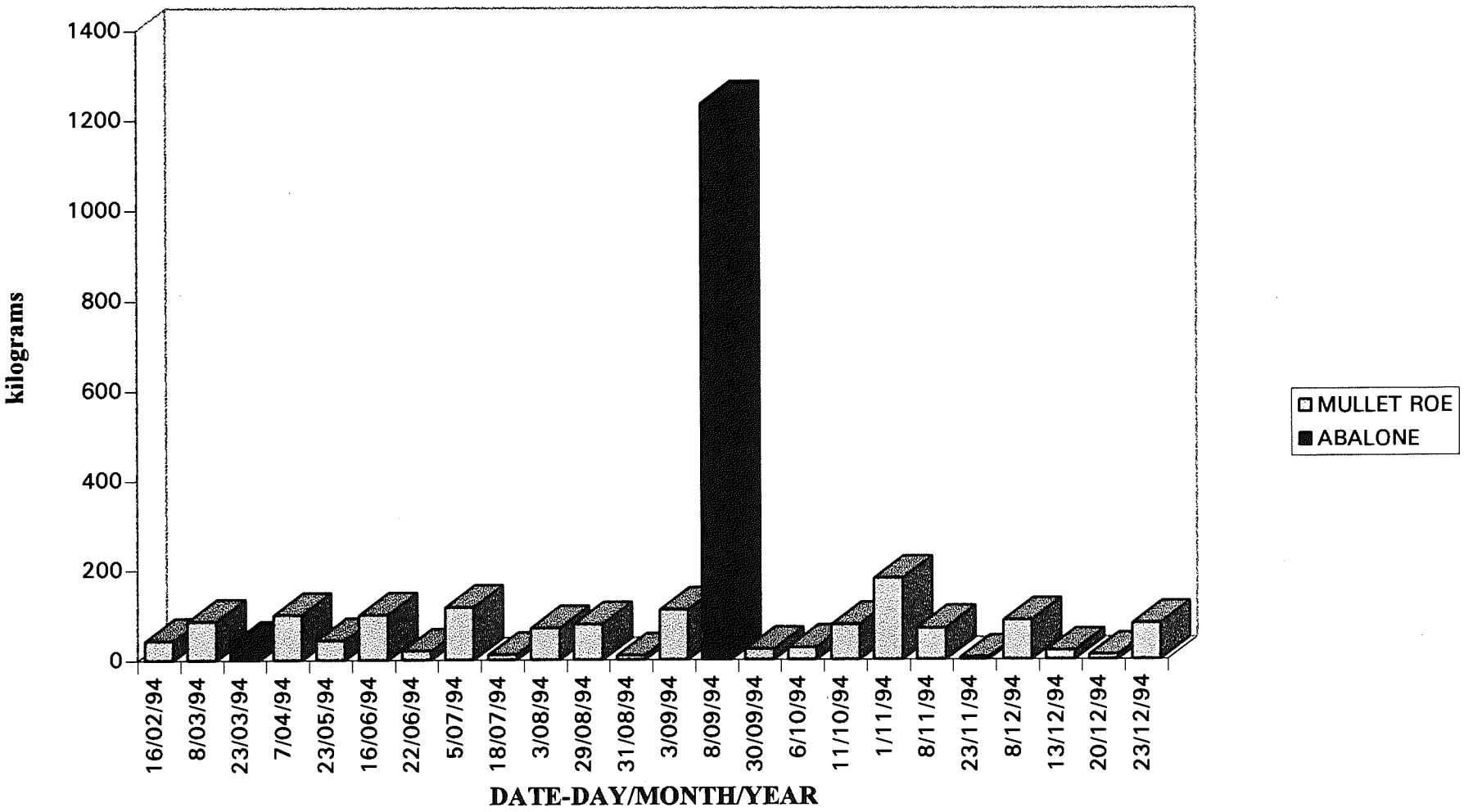


Figure-4B

# AUSTRALIAN EXPORTS TO MALAYSIA OF DRIED SEAFOOD FOR 1993 & 94

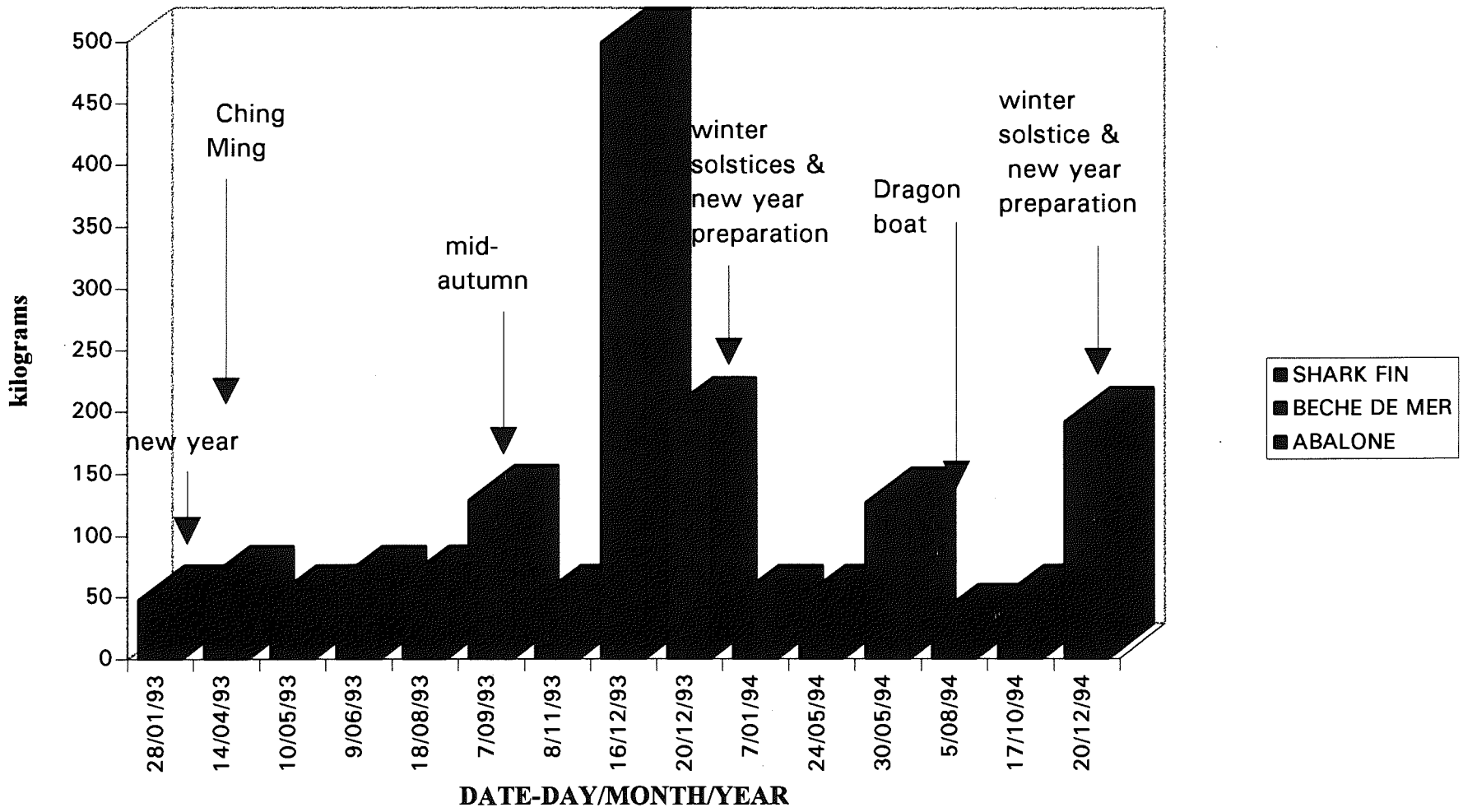


Figure-5

# AUSTRALIAN EXPORTS TO CHINA & CANADA OF DRIED SEAFOOD FOR 1993 - 94

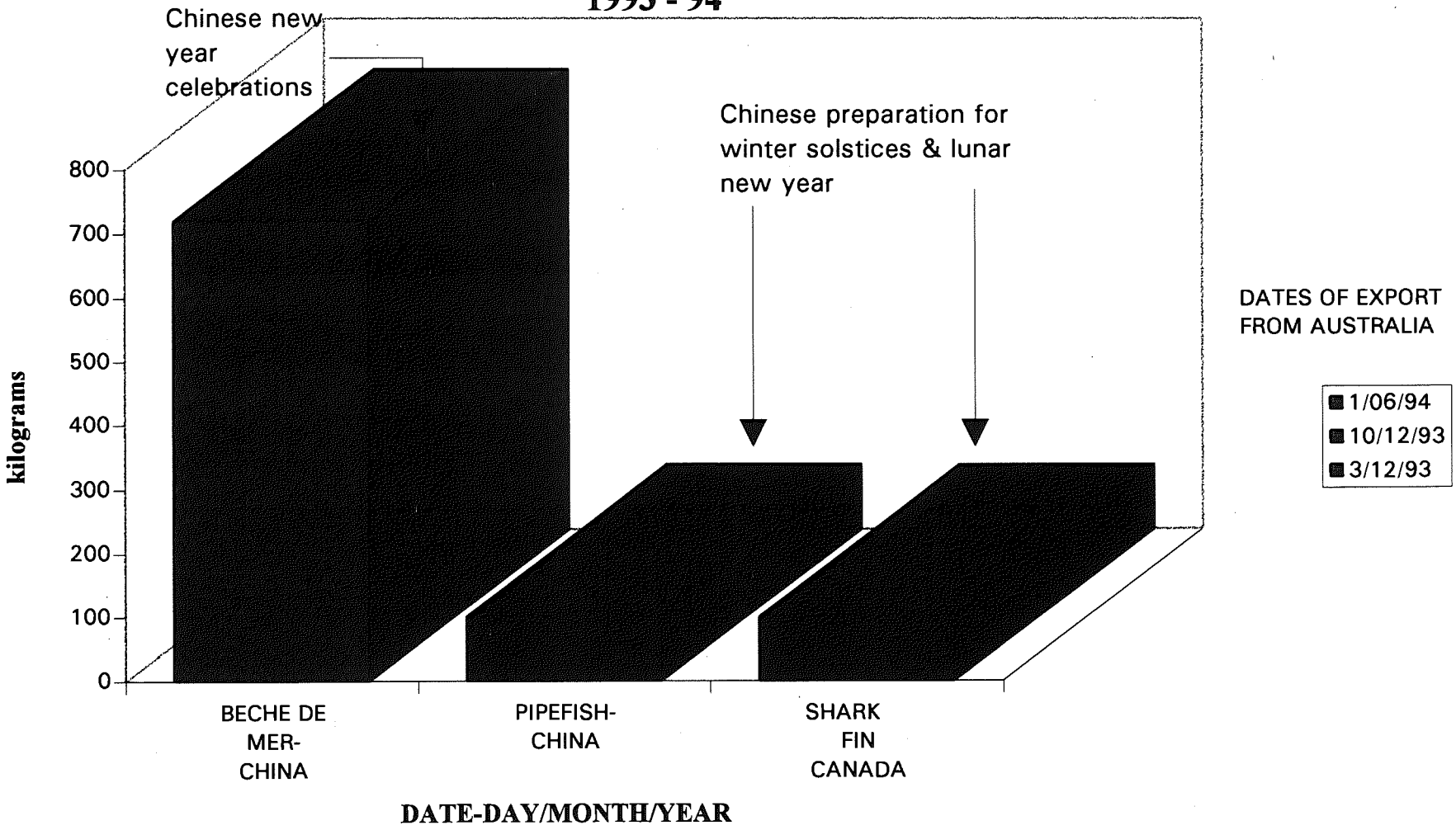


Figure-6

## ISOLATED EXPORTS OF DRIED SEAFOOD PRODUCTS FROM AUSTRALIA FOR 1993

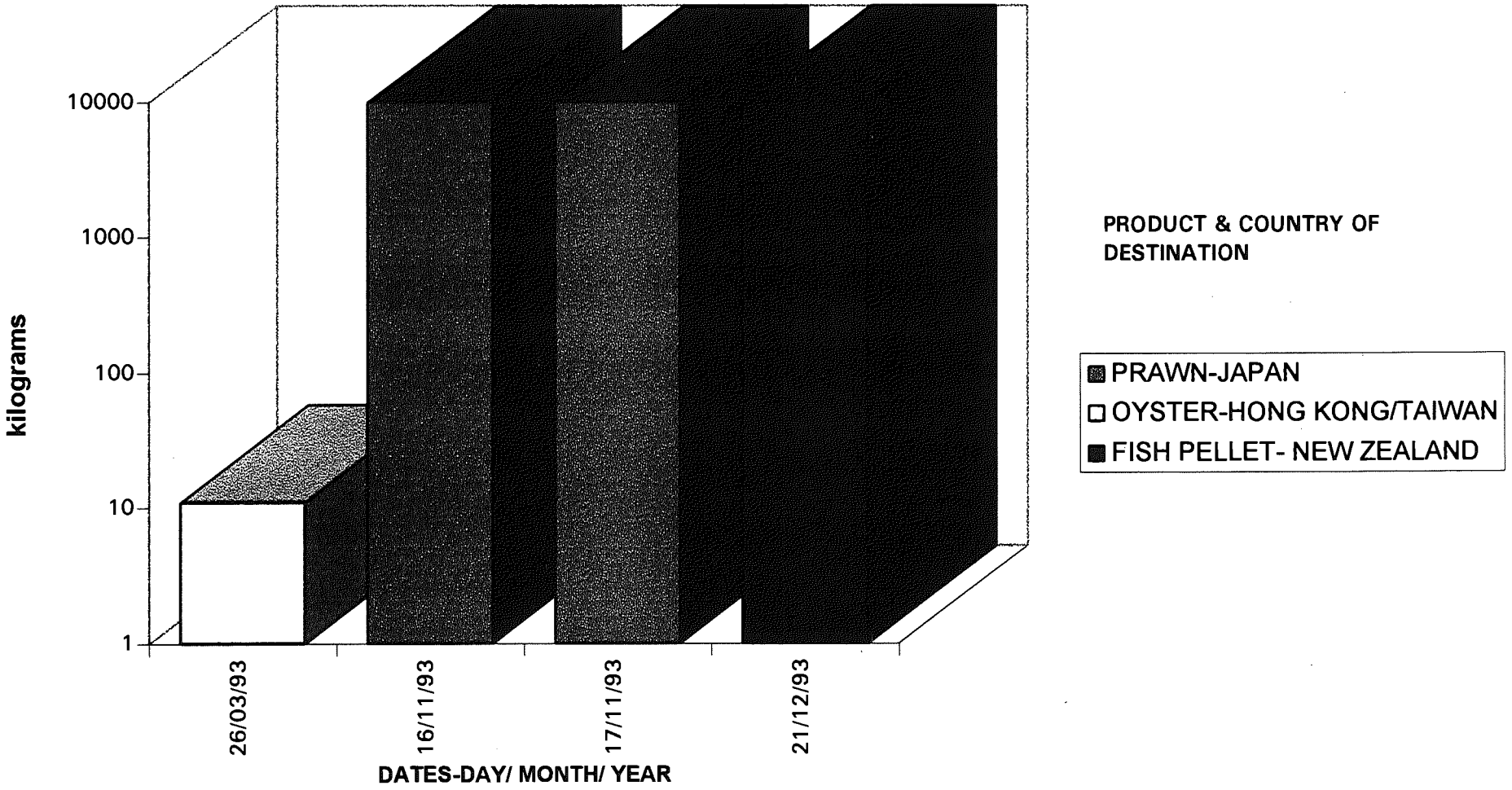


Figure-7A

## ISOLATED EXPORTS OF DRIED SEAFOOD PRODUCTS FROM AUSTRALIA FOR 1994

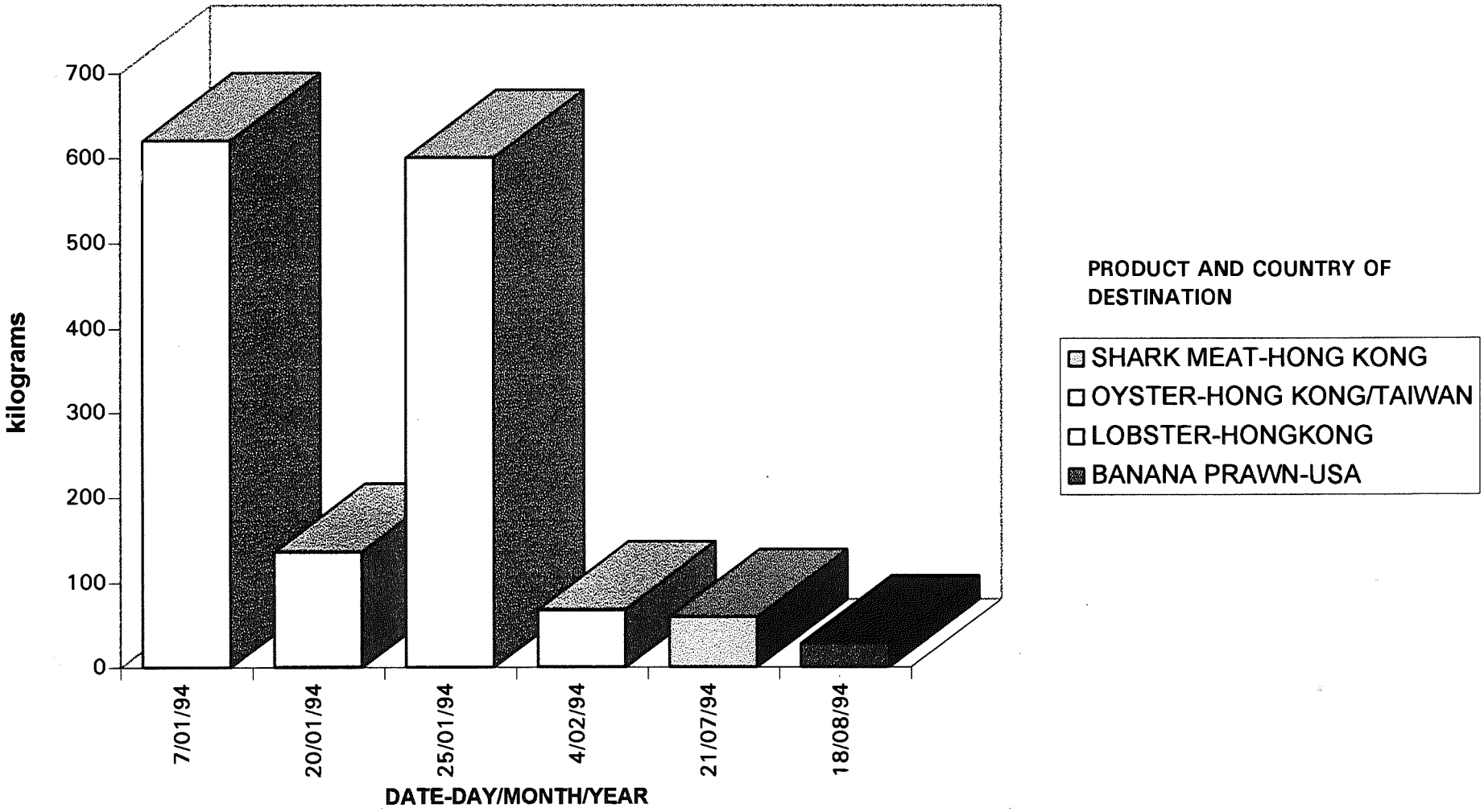


Figure-7B

# APPENDIX 3 - AUSTRALIAN EXPORTS OF DRIED SEAFOOD BY SPECIES

Figure 1A - Sharkfin 1993

Figure 1B - Sharkfin 1994

Figure 2A - Beche-de-mer 1993

Figure 2B - Beche-de-mer 1994

Figure 3A - Fish roes 1993

Figure 3B - Fish roes 1994

Figure 4A - Abalone 1993

Figure 4B - Abalone 1994

Figure 5A - Pipefish 1993

Figure 5B - Pipefish 1994

Figure 6A - Seadragon 1993

Figure 6B - Seadragon 1994

Figure 7A - Pearl meat 1993

Figure 7B - Pearl meat 1994

## AUSTRALIAN EXPORTS OF DRIED SHARKFIN FOR 1993

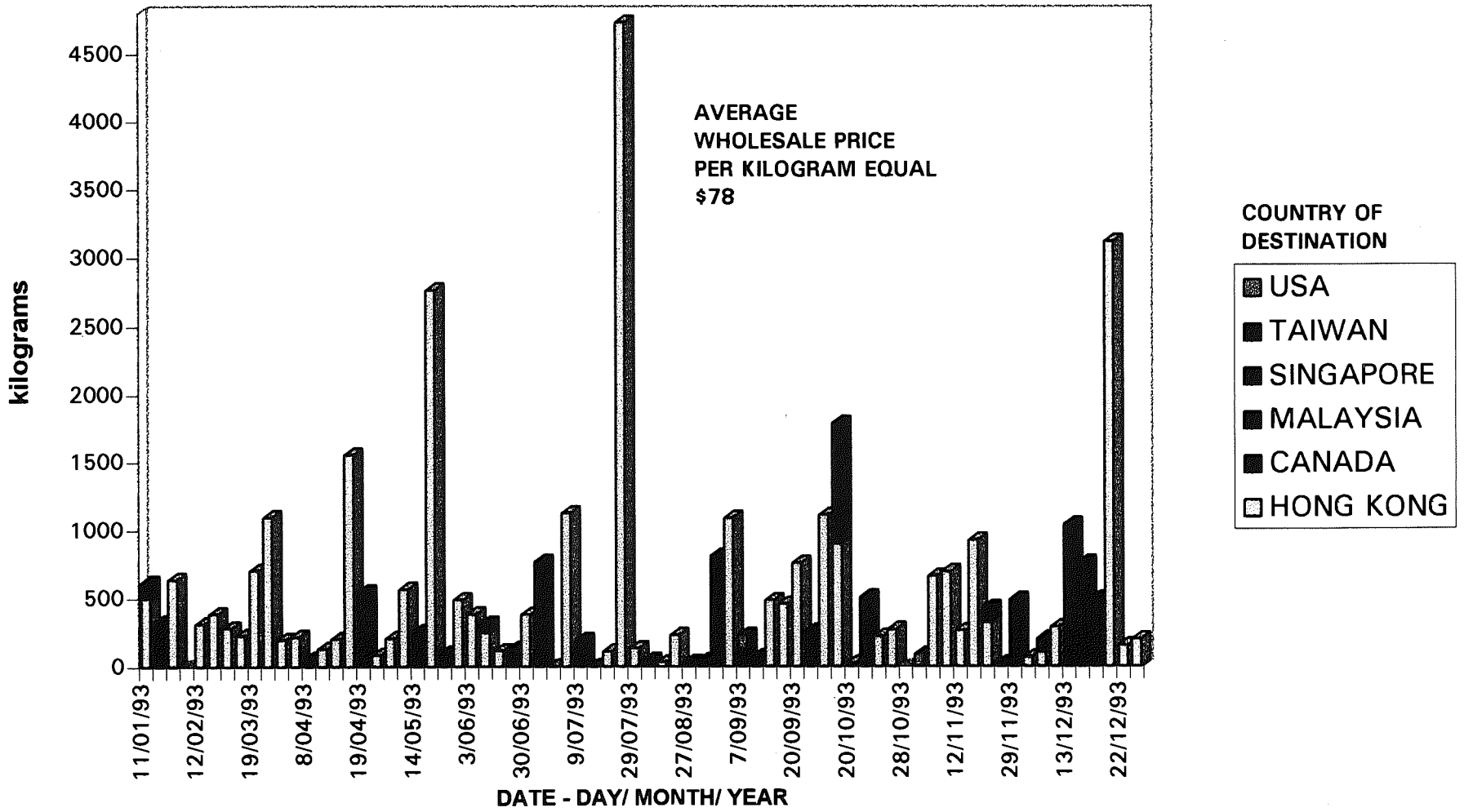


Figure-1A

## AUSTRALIAN EXPORTS OF DRIED SHARKFIN FOR 1994

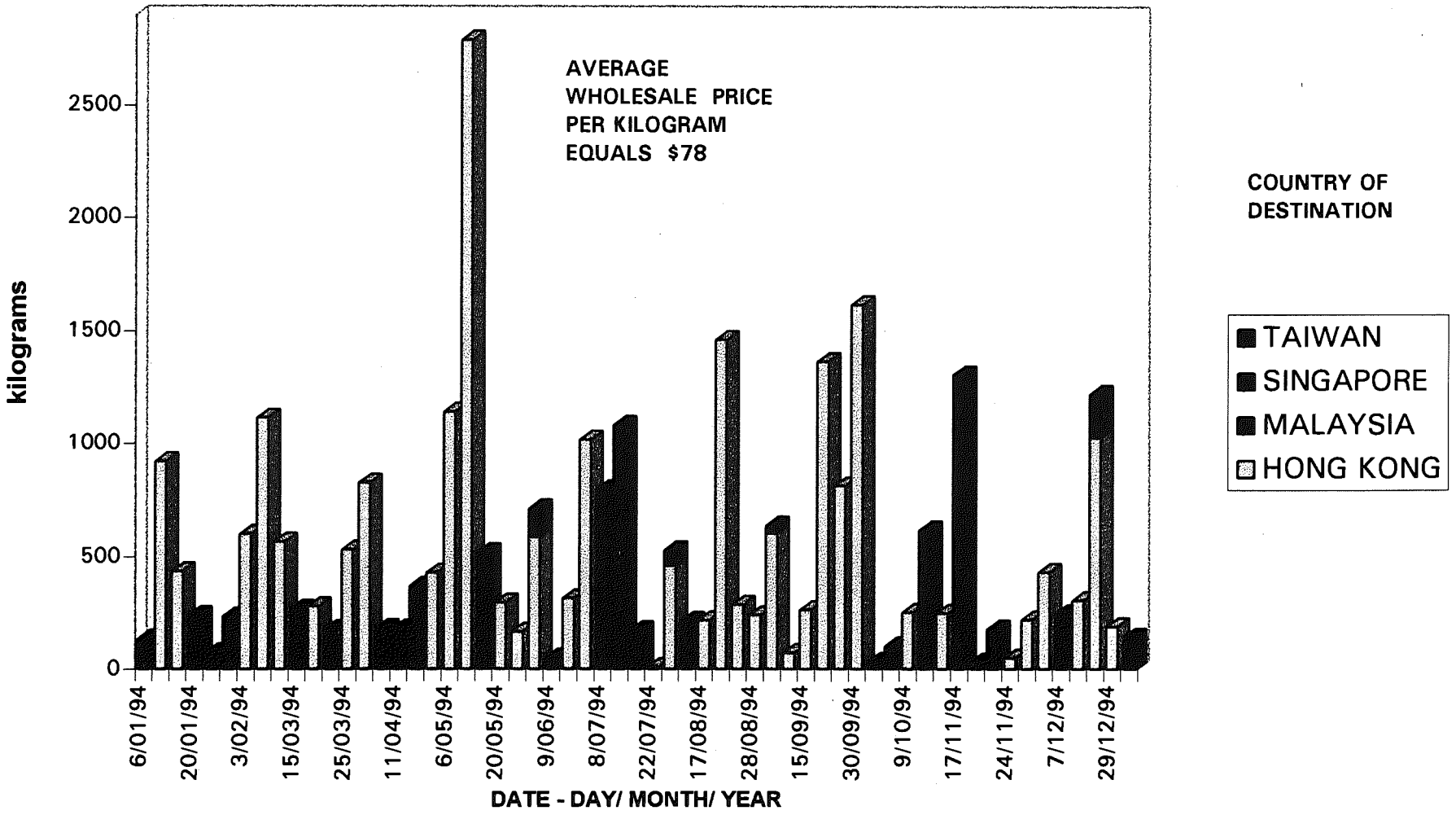


Figure-1B

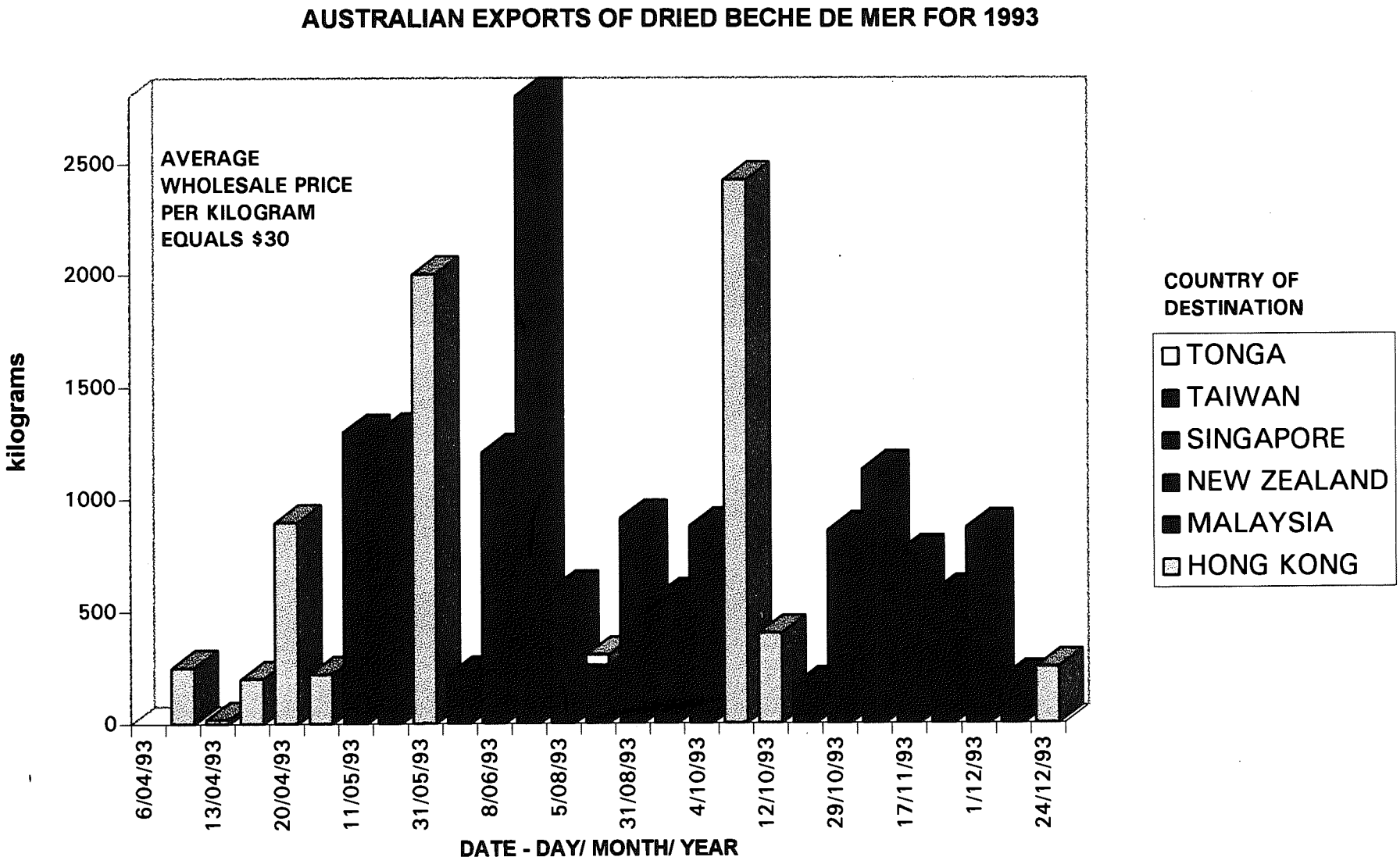
AUSTRALIAN EXPORTS OF DRIED BECHE DE MER FOR 1993
AVERAGE
WHOLESALE PRICE
PER KILOGRAM
EQUALS $30
kilograms
2500
2000
1500
1000
500
0
6/04/93
13/04/93
20/04/93
11/05/93
31/05/93
8/06/93
5/08/93
31/08/93
4/10/93
12/10/93
29/10/93
17/11/93
1/12/93
24/12/93
DATE - DAY/ MONTH/ YEAR
COUNTRY OF
DESTINATION
TONGA
TAIWAN
SINGAPORE
NEW ZEALAND
MALAYSIA
HONG KONG

Figure-2A

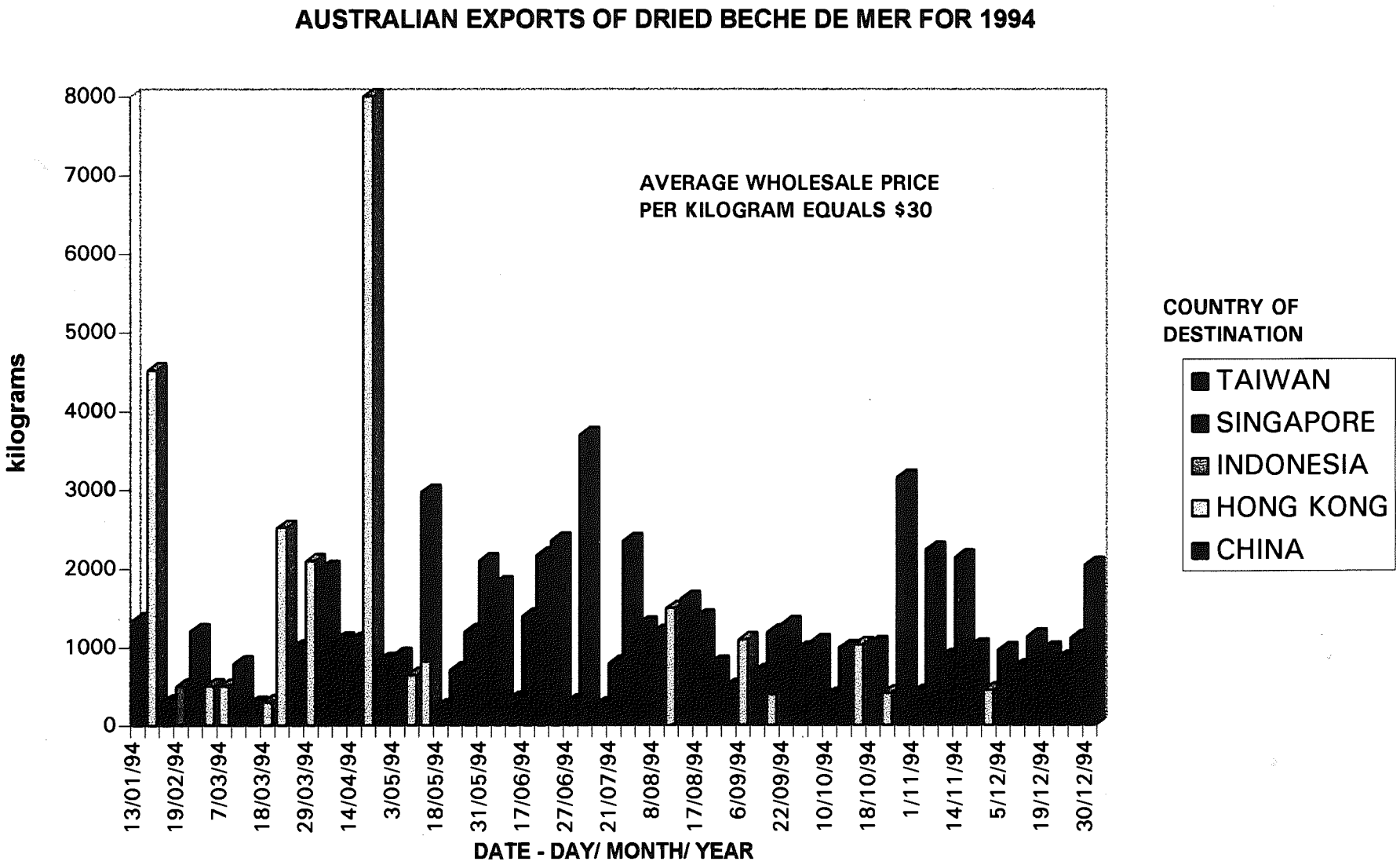
AUSTRALIAN EXPORTS OF DRIED BECHE DE MER FOR 1994
AVERAGE WHOLESALE PRICE
PER KILOGRAM EQUALS $30
kilograms
8000
7000
6000
5000
4000
3000
2000
1000
0
13/01/94
19/02/94
7/03/94
18/03/94
29/03/94
14/04/94
3/05/94
18/05/94
31/05/94
17/06/94
27/06/94
21/07/94
8/08/94
17/08/94
6/09/94
22/09/94
10/10/94
18/10/94
1/11/94
14/11/94
5/12/94
19/12/94
30/12/94
DATE - DAY/ MONTH/ YEAR
COUNTRY OF
DESTINATION
TAIWAN
SINGAPORE
INDONESIA
HONG KONG
CHINA

Figure-2B

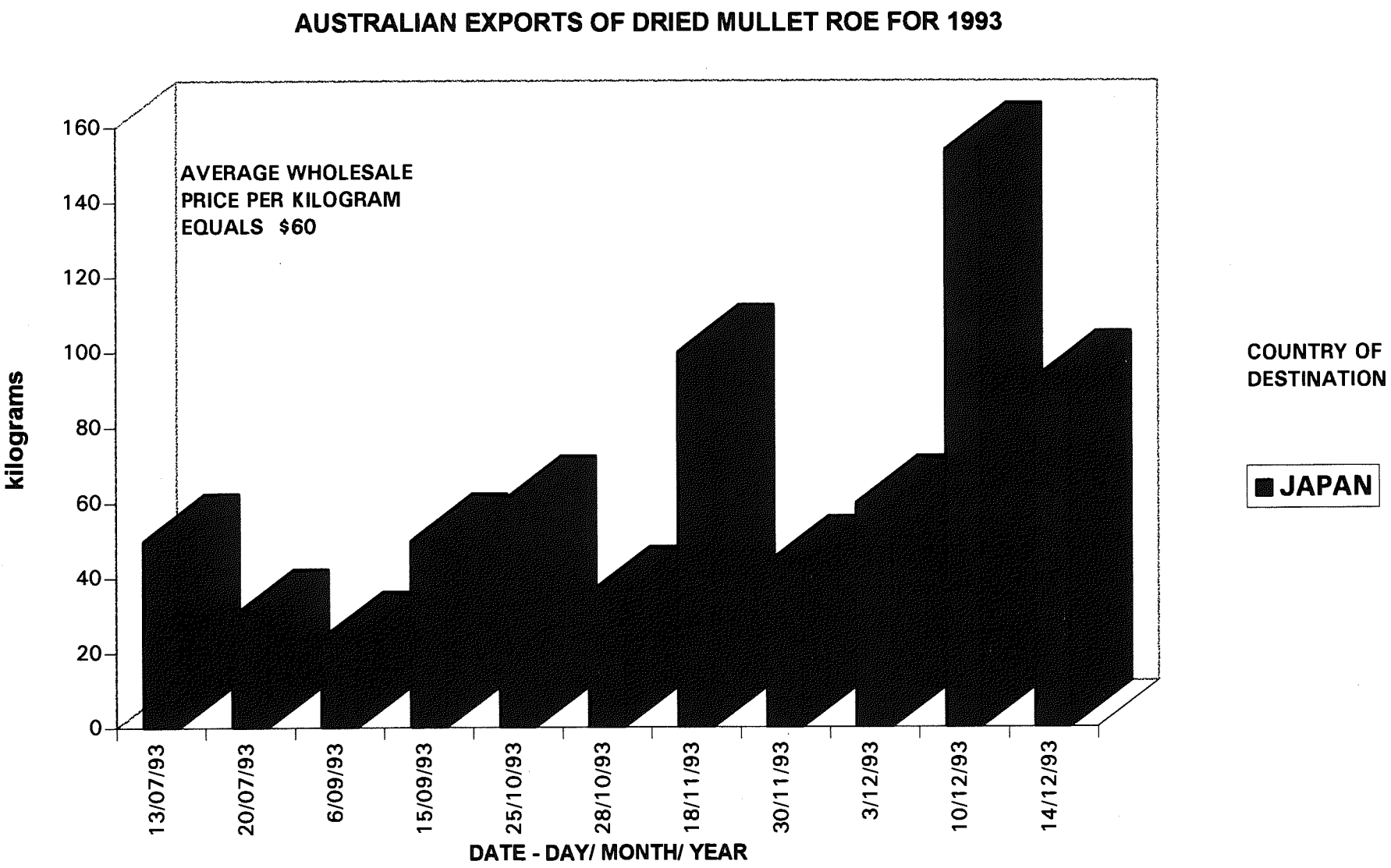
AUSTRALIAN EXPORTS OF DRIED MULLET ROE FOR 1993
AVERAGE WHOLESALE
PRICE PER KILOGRAM
EQUALS $60
kilograms
160
140
120
100
80
60
40
20
0
13/07/93
20/07/93
6/09/93
15/09/93
25/10/93
28/10/93
18/11/93
30/11/93
3/12/93
10/12/93
14/12/93
DATE - DAY/ MONTH/ YEAR
COUNTRY OF
DESTINATION
JAPAN

Figure-3A

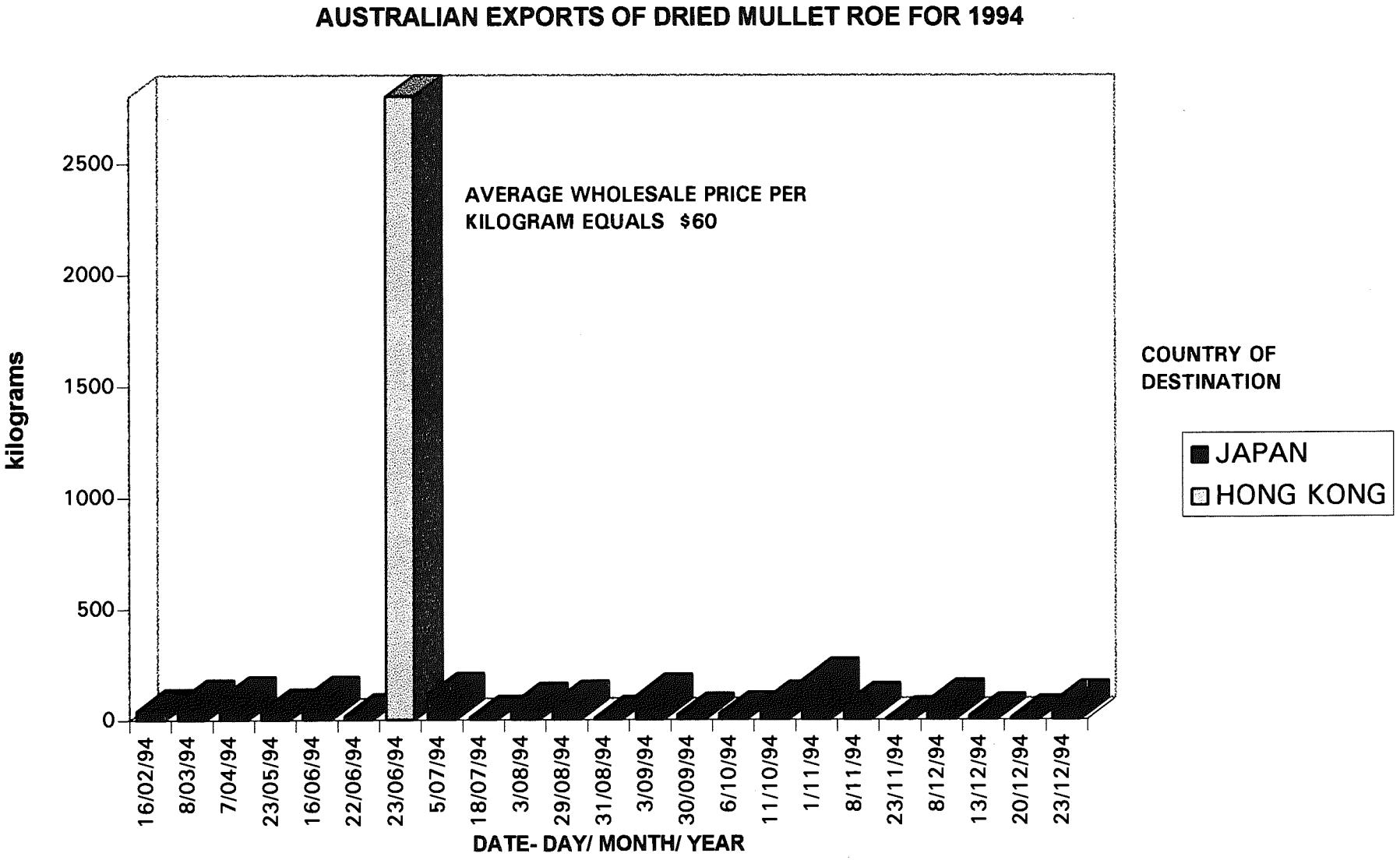
AUSTRALIAN EXPORTS OF DRIED MULLET ROE FOR 1994
kilograms
2500
2000
1500
1000
500
0
AVERAGE WHOLESALE PRICE PER
KILOGRAM EQUALS $60
COUNTRY OF
DESTINATION
JAPAN
HONG KONG
16/02/94
8/03/94
7/04/94
23/05/94
16/06/94
22/06/94
23/06/94
5/07/94
18/07/94
3/08/94
29/08/94
31/08/94
3/09/94
30/09/94
6/10/94
11/10/94
1/11/94
8/11/94
23/11/94
8/12/94
13/12/94
20/12/94
23/12/94
DATE- DAY/ MONTH/ YEAR

Figure-3B

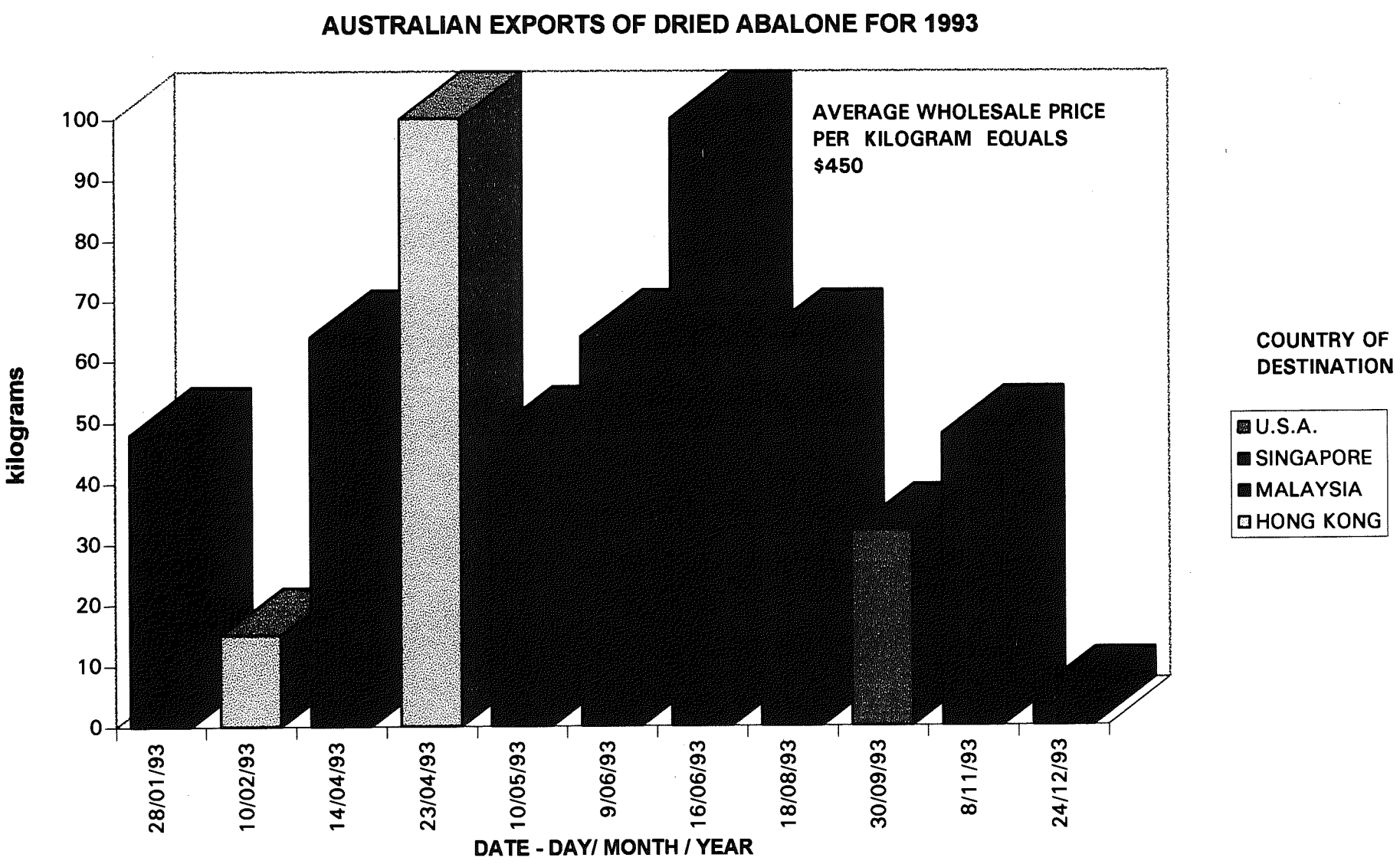
AUSTRALIAN EXPORTS OF DRIED ABALONE FOR 1993
AVERAGE WHOLESALE PRICE PER KILOGRAM EQUALS $450
kilograms
100
90
80
70
60
50
40
30
20
10
0
28/01/93
10/02/93
14/04/93
23/04/93
10/05/93
9/06/93
16/06/93
18/08/93
30/09/93
8/11/93
24/12/93
DATE - DAY/ MONTH / YEAR
COUNTRY OF DESTINATION
U.S.A.
SINGAPORE
MALAYSIA
HONG KONG

Figure-4A

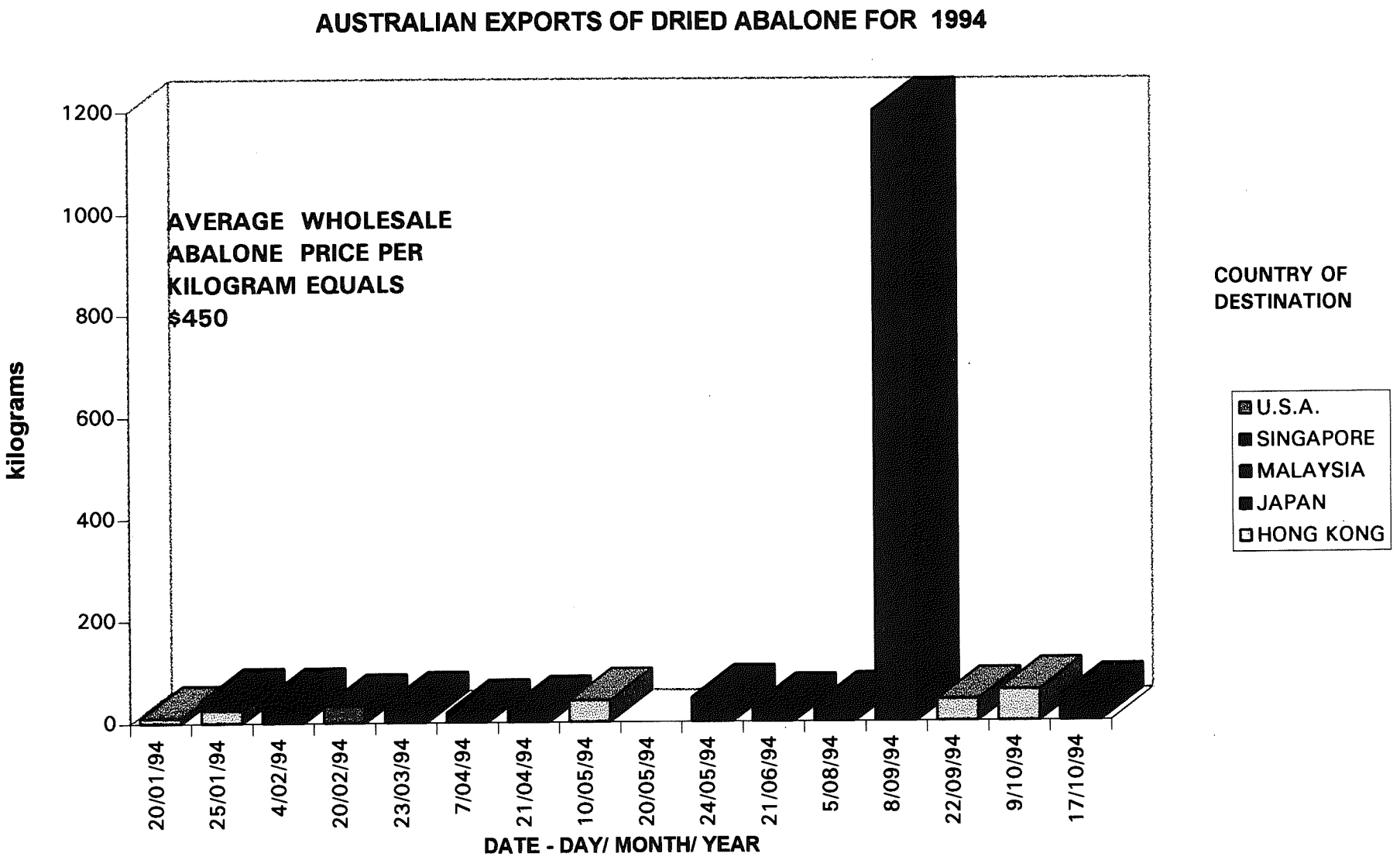
AUSTRALIAN EXPORTS OF DRIED ABALONE FOR 1994
AVERAGE WHOLESALE ABALONE PRICE PER KILOGRAM EQUALS $450
kilograms
1200
1000
800
600
400
200
0
20/01/94
25/01/94
4/02/94
20/02/94
23/03/94
7/04/94
21/04/94
10/05/94
20/05/94
24/05/94
21/06/94
5/08/94
8/09/94
22/09/94
9/10/94
17/10/94
DATE - DAY/ MONTH/ YEAR
COUNTRY OF DESTINATION
U.S.A.
SINGAPORE
MALAYSIA
JAPAN
HONG KONG

Figure-4B

## AUSTRALIAN EXPORTS OF DRIED PIPEFISH FOR 1993

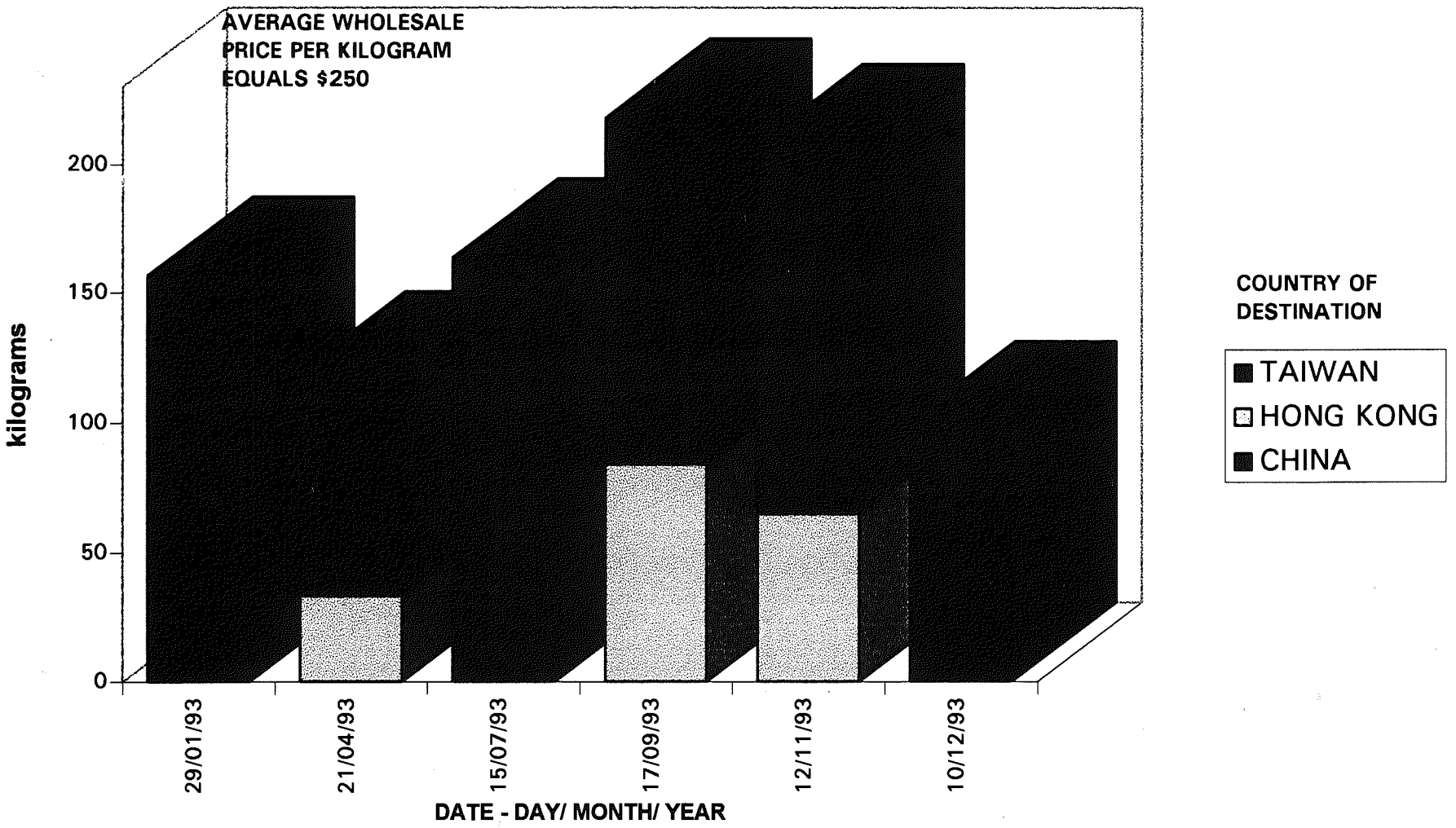


Figure-5A

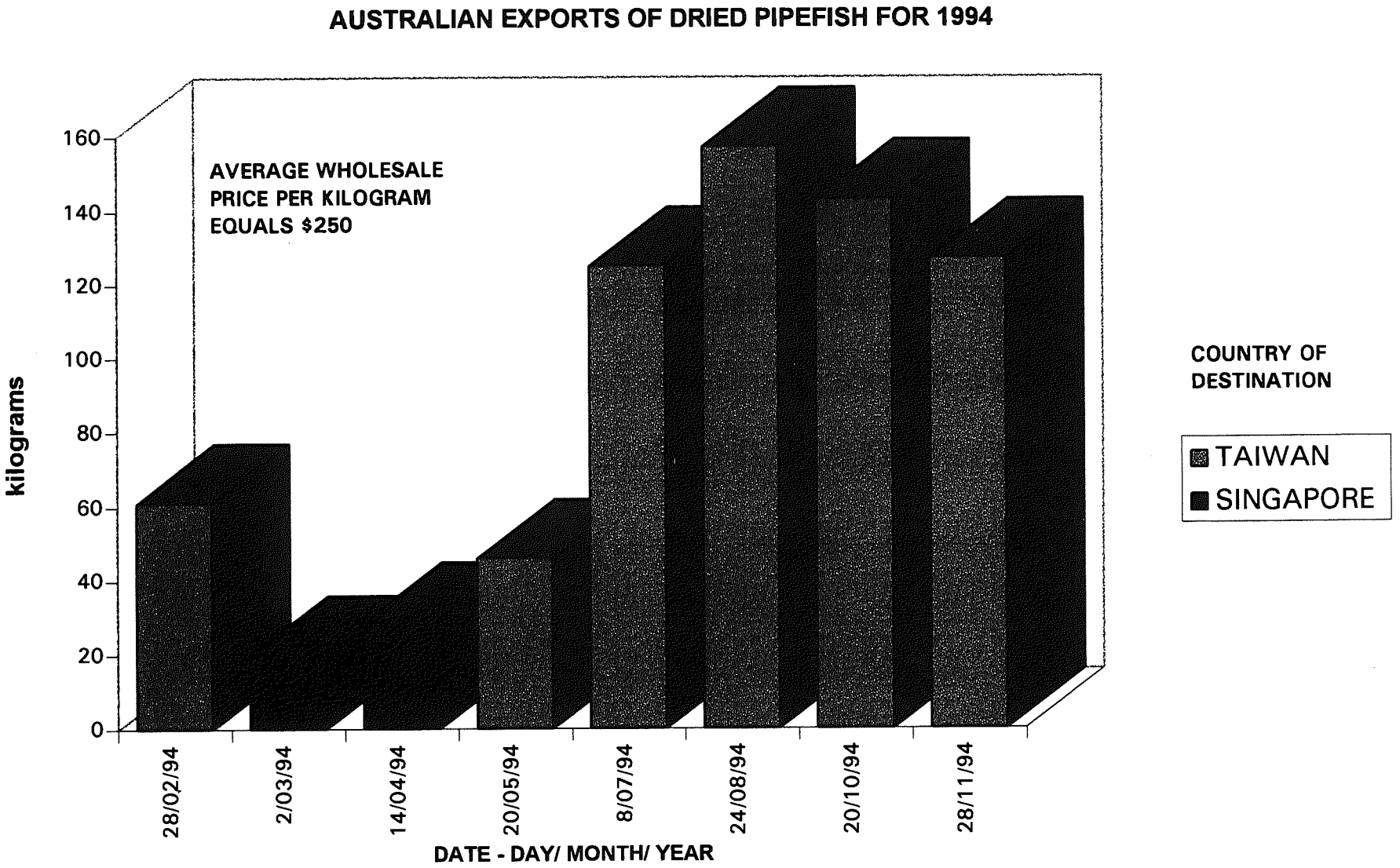
AUSTRALIAN EXPORTS OF DRIED PIPEFISH FOR 1994
AVERAGE WHOLESALE
PRICE PER KILOGRAM
EQUALS $250
kilograms
160
140
120
100
80
60
40
20
0
28/02/94
2/03/94
14/04/94
20/05/94
8/07/94
24/08/94
20/10/94
28/11/94
DATE - DAY/ MONTH/ YEAR
COUNTRY OF
DESTINATION
TAIWAN
SINGAPORE

Figure-5B

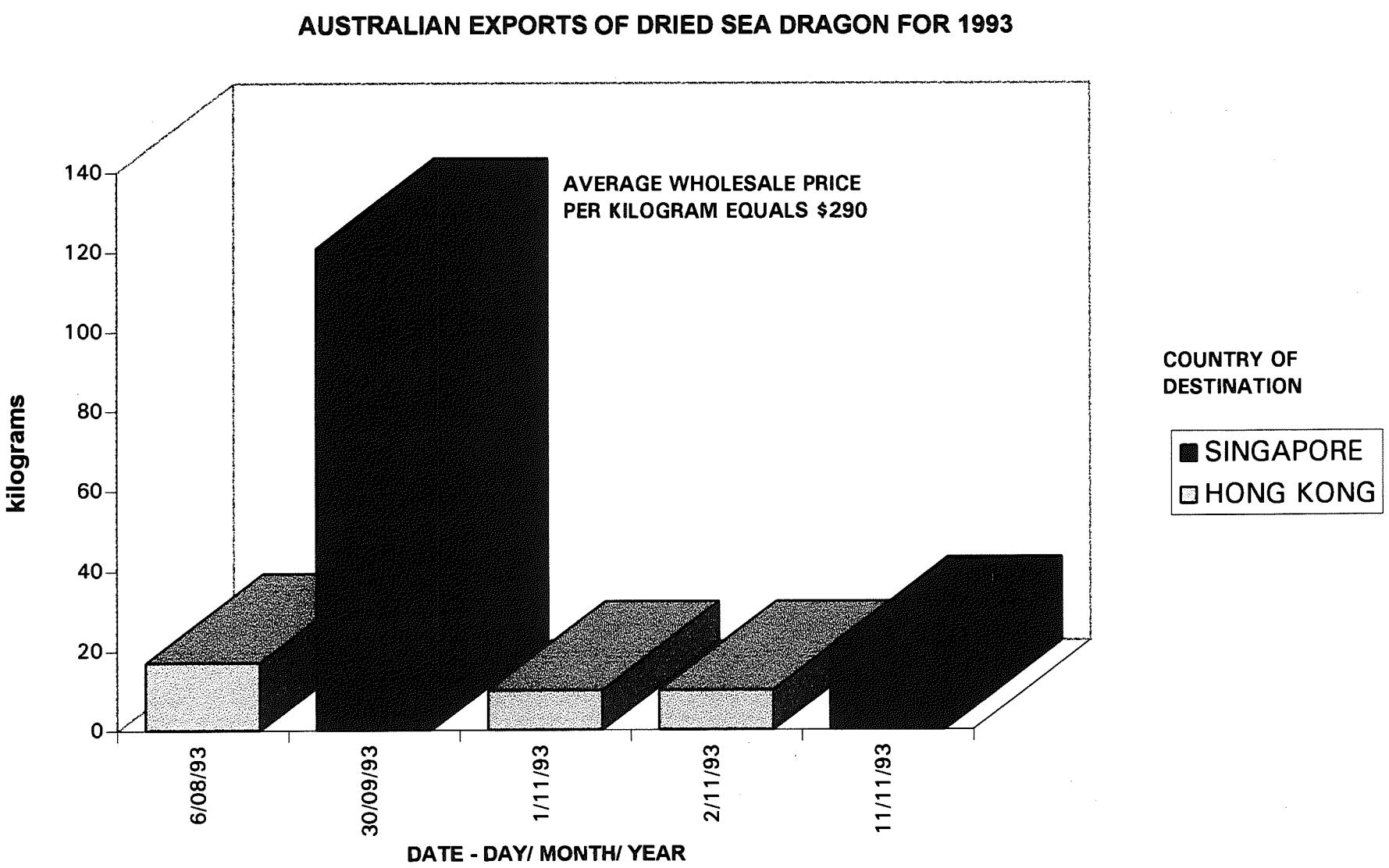
AUSTRALIAN EXPORTS OF DRIED SEA DRAGON FOR 1993
AVERAGE WHOLESALE PRICE
PER KILOGRAM EQUALS $290
kilograms
140
120
100
80
60
40
20
0
6/08/93
30/09/93
1/11/93
2/11/93
11/11/93
DATE - DAY/ MONTH/ YEAR
COUNTRY OF
DESTINATION
SINGAPORE
HONG KONG

Figure-6A

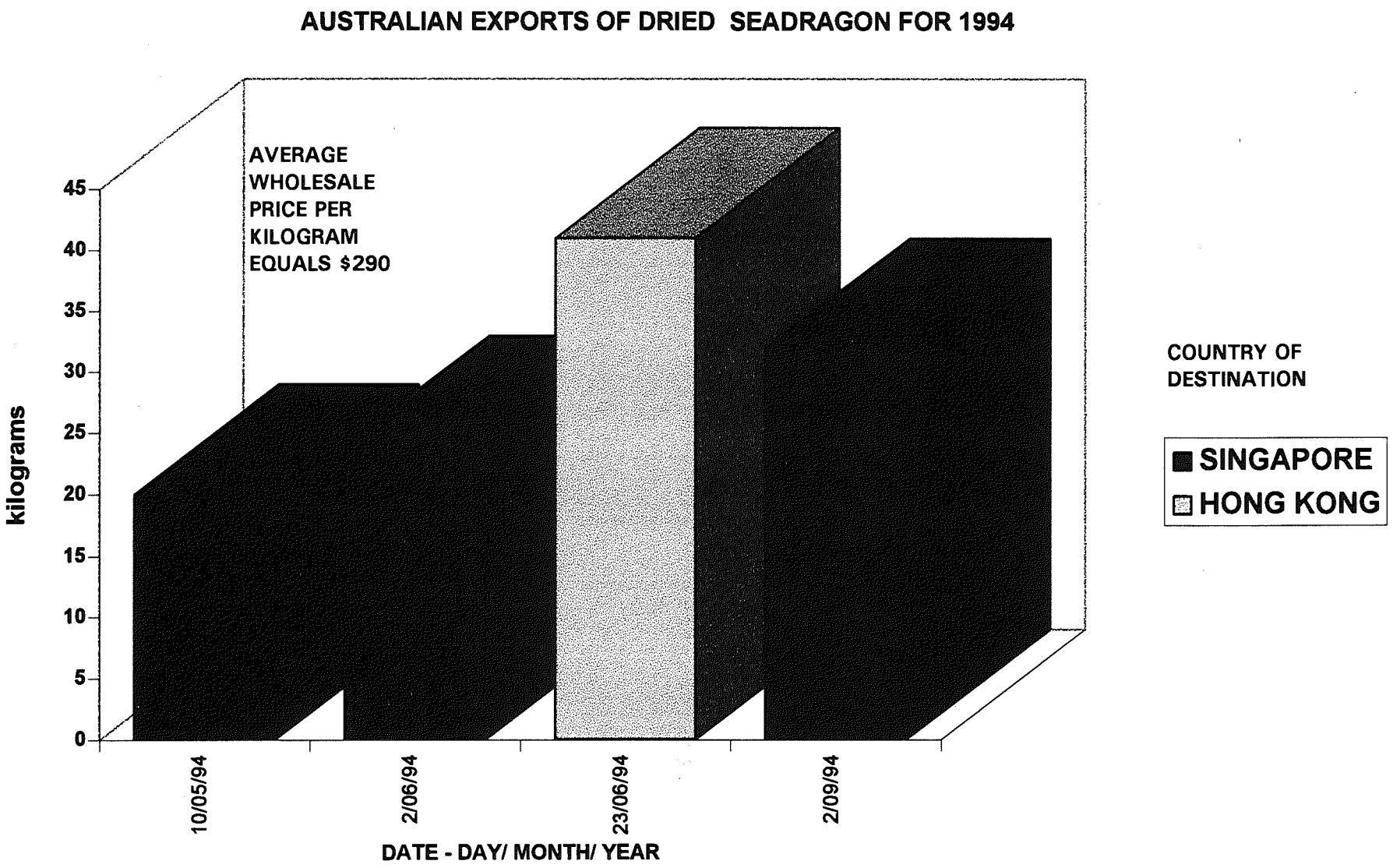
AUSTRALIAN EXPORTS OF DRIED SEADRAGON FOR 1994
AVERAGE WHOLESALE PRICE PER KILOGRAM EQUALS $290
kilograms
0
5
10
15
20
25
30
35
40
45
10/05/94
2/06/94
23/06/94
2/09/94
DATE - DAY/ MONTH/ YEAR
COUNTRY OF DESTINATION
SINGAPORE
HONG KONG

Figure-6B

## AUSTRALIAN EXPORTS OF DRIED PEARL MEAT FOR 1993

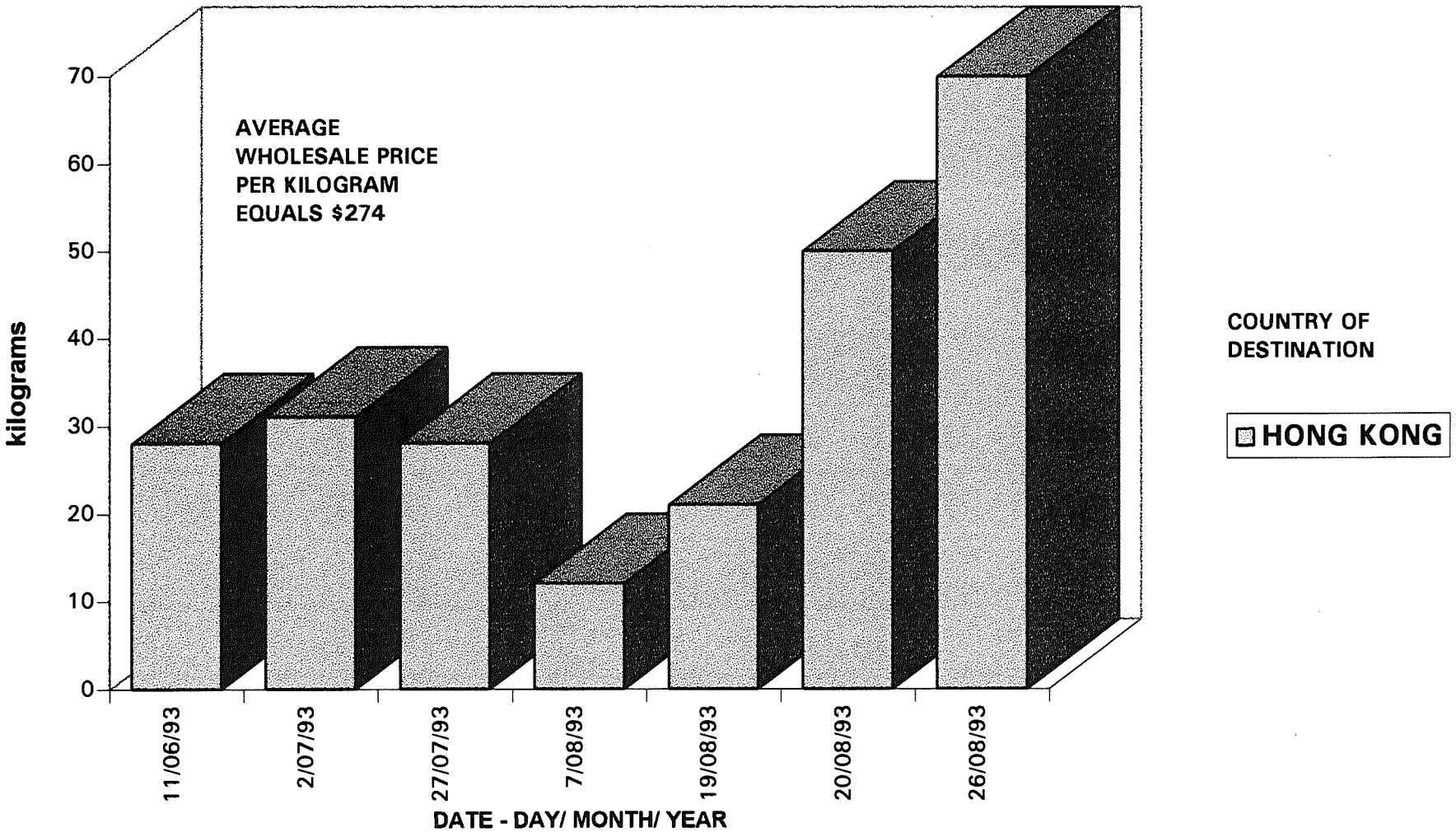


Figure-7A

## AUSTRALIAN EXPORTS OF DRIED PEARL MEAT FOR 1994

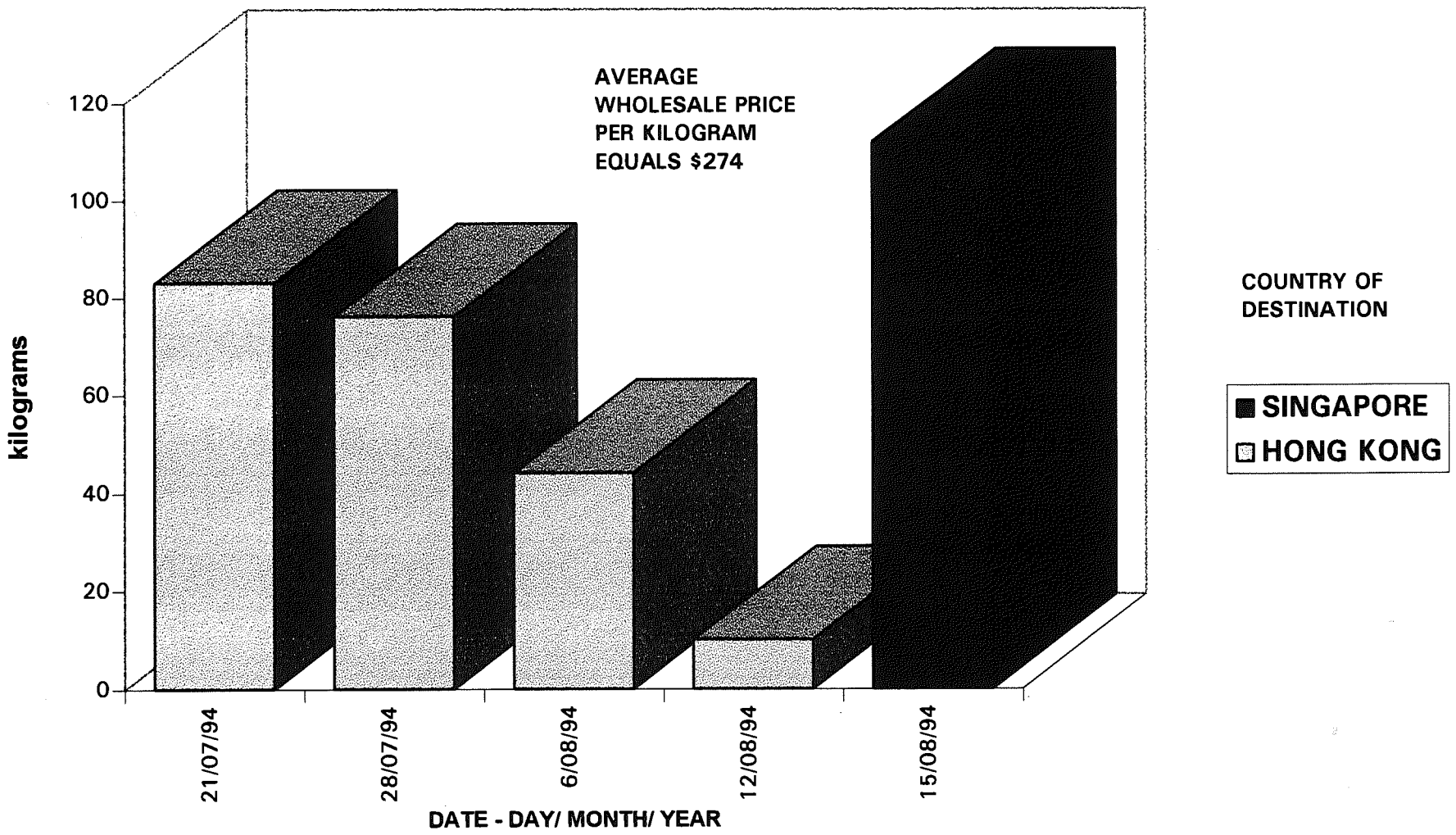


Figure-7B

# APPENDIX 4 - DRIED CUTTLEFISH IMPORT TREND 1989 & 1994 INTO AUSTRALIA

Figure 1A - Imports 1989

Figure 1B - Imports 1994

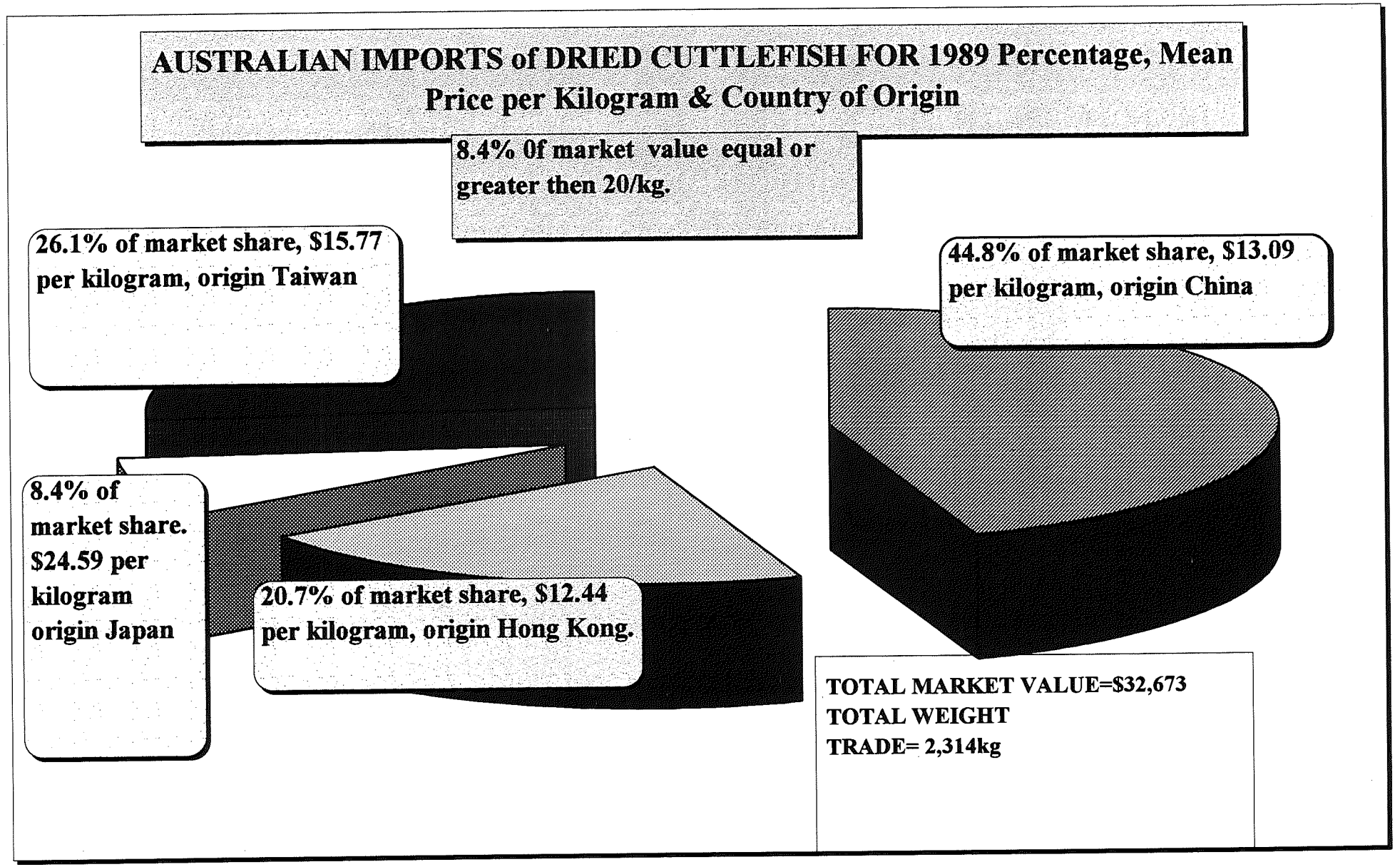
AUSTRALIAN IMPORTS of DRIED CUTTLEFISH FOR 1989 Percentage, Mean Price per Kilogram & Country of Origin
8.4% 0f market value equal or greater then 20/kg.
26.1% of market share, $15.77 per kilogram, origin Taiwan
44.8% of market share, $13.09 per kilogram, origin China
8.4% of market share. $24.59 per kilogram origin Japan
20.7% of market share, $12.44 per kilogram, origin Hong Kong.
TOTAL MARKET VALUE=$32,673
TOTAL WEIGHT
TRADE= 2,314kg

Figure-1A

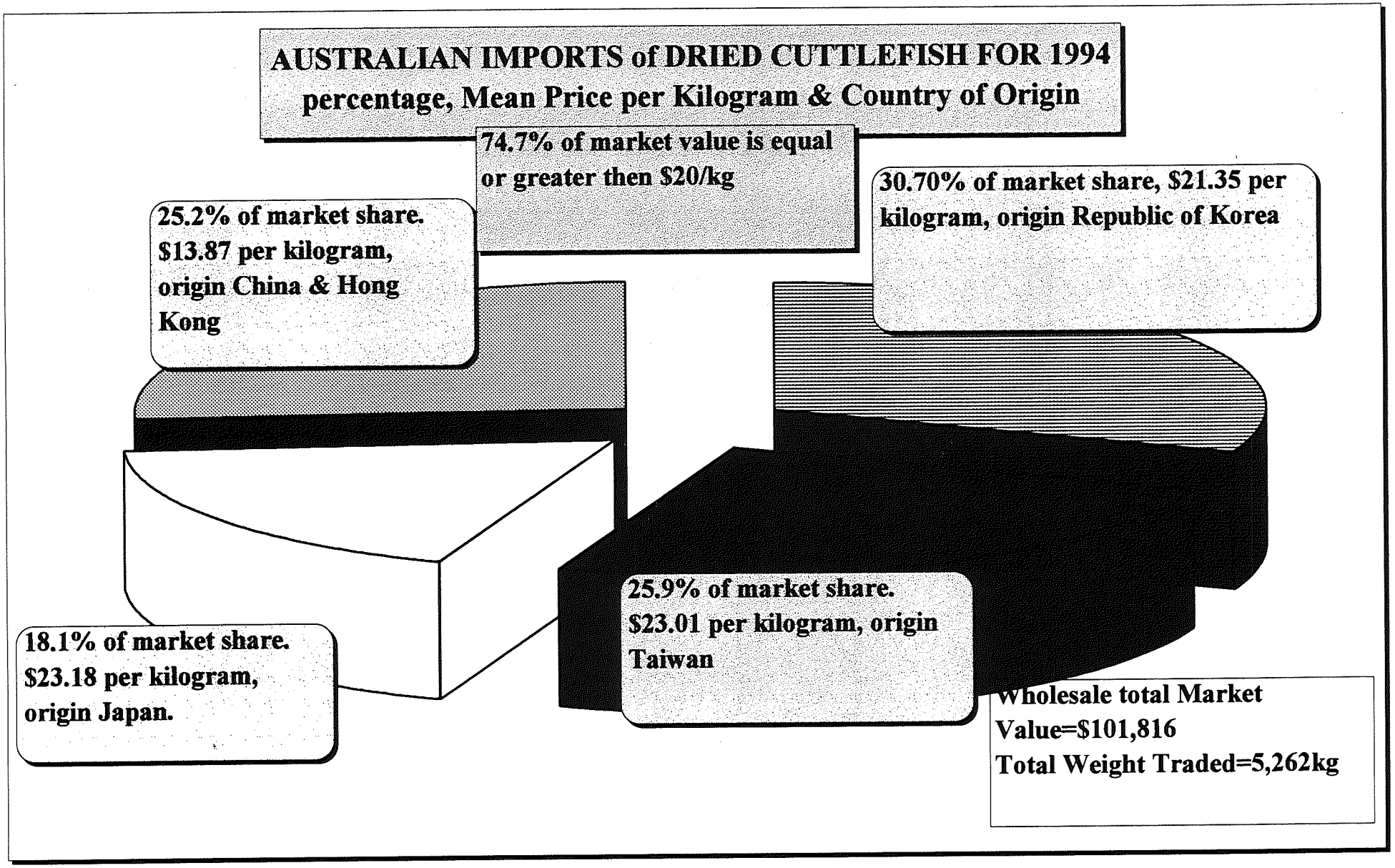
AUSTRALIAN IMPORTS of DRIED CUTTLEFISH FOR 1994
percentage, Mean Price per Kilogram & Country of Origin
74.7% of market value is equal or greater then $20/kg
25.2% of market share. $13.87 per kilogram, origin China & Hong Kong
30.70% of market share, $21.35 per kilogram, origin Republic of Korea
25.9% of market share. $23.01 per kilogram, origin Taiwan
18.1% of market share. $23.18 per kilogram, origin Japan.
Wholesale total Market Value=$101,816
Total Weight Traded=5,262kg

Figure-1B

# APPENDIX 5 - SALTED DRIED SEAFOOD TREND AT HONG KONG FISH MARKET ORGANISATION

Figure 1 - FMO Salted & dried seafood trading trend 1965-1994

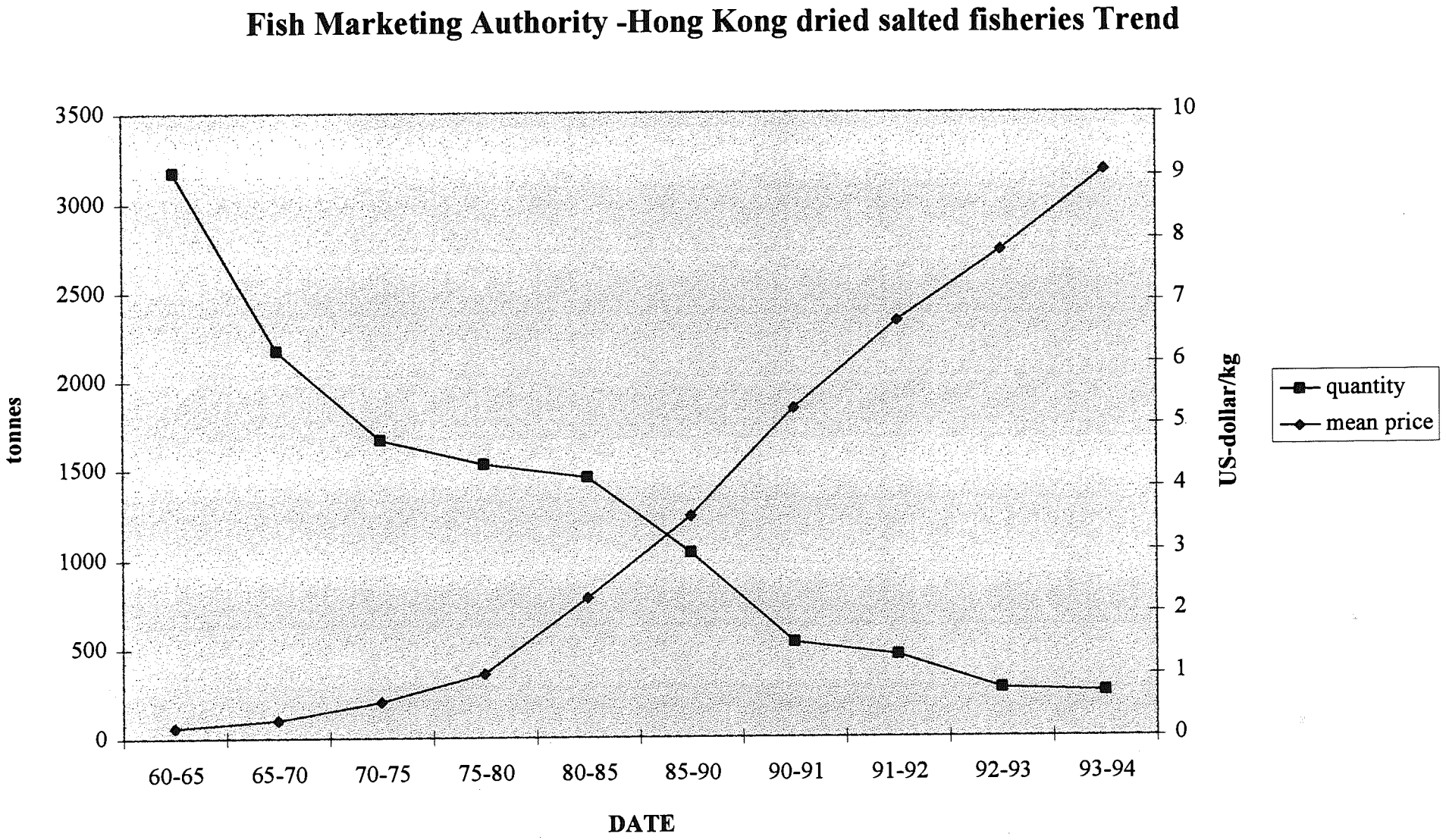
Fish Marketing Authority -Hong Kong dried salted fisheries Trend
tonnes
3500
3000
2500
2000
1500
1000
500
0
10
9
8
7
6
5
4
3
2
1
0
US-dollar/kg
quantity
mean price
60-65
65-70
70-75
75-80
80-85
85-90
90-91
91-92
92-93
93-94
DATE

Figure-1

# APPENDIX 6 - PHOTOGRAPHIC EXAMPLES OF DRIED SEAFOOD IN UNITED STATES OF AMERICA, HONG KONG AND TAIWAN

Figure 1 - Dried prawns in the USA

Figure 2 - Dried prawns in the USA

Figure 3 - Cuttlefish Taiwan

Figure 4 - Fish roes Taiwan

Figure 5 - Fish maw Taiwan

Figure 6 - Bonito Taiwan

Figure 7 - Sharkfin, prawns, scallops & abalone Hong Kong

Figure 8 - Prawns, fish maw, tendon, scallops, blue sprat & mixed cuttlefish Hong Kong

Figure 9 - Beche-de-mer, abalone and scallops Hong Kong

Figure 10 - Traditional solar drying Hong Kong


Figure 1: Dried peeled whole prawns for sale in the United States of America.

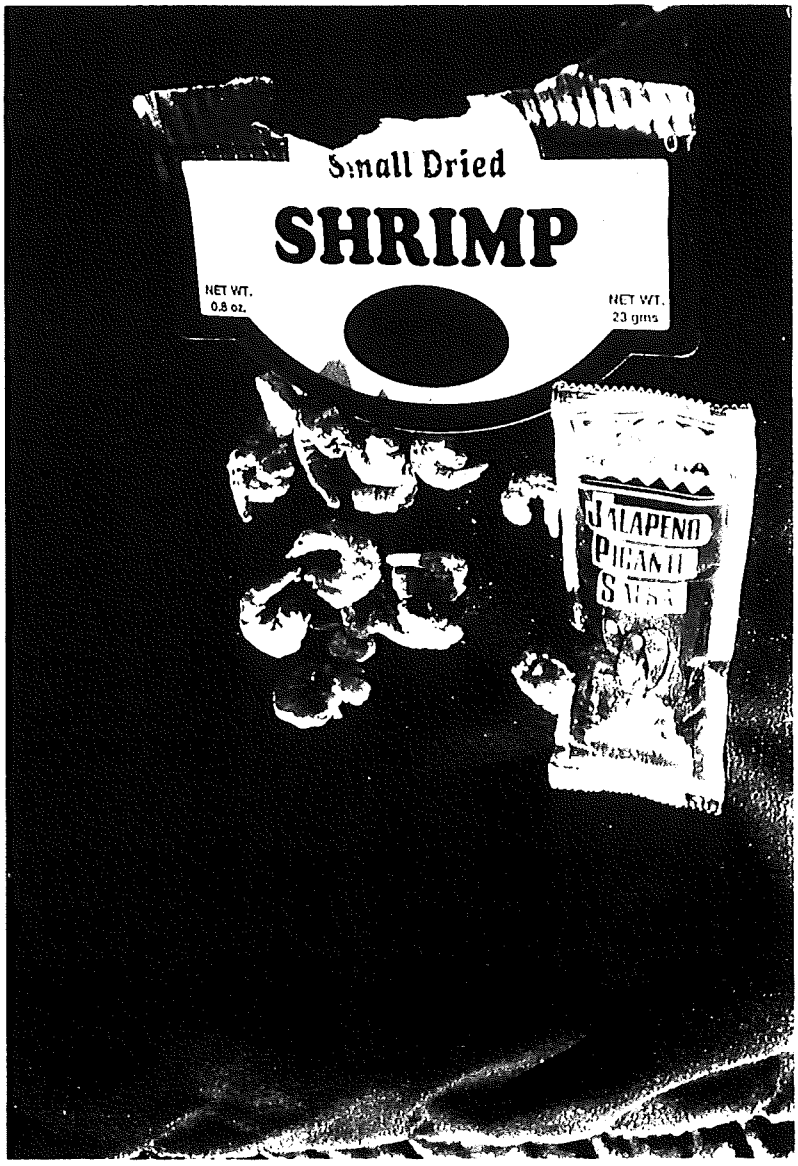


Figure 2: Dried peeled whole prawns for sale in the United States of America.

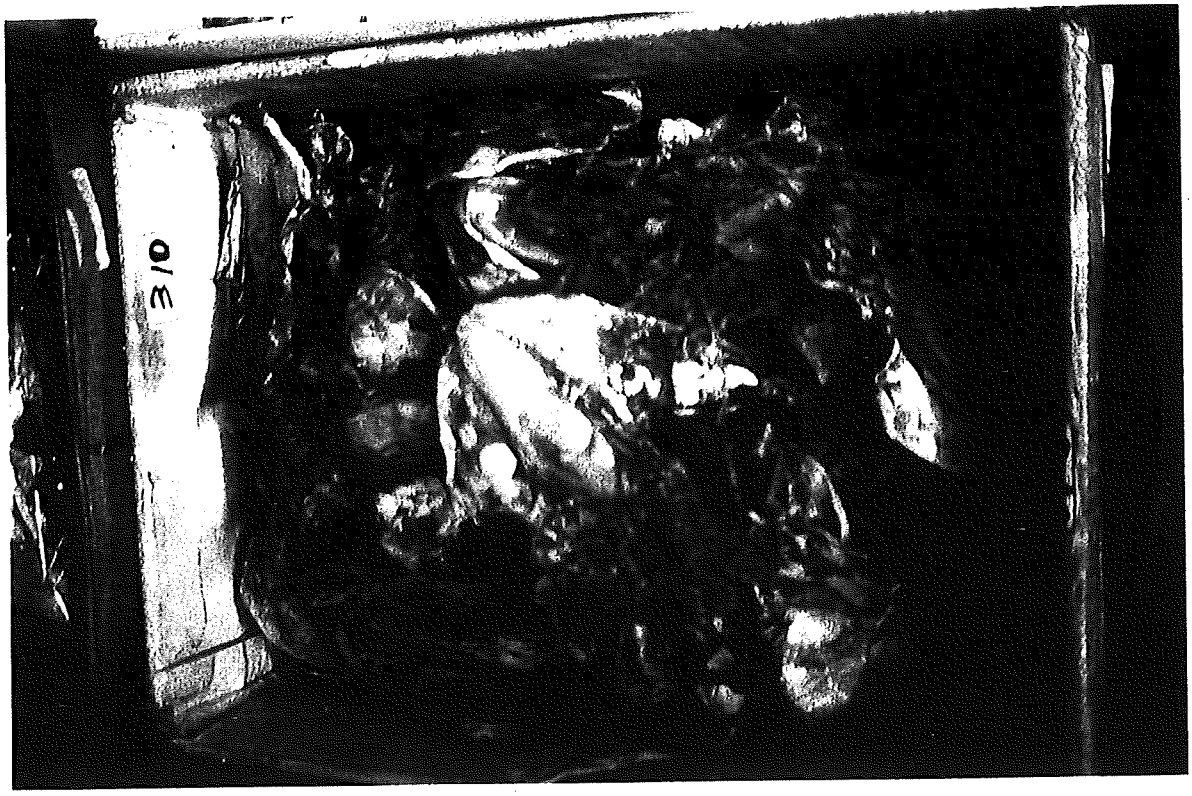

Figure 3: Dried cuttle fish for sale in Taiwan august 1995

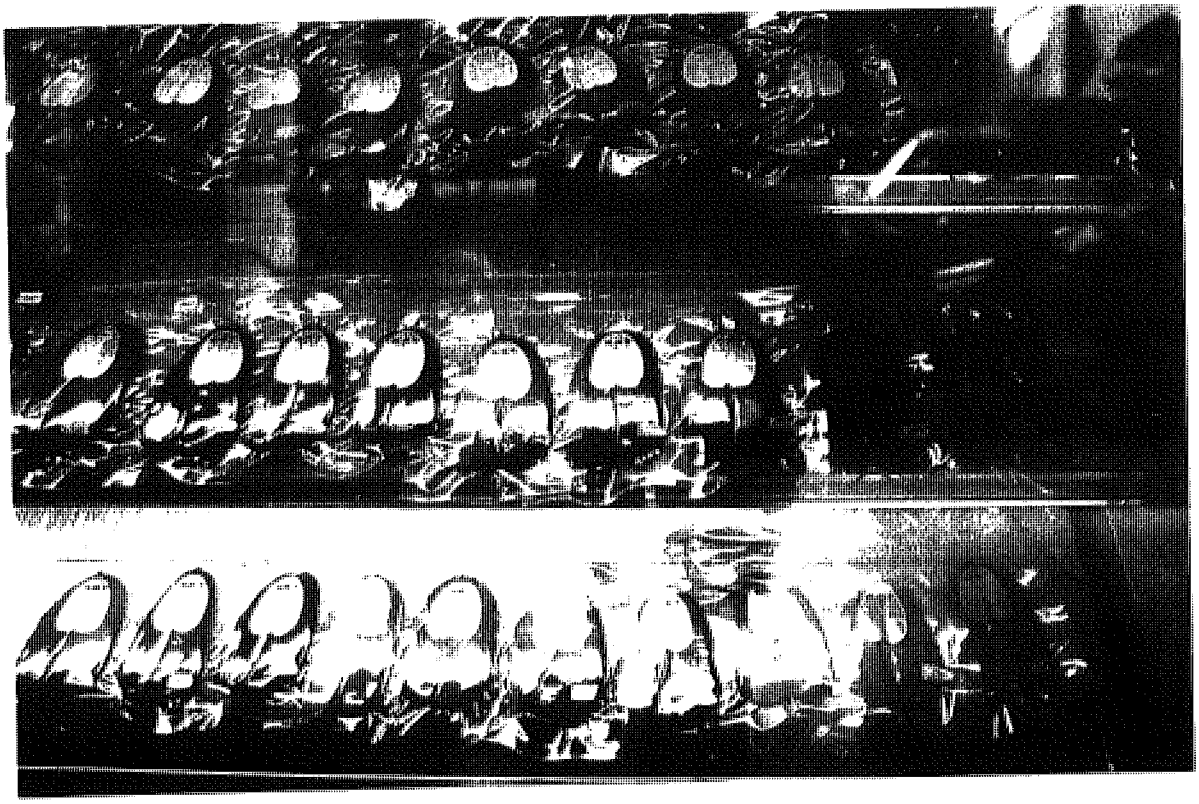

Figure 4: Dried fish roe for sale in Taiwan august 1995

Figure 5: Dried fish maw for sale in Taiwan august 1995


Figure 6: Dried bonito for sale in Taiwan august 1995

Figure 7: Dried sharkfin, prawns, scallops & abalone in Hong Kong august 1995

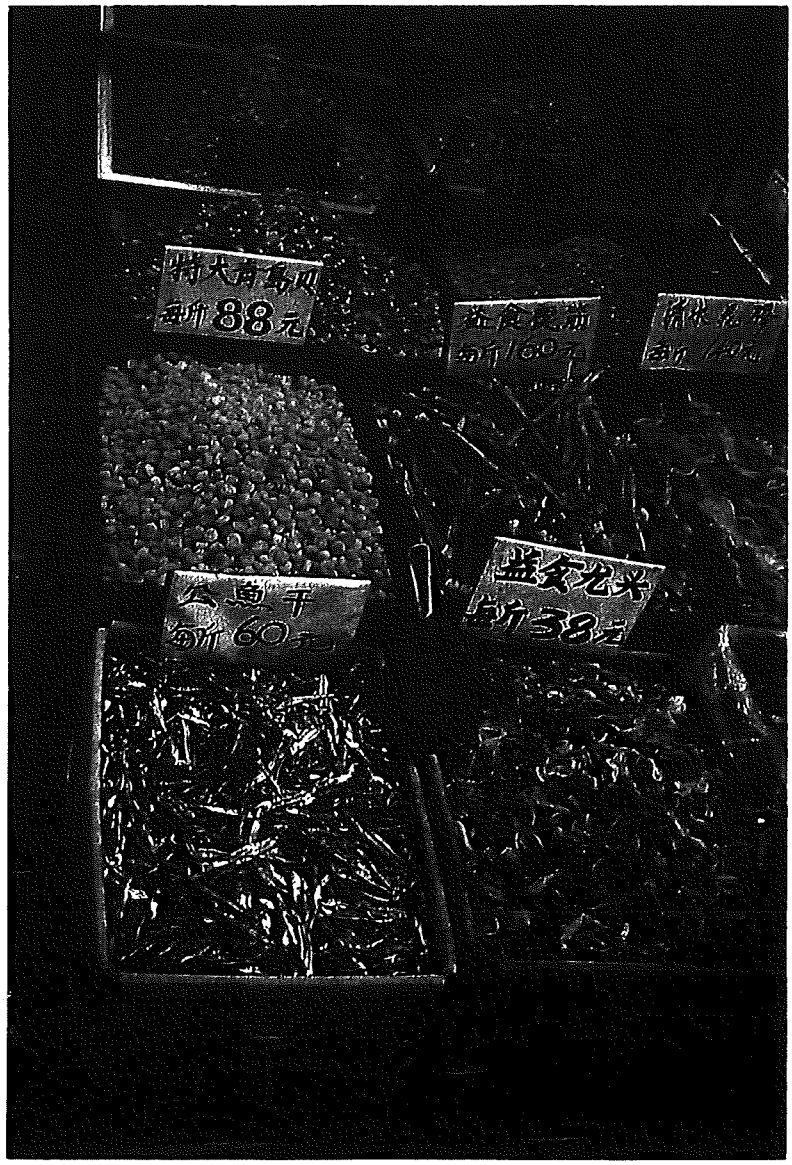

Figure 8: Dried prawns, fish maw, tendon, scallops, blue sprat and mixed cuttlefish in Hong Kong August 1995

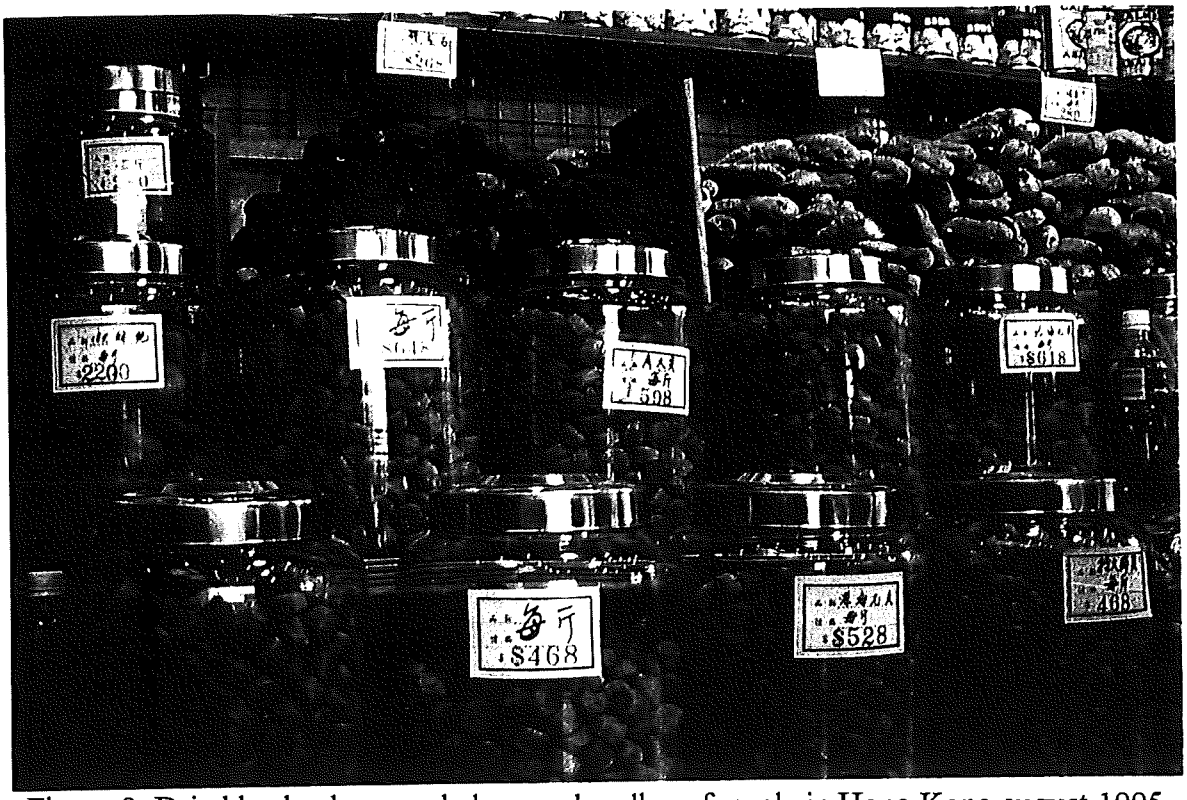

Figure 9: Dried beche de mer, abalone and scallops for sale in Hong Kong august 1995.

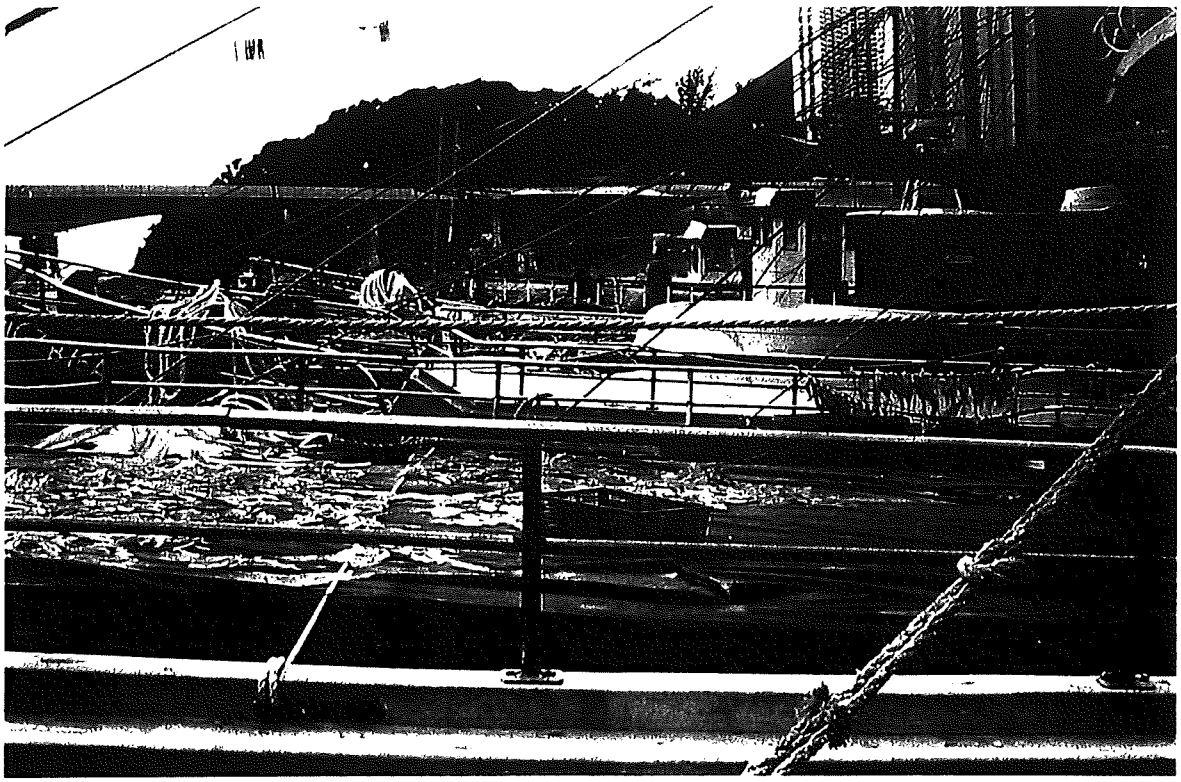
Figure 10 Traditional solar drying of seafood on Hong Kong harbour august 1995

# APPENDIX 7 - EXAMPLE OF QUESTIONNAIRE USED FOR SURVEYING LOCAL SEAFOOD PROCESSORS

Steve Slattery and Ross Naidoo are employed by the Department of Primary Industries Qld, within the IFIQ seafood group, both members are currently working on the marketing aspects of seafood drying before the technology section of a FRDC project begins.

It was felt of utmost importance to gain the feedback of those involved in the seafood industry, those members such as yourselves who ultimately should benefit economically and qualitatively from a project such as this.

With this in mind we have taken the step of sending your organisation a simple questionnaire with which we hope you will take time to read, reply and return as promptly as is convenient to yourself and organisation. All information will be greatly appreciated and accepted by the Department, the Institute and ourselves.

1) Are you or your company interested in drying seafood products & why (briefly)?

2) Do you or your organisation see any potential market value for producing dried seafood products in Australia?

3) What species or types of seafood would you suggest?

4) Is there a reliable raw ingredient supply of this seafood (any weight estimation)?

5) What would you estimate the raw ingredient cost of this seafood resources?

6) What would you estimate the price of this dried seafood could command in:

   Australia:

   Overseas:

7) If you had a preference what type of drying method would you prefer with seafood products and why?

Sun-dry & why:

Conventional hot air & why:

Reverse heat pump cycle & why:

8) What would you consider to be the break even price involved in the drying of your selected seafood product or products?

9) If it could be shown that quality dried seafood produced in Australia had a Import replacement or Export economic potential would your company be interested in pursuing the appropriate investment in this area (Assuming it is not already in place).

10) If it was possible would a representative from your company be available for a brief face to face discussion during the following dates; 15/16 & 17 of March 1995 (Please provide the most appropriate time for yourself & organisation).

11) Any additional information you may wish to provide which aids or hinders the drying of seafood in Australia would be appreciated. i.e. "the biggest stumbling blocks in quality & competitiveness standing in your way".

# APPENDIX 8 - TOUR OF HONG KONG AND TAIWAN IMPORTERS AND MANUFACTURERS OF DRIED SEAFOOD

# REPORT ON

# TOUR OF HONG KONG AND TAIWAN

# IMPORTERS AND MANUFACTURERS

# OF DRIED SEAFOOD

## 18-26 August 1995

Steve Slattery IFIQ

# CONTENTS

# 1. PRELIMINARY REPORT TO THE MINISTER

## 1.1 OBJECTIVES OF THE VISIT

The travel was to provide information on the various species, product forms, processing requirements, demand and value of dried seafood available in Hong Kong and Taiwan. The information was obtained by visits to wholesale and retail markets, import/exporters and processors of seafood in both countries.

This information will form the basis for selection of experimental subjects for the second stage of the Fisheries Research and Development Corporation funded project "Value adding to seafood by application of modern drying techniques. This project funded all the costs of the travel except salary.

The opportunity to obtain information about product specifications for fresh mackerel was also present. The information gained during this trip will be used for an upcoming National Seafood Centre funded project investigating the handling methods and shelf life of fresh mackerel for export.

## 1.2 BENEFITS

There is a high demand for Australian seafood, particularly fresh or frozen, in Hong Kong and Taiwan. As these are then processed locally there is a lower demand for it dried. Many individuals interviewed had an impression that Australia could not successfully produce dried seafood because of labour costs. Since the start of the project the number of requests that have been received from Australian processors for information about drying seafood and for access to the heat pump drier indicates that this form of processing can be economically viable.

One successful aspect of this trip will be the introduction of Queensland producers of seafood directly to buyers overseas. Most company representatives interviewed during this trip requested details of Australian suppliers of seafood. These requests will be passed on to processors and fishers.

Another important aspect of this trip is the collation of actual retail prices which Australian producers can use to help make decisions about processing and to estimate the maximum price it is possible to obtain for their goods.

Interest was shown in the use of alternative technology to replace traditional sun drying and brochures from a manufacturer of heat pump driers were requested. These requests will be passed onto a Queensland manufacturer of heat pump equipment. This interest by overseas manufacturers indicates that the drying of seafood using this technology will result in products suitable for the Asian market

While most products were similar for both countries some differed. In Hong Kong even though refrigeration facilities are common in the home there existed a preference for dried seafood. The order of preference was for live seafood first followed by fresh chilled then dried. Frozen seafood was not high on the list for the home buyer. In Taiwan there was more demand for fresh or frozen although dried seafood was still a major commodity being sold.

The most valuable commodities were abalone (A$500-1500/kg) followed by scallops (A$100-250/kg), seahorses and pipefish (A$400-650/kg), fish maw (A$20-250/kg), prawns (A$20-60/kg) then oysters (A$30-60/kg) and gastropod meat (A$15-70/kg). Very little of the other products available were sold for less the A$10 per kilogram.

These first four commodities should be the main targets for Australian processors but others where the price of raw material is low can have very good potential. As the utilisation of waste material is seen as a means of increasing the value of seafood the processing of these into dried seafood shows good potential. As access to material such as fish swim bladders and gastropod meat has been developed these commodities will be targeted for experimentation. Some of the main four commodities will also be included in the trials being carried out at IFIQ using the heat pump dryer.

While dried fish would be easy to dry using this technology the cost of larger sized fish in this country prohibits their inclusion in the trials. Smaller species such as anchovies and pilchards may be more viable.

## 2. DETAILED ITINERARY

**FRIDAY 18 August 1995**

Brisbane to Hong Kong on Qantas Airways flight QF 85, departing at 11.45 am, arriving 18.40 pm.

**SATURDAY 19 August 1995**

9 am visit to Aberdeen to observe retail market of live seafood for sale. Travel to Sai Ying Pun to inspect the more than 50 retail outlets selling dried seafood and other dried products. Interviewed many of the managers to obtain product requirements and demand for various products. These companies are detailed in the list below.

**SUNDAY 20 August 1995**

Travelled to Cheung Chau Island to inspect the retail seafood market, fishing fleet and product being traditionally sun dried. Most mainland outlets are shut on Sunday.

**MONDAY 21 August 1995**

4.30 am start to inspect Aberdeen wholesale markets operated by Hong Kong Fish Marketing Organisation. Appointments were also conducted with Import/Export companies at Sai Ying Pun, the Heep Tung Hong Sanchion Company, Kowloon, the Success Food Trading Company and Tsim Sha Tsui, the East Sea Trading Company.

**TUESDAY 22 August 1995**

Aberdeen market visit then departed 11 am for 13.20 pm flight to Taiwan via Thai Airways. Due to traffic delays in Hong Kong-Kowloon tunnel and overbooking of flight the current

flight was unavailable. Even with 35 minutes before departure of the flight the problem could not be resolved. With later flights fully booked a refundable standby ticket was purchased with another airline which had many flights to Taipei that day. A standby seat with the earlier carrier was obtained and a much later flight was taken. Arrived in Taiwan 20.55 pm. Arrive at hotel in Taipei 23.00 pm.

**WEDNESDAY 23 August 1995**

Visited main office of Cathay Pacific to obtain refund from standby ticket. Met the interpreter I had hired to assist with interviews in Taipei and discussed the purpose of my trip and the type of information I required. Appointments at 14.00 with the Tah Shi Nan Trading Company and 16.00 pm with Lin Progress Incorporated which are dried seafood importers

**THURSDAY 24 August 1995**

Travel to Keelung City to inspect processing factory of the Jian Bao Foods Company producing dried prawns at 10.00 am. Back in Taipei appointments with another two dried seafood importers at 13.30 pm, Young Sunlit Incorporated, and 15.30 pm, Austrameal International.

**FRIDAY 25 August 1995**

Met with new interpreter 7.15 am. Travelled to domestic airport to fly 8.15 am to Kaohsiung for a 10.00 am meeting with a manufacturer of dried seafood, Shin Ho Sing Ocean Enterprise. Next meeting was further north in Fong Ren City at 13.00 pm with an importer of dried seafood, Hai Jye Food Company. Further north again in Tainan Hsien a meeting at 16.00 pm was conducted with an importer of dried, frozen and fresh seafood, Lincky Industrial. After this lengthy meeting the 20.55 flight back to Taipei was taken.

**SATURDAY 26 August 1995**

The final interview was conducted at 9.30 am with Sophisca Food Company which imports and packages dried seafood. After this meeting I returned to the hotel, packed for a checkout at 12.00 pm and departed for the airport, which was over 45 km away, at 14.50 pm for the 19.45 pm flight to Brisbane via Sydney and arrived at 10.00 am the next morning.

# 3. DETAILED OBSERVATIONS

## 3.1 HONG KONG

### Aberdeen Markets

Aberdeen is a major fishing port for Hong Kong with the constant arrival and departure of fishing vessels of all types. The Hong Kong Fish Marketing Organisation has one of it's 7 wholesale markets located here. Fishers catches have to pass through the Fish Marketing Organisation before they can be sold. A 7% commission on sales is levied to cover the running costs of the organisation. Loans are made available to fishers through the organisation, schools for fishers children are operated by the organisation, scholarships are

supported by the organisation. The 1993-94 Annual Report produced by the organisation was obtained and is available throughout the IFIQ library.

The product sold is either seafood stored on ice for up to 3 weeks or dried on the vessel while out fishing. The catch is unloaded at the dock into stainless steel tubs, passed through weighing gates, registered and placed on the auction floor. The sellers are restricted from the auction floor and buyers from the dock area to prevent price fixing. The catch on the day was down because of the influence of typhoon Helen during mid August. The species were varied ranging from small fish, crabs and molluscs to one large sailfish. Many of the species were similar to those caught in Australian waters. The quality, because of the large distances the fleet has to travel, is low with many fish exhibiting belly bursting due to enzymic damage.

Outside these markets live, fresh and dried seafood is sold direct to the general public in an open air market. The live seafood is kept in shallow tanks with air or oxygen pumped in. Live prawns, crabs and fish of a range of species were available. Because of previous cholera scares the government provides treated seawater for use by vendors. There was also a small amount of frozen product such as conch from the US, abalone from Mexico and fish.

In the Hong Kong tradition of life on the water as seen with the sampans and floating restaurants a number of floating seafood processing factories can also be seen at this site. These vessels are barges with two stories built on. They are connected to the electricity mains and water supply. A variety of seafood is processed including drying on the top deck of the vessel.

There are a large number of traders situated in the Sai Ying Pun area of Hong Kong Island. On Des Veoux Road alone there would be up to one hundred stores selling all manner of dried foods. The shop managers of those stores selling predominantly dried seafood were solicited for information. The English speaking individuals were in the minority of shops entered. Pictures of seafood dried at IFIQ and a sample of mullet were presented for appraisal. Photographs were taken of product for sale. Prices are clearly identifiable and are in Hong Kong dollars (HK$5.3 = A$1) per catty (1 catty = 0.6 kg).

**Wing Sang Trading Company**

This shop was the first on Des Veoux Rd and had a large range of products. The mullet sample was examined and noted to be of very good quality but too much salt was present. A tentative value of HK$40-60/kg depending on the size was nominated.

**Fook Shing Ho Ltd**

This company stated that the mullet was of low quality and not suitable for the local market as it was too dry.

**Kwan Kee Shark's Fin (Shark's Fin City)**

High priced commodities at expensive prices compared to neighbours.

**Wing Luen Marine Products**

A variety of products including sprats HK$60, prawns HK$60-96, oysters HK$138-158 and squid HK$64-68 were sold.

**Hop Lee Ho Import & Export**

Seahorse at HK$1200, pipe fish HK$2100, molluscs HK$50-88 and pieces HK$128 and fish maw of low quality with holes and distortion HK$60.

**Lam Kee Groceries**

The mullet was low quality because it was flat. Local requirements are for unsplit fish with head on and still some softness to the flesh.

**Ching Sang Chung Marine Products Company Ltd**

This outlet sold whole dried fish. Croaker, which is similar to our jew or mulloway was sold for HK$60-90 depending on the size. This shop provided information on the processing requirements. The fish are scaled, gilled and gutted and sun dried whole unsplit. The final texture is soft to squeeze. The product is shipped chilled and worth more if soft. The fish becomes hard if frozen.

Conclusions from the day's discussions. Fish should be gilled, gutted and scaled only. The use of salt is acceptable but should not be excessive. Drying should not be complete. The flesh should still be soft or malleable with pressure. If it is hard this is seen as an indication that the fish was frozen before drying rather than from a fresh state. This aspect can be used to Australian advantage with controlled drying techniques such as the heat pump dryer.

The main species are predominantly jew (Sciaenids), followed by the snappers (Lutjanids), threadfin salmon (Polynemids), spanish mackerel and queenfish of 1/2 to 3 kg. The fish should be shipped in chilled containers.

Most interest shown by the contacts were about the availability of Australian beche-de-mer and the names of suppliers. Lists of local fishers will be passed onto these companies.

While plenty of dried scallops were offered for sale there was no demand for Australian material to produce these because of soaking practices of some suppliers. Many importers have been burnt by the drop in Australian abalone prices and have difficulty in selling canned Australian abalone bought at the higher price.

**Heep Tung Hong Sanchon Company Ltd**

This company specialises with the import and export of fish maw. The fish must be large to provide suitable material. The main source was Nile perch from Africa and kingclip from New Zealand. The mullet was seen as having good colour and aroma. A piece was taken to rehydrate and appraise for texture. The scallops in the photographs were not round enough.

### Success Food Trading Company Ltd

This company was no longer trading with dried seafood. Biscuits and crackers were the main commodities present in the warehouse.

### East Sea Trading Company

Even with making an appointment with this company nobody was present who could speak English. The manager was out at the time.

## 3.2 TAIWAN

Photographs were taken of product for sale in many retail outlets. Prices are clearly identifiable and are in New Taiwan dollars (NT$20.14 = A$1) per taigin (1 taigin = 0.6 kg).

### Senator Seafood Pty Ltd

Bob Hepburn, the general manager of this company based in South Australia, happened to be staying at the same hotel as I. He was accompanied by his wife and was visiting seafood buyers for possible sales. The company exports lobster, abalone and mullet. It was associated with Safcol and is dealing with a Queensland company trying to market mullet overseas. He was interested in the work being conducted at IFIQ especially with drying fish such as mullet and wanted to become involved with the project and possibly conduct some drying trials.

Bob has much experience with the southern shark industry and handling practises were also discussed as I had just completed an investigation of the cause of tough texture in northern shark. He has found that southern shark must progress through rigour before cutting. If they are still in rigour when fillets are removed they will have a bluish tint, much drip loss and be very tough. This behaviour while different to what occurs in the northern shark it has important connotations for processing. Somewhat similar behaviour was witnessed for a few northern shark during the investigation.

### Tah Shi Nan Trading Company Ltd

This company imports canned abalone, frozen scallops and smoked and fresh salmon from Australia. These products are also obtained from other countries with Mexico producing the best and most expensive abalone. Cans of abalone from Mexico are purchased for NT$1000 to NT$280. The next best quality are from Australia are NT$500. The reasons for these differences between the two sources are that the size of Mexican abalone are 9 oz while Australian abalone are smaller at 7.5 oz and the foot of the latter is larger and tougher. This condition may be different for aquacultured abalone and could be the subject of future experimentation.

The company deals in large amounts of dried scallop from Japan and the US. There is a high demand for dried scallops but also good supply. The Japanese product comes in a 20 kg carton with two 10 kg boxes inside. This company sells 80,000 boxes per year. It was thought that there was an oversupply of scallops and too many importers.

The Japanese add sauces before drying. There are many grades available and a list in Japanese with product descriptions was obtained. One size the company buys for NT$1250/taigin or NT$1450 with import tariff included is sold for NT$1500. The manager thought that Australian scallops would be suitable for the Taiwan dried market.

The company in the past imported small dried fish and prawns but they were of low value. Dried prawns were imported from Thailand, mainland China and Vietnam. The prawns in the photographs were too large for the market. The shelled prawns are called "Peee" and they retain some moisture. They are shipped chilled and cost NT$180/taigin. The harder prawns would get more value and should be shipped vacuum packed and there was no need for refrigeration. Colouring should be used if the prawns are pale.

Dried salmon is a popular commodity, either whole or as sliced fillets. At street stalls a whole salted salmon cost NT$220/taigin. Shaved mackerel and bonito is a popular snack food valued at NT$150/taigin or NT$10/10 g in packs similar to potato chips or crisps.

**Lin Progress Incorporated**

This company imports lobster from Perth, beche-de-mer from Darwin and coral trout from Queensland. Shark cartilage and dried scallops are imported from mainland China.

From discussions about species for Australia to dry dried squid was perceived as being more valuable than prawns to produce. Squid heads should be kept intact but the stomach removed and the body split all the way down and opened flat. No blanching or salt was needed.

Spanish mackerel was very popular and is bought salted, frozen or chilled. For the latter the fish is preferred intact, gut in and unbled. Smaller salted mackerel come from mainland China. There are very large quantities of dried fish sold in mainland China but the price is very low. For fish such as mullet it costs US$1/kg to send to mainland China so prices must be low enough to accommodate for this. Mullet should be good in Singapore and Malaysia. In general the wholesale price is 30% less than retail in Taiwan.

**Jian Bao Foods Company Ltd**

This company has a large factory in Keelung City which processes large amounts of prawns. The prawns are brought in fresh and frozen by trucks with only some sorting and discarding of bycatch. The frozen prawns are better sorted and come in 2-3 kg amounts in stainless steel trays. They are thawed in recirculating water and lifted to heating units.

The prawns are first cooked with sauces containing salt, colour, flavour and monosodium glutamate (MSG). They are heated to dry twice, the first for one hour at 120-140°C and then for 45 min at 90-110°C. They are sorted by size using vibration and fed up to a brush polisher to remove most of the shell. 20-30% can still remain and almost always the tail. The shell is collected, bagged and sold for fish burley and to other fish processors. There are still contaminants present and these are initially removed by computer using colour sorters brand name "Sortex" followed by a human sorting line removing the remaining pieces of crab and shell. The prawns still have some moisture even by this stage. The prawns are bagged and weighed electronically and boxed. The contents label states that salt and colour (Red 6 & Yellow $) are present, they should be refrigerated and that storage life is for 6 months.

### Liga International Trading Company

This company has been dealing in beche-de-mer for 20 years. This company is happy to buy sandfish from Australia and produced the SPC Handbook No. 18 (1979) "beche-de-mer of the Tropical Pacific - A handbook for fishermen" which states that to prepare sandfish a fisherman should "boil twice and clean as other species then bury overnight in clean, moist sand". This burial aids decomposition and easy cleaning of the outer skin layer.

Abalone is also marketed. The manager considered abalone to be the best prospect for Australia to produce with prices going up to US$500-515/kg. These are usually light chocolate or coffee in colour while the bulk of the product available is dark and of lower value. The size should be about 9 cm in length. Smaller abalone with mould present goes for US$400/kg. The foot should be flat rather than curved.

### Austrameat International Company Ltd

This company markets a lot of Australian beef as the name indicates. It also handles plenty of Australian seafood. Different prospective commodities to dry were discussed. Prawns, scallops and beche-de-mer should be appropriate. In Tainan Australian trawl caught whiting is dried for the Japanese market. The fish are filleted and the fillets are soaked in sugar then dried.

The gizzard from mullet, worth A$30/kg, should not be dried as most of this product is used in stews or fried. Fish maw has potential being worth more than A$30/kg but large fish greater than 20 kg and usually between 30 and 40 kg are required. The main species are jew, croaker and grouper.

Trochus meat would be possible but best fresh or frozen. The liver and stomach should be frozen but the operculum left on. The French buy a large amount of gastropod meat. A large amount of "top shell" (*Turbo cornactus*) as well as *Omphalius pfefferi* is imported from Argentina for canning.

This company imports a large amount of mackerel from Dubai. They prefer the fish whole. It is caught and placed in a deep ice slurry or RSW. Before packing salt is rubbed onto the belly area to firm the flesh. The fish are packed two per box belly up with the tail on and uncut.

### Shin Ho Sing Ocean Enterprise Company Ltd

This is a large company operating in the south of Taiwan. It has three divisions, the first is responsible for 60% of production and is composed of the factory visited which produces four species of dried seafood. The second produces frozen prepared seafood. The organisation turns over US$30 million/yr worth of production and supplies 75% of the local market.

The factory processes tuna, squid, seaweed and surimi. The tuna processed is the poorly handled fish from the sashimi trade, mainly yellowfin and bigeye but also some albacore which have been caught by long line. The raw material costs US$1.1-1.2/kg. Large fish are required, 20 kg or bigger to obtain the best yield. The tuna are sliced cut into one inch thick cutlets, cooked by steam, sauces containing sugar and MSG are added and dried. The flesh is then cut into 1 cm cubes and wrapped in foil. A second grade is produced by sticking the

chips and crumbs lost from processing together with surimi and forming into cubes. This second grade is much harder in texture. The MSG is quite detectable. The catch sector sends about 100,000 tonne of albacore to Japan.

Squid is the main item processed. A video was shown of the processing conditions. The squid are brought in frozen, thawed and dried in gas fired ovens on hot plates moved by conveyer through the ovens. Sauces containing MSG and sugar added and the squid are cooked again and dried. There is a growing demand for less MSG in foods in Taiwan but it is thought that some is needed for the flavour of dried seafood The cardboard textured squid is then shredded, sorted and packaged. Shredded cuttlefish is also produced. It is mechanically skinned for one type of product. After cooking both squid and cuttlefish are sterilised with alcohol which is driven off with more heating..

Seaweed is also processed here. The raw material costs less than US$3/kg dried weight but some Japanese species command up to US$10. Kelp is one of the species used. The local names are laver and tengo and they come in see through packets of dried strips 3 cm wide by 30 cm long.

Discussions about other products were not very successful. They did not consider there to be a market for large dried prawns. The company had bought two containers of mullet gizzards (OR YEE GEN) from Australia but the quality was variable and the oil content too high. There are two kinds of product produced, dry or fresh with the latter the most in demand. The company sees no demand for dried mullet in Taiwan but suggested trying smoked in the US. In Taiwan after the roe, milt and gizzards are removed it is turned into fish meal worth US$0.50-0.60/kg. The company buys abalone from Mexico and Chile for drying. The gastropod "top shell" is canned. The only processing is the removal of the guts. The meat is worth US$2/kg.

**Hai Jyi Foods Company Ltd**

This company imports dried squid, cuttlefish and tuna. Top shell is processed for freezing and then canning. The guts are removed before freezing. The operculum is left intact. The price wholesale is $US5-8/kg frozen. The size used is the intermediate and is usually 150-350 pieces/kg. The meat for canning is part cooked and sauces containing oil, sugar, soy and MSG are used.

The mullet sample was seen as suitable for the local market. People do not know how to cook such dried fish. It would be better to fry as chips. A product which could be produced using the vacuum fryer was presented. Slices between 2 and 3.5 cm with bones present were fried till dry and brittle. Sauces such as soy, sugar, MSG and a little salt were applied before drying. Sometimes chilli was used but not excessively. The product was fried wet not dried. They were interested in any samples we produced.

**Lincky Industrial**

The general manager of this company visits Australia regularly and wanted to invest in the mullet fishery but was told this wasn't possible. I recommended a number of government departments to discuss this with.

# TAIWAN

| COMPANY | ADDRESS | CONTACT<br>Position | TEL NO. | FAX NO. | COMMODITIES |
|---|---|---|---|---|---|
| Tah Shi Nan Trading Co. LTD.<br>Goang Yuh Shing Co. LTD. | 163 Sec. 1. Tik Hwa St., Taipei | Mr Wang Chin Chun<br>Director | 02 5537186 | 02 5574633 | Imports canned abalone, frozen abalone & scallops, fresh & smoked salmon, dried prawns, scallops & abalone |
| Lin Progress Incorporated | 3 Fl 174 Sec 4 Pa Te Rd., Taipei | Ms Jennifer Tseng<br>General Manager<br>Mr Jonathan Lin<br>assistant | 02 7672151 | 02 7677561 | Imports live lobsters, coral trout, spanish mackerel, dried scallops, prawns & squid |
| Jian Bao Foods Co. LTD.<br>Hsing Lung Foods Co. LTD. | 6-2 Lane 154 Pei Ning Rd, Keelung City | Mr Se-Hwu Liu<br>President<br>Mr Shao Chang Lin<br>General Manager | 02 4623106-8 | 02 4626990 | Manufacturer of fresh, canned & dried prawns & canned tuna |
| Young Sunlit Inc.<br>Liga International Trading Co. LTD. | 1 Fl. Sec 4 78 Chung Ching N. Rd., Taipei | Mr Sheng Tong Lee<br>Director | 02 8117807 | 02 8112195 | Imports dried abalone & beche-de-mer |
| Austrameat International Co. LTD.<br>Riverland Co. LTD. | 3Fl 383 Sec 2 Chung San Rd., Chung Ho City, Taipei Hsein | Mr Lan Chin-Tsair<br>Vice General Manager | 02 2217833 | 02 2217913 | Imports frozen mullet roe & gizzards, fresh mackerel |
| Shin Ho Sing Ocean Enterprise Co. LTD. | 31 Fishing Harbour South 1st Rd., Chein Chen District Kaohsiung | Mr Jong-Bao Ho<br>General Manager | 07 8316101-6 | 07 8114695 | Processor of dried squid, tuna & seaweed & surimi |
| Hai Jyi Foods Co. LTD. | 236 Feng Jen Rd., Feng Shan City, Kaohsiung Hsien | Mao-Shen Chang<br>Chief Manager<br>Lina Pan, Assistant | 07 7420119<br>07 7420110 | 07 7425796 | Imports dried squid, cuttlefish & tuna, frozen topshell, scallops & mackerel |
| Lincky Industrial Co. LTD.<br>Sing Shiny Light Metal Co. LTD. | No. 6 Lane 715 Sec 1 Hsi Men Rd., Tainan | Mr Frank Chien<br>General Manager | 06 2262965<br>06 2543747 | 06 2268256<br>06 2543765 | Imports mullet roe & gizzards, coral trout, mackerel & frozen scallops |
| Sophisca Food Ind. Co. LTD.<br>E & K Wholesale Club Inc. | 8 Fl 40 Sec 2 Tun Hwa S. Rd., Taipei | Ms Alice Y.L. Tzou<br>Secretary to GM | 02 7056778 | 02 7037037 | Importer & Manufacturer of dried squid, cuttlefish & fish |

The company is the largest in Taiwan importing fish. It imports mullet roe and gizzard from Australia and Italy. The price for mullet from Australia is seen as too high but it is bought because it is available in the off season in the northern hemisphere. The best grade of mullet comes from Taiwan followed by the US then Australia, South America and Italy. The mullet sample was appraised as too salty and too dry. It should be obtained fresh before drying. The fish should be soaked in freshwater with sauces containing MSG or the sauce sprayed after the product is half dry to maximise absorption. From the US it can cost NT$10-11/kg with a margin of 11% although it can retail for NT$30/kg butterfly cut. It is also sold skinned and boned 800g-1 kg size, packed in 20 kg lots of only two layers with one fillet per layer.

The company is looking for supplies of coral trout in the 6-8 oz size range. Most is obtained from Malaysia and Vietnam for NT$180/kg but the cholera scare has impacted on sales. Australia is perceived as being disease free and this can be a powerful marketing tool. Identification tags such as those used by the salmon industry could be used to identify Australian produce. Fish from Australia is bought IQF for NT$300/kg and is sold for NT$380/kg. This difference between wholesale and retail of 27% is consistent with other commodities.

The company also buys large amounts of mackerel "Ching-Yu". 30 tonne a day of spanish mackerel is bought from mainland China. Fish from this region have more oil. Boxes which contain only two fish are used. The fish are kept intact and sent chilled. The best size is between 10 and 14 kg and are packed with dry ice or gel pack kept out of contact with the flesh. The best season to fish was when behind the head or shoulder was rounder. After spawning the oil content was low and the head flatter. When the fish are caught they are placed immediately in an ice slurry in a stainless steel tank. They should be kept out of direct sunlight. Locally caught spanish mackerel take only one hour before being brought to port. The time involved in shipping from Darwin or Gove may be too long as there are no direct flights out of Darwin to Taiwan or Australia into Tainan.

The company has tried to sell top shell but had difficulty with quality of fresh product. He recommended it not be frozen. If the large prawns are dried they should have the shell removed.

**Sophisca Food Industry Company Ltd**

This company only packages dried seafood obtained from the mainland. The main products are squid, cuttlefish and sardines. The latter are skinned and dried/fried. Sauces are usually added. These contain sorbitol, chilli, MSG, soy sauce, salt and sodium benzoate (under 0.1% as antiseptic *from the actual declaration*). Products have expiry dates of 240 days. Dried prawns are sold with a 20-30% difference between wholesale and retail. This company indicated that import tariffs were quite high for processed foods in Taiwan, about 45-50%.

## 4. CONCLUSION

This visit to Hong Kong and Taiwan has provided information which is not available from normal literature sources. The opportunity to ask buyers and processors specific questions about product requirements and processing procedures provides information which is not always readily available. This sort of information allows the development of new processing

techniques to proceed with an understanding of the final product that needs to be produced. This helps save much time and effort which could have been wasted in producing products which may not be in demand.

The cost of exporting produce overseas is usually directed to the producer. The pertinent costs for a number of countries should be obtained rather than targeting a particular market to allow the best possible profit to be obtained for a commodity. Import tariffs for some Asian countries such as Taiwan may be high for processed foods such as dried seafood. Until these can be reduced by groups such as APEC they can be a major impediment to Australia producing a vide variety of products and competing successfully in the dried seafood market.

# APPENDIX 1

# PHOTOGRAPHS

Figure 1 A typical shop in Hong Kong selling dried seafood.

Figure 2. The types of commodities sold are quite varied.

Figure 3. The quality of produce offered can be poor.

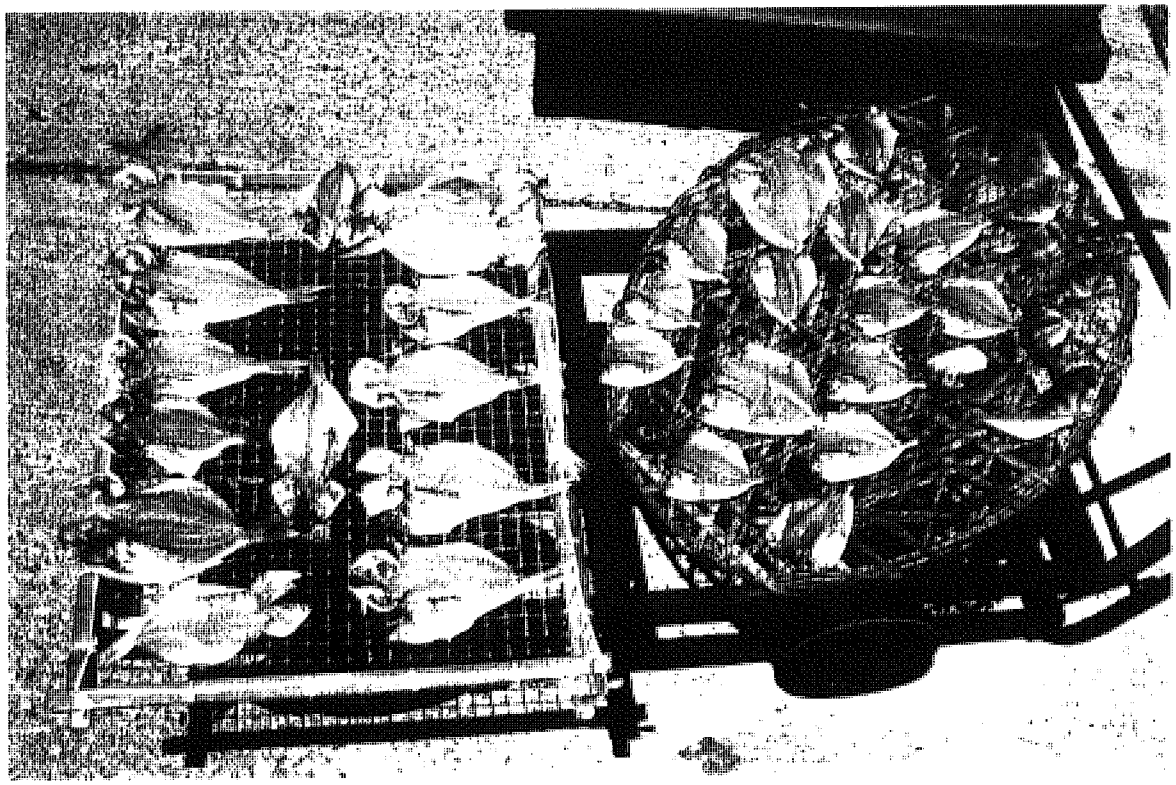

Figure 4. Drying fish the traditional way.

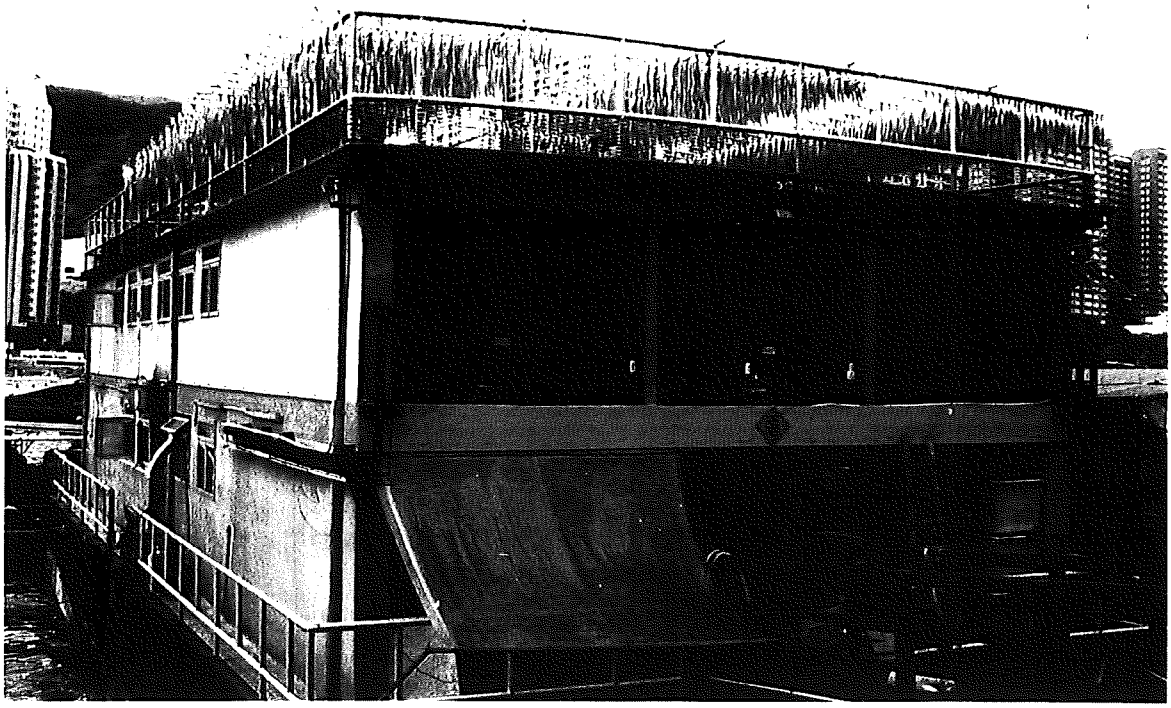

Figure 5. A floating fish factory in Aberdeen harbour.

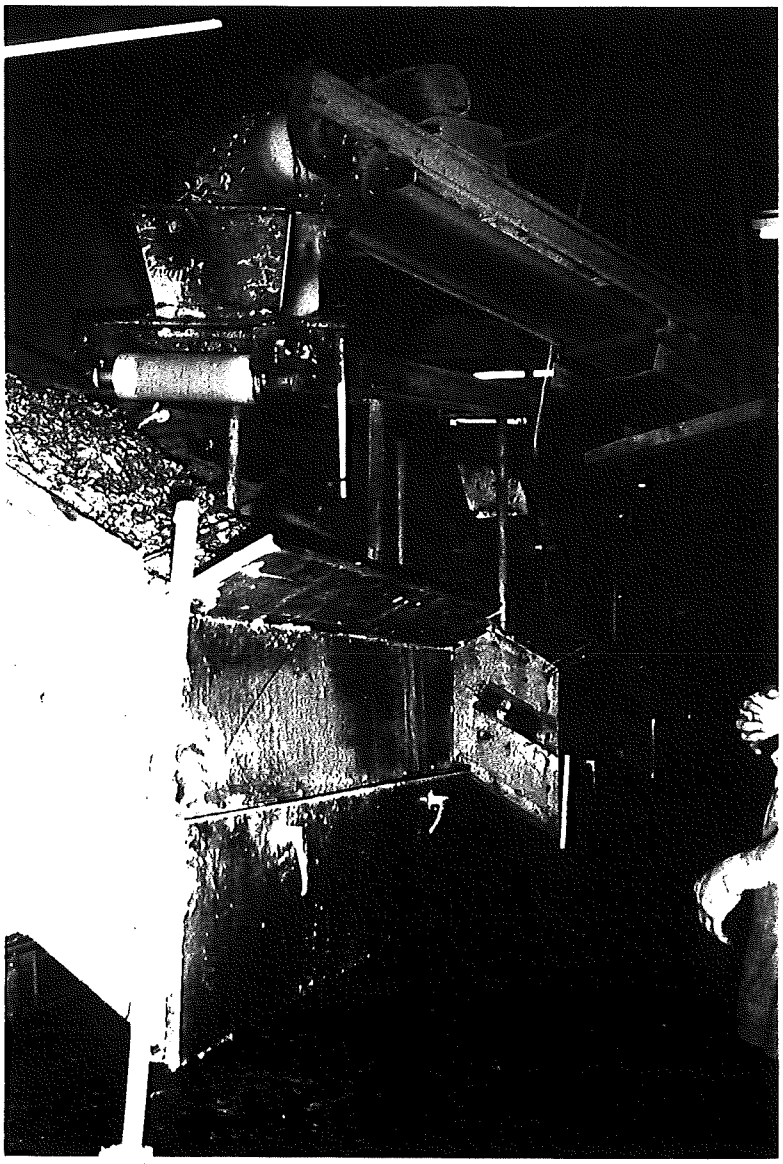

Figure 6. A factory in Keelung, Taiwan producing dried prawns.

# APPENDIX 2

# COMPANIES INTERVIEWED

# HONG KONG

| COMPANY | ADDRESS | CONTACT Position | TEL NO. | FAX NO. | COMMODITIES |
|---|---|---|---|---|---|
| Wing Sang Trading Co. | 22 Des Veoux Road West,<br>Sai Ying Pun | Mr John Mak<br>Manager | 2858 3898 | 2857 1865 | All varieties<br>Import & Export |
| Fook Shing Ho LTD. | Ground Fl 66-68 Des Veoux Road West, Sai Ying Pun | | 2548 3478 | 2559 0053 | All varieties<br>Import & Export |
| Kwan Kee Shark's Fin<br>Shark's Fin City | 76 Des Veoux Road West, Sai Ying Pun | Miss Mok Tan Hung<br>Manager | 2547 9663 | 2858 4640 | Shark's fin and dried abalone |
| Wing Luen Marine Products | 102 Des Veoux Road West,<br>Sai Ying Pun | | | | All varieties<br>Import & Export |
| Hop Lee Ho Import & Export | 152 Des Veoux Road West,<br>Sai Ying Pun | Mr Chun-fai Au<br>Manager | 2546 2204 | 2858 7195 | All varieties |
| Lam Kee Groceries | Block C D G/F Sing Fai Bldg<br>8-12 Wilmer St.,<br>Sai Ying Pun | Mr Alex K.H. Ng<br>Manager | 2548 3977<br>2548 7645<br>2540 5987 | 2858 3407 | All varieties<br>Retail |
| Ching Sang Chung Marine Products Co. LTD. | 182 Des Veoux Road West, Sai Ying Pun | Mr Eric K.H. Cheung<br>Executive Director | 2547 4906<br>2547 3509 | 2540 6280 | Dried fish<br>Import & Export |
| Fish Marketing Organization | 102 Shek Pei Wan Road Aberdeen | Mr Yiu Shik Yat<br>Market Manager | 2552 8853 | | Wholesale markets fresh and dried |
| Heep Tung Hong Sanchon Co. LTD. | 13th & 17th Fl<br>Wing Yue Bldg<br>60-64 Des Veoux Road Sai Ying Pun West, | Mr Ricky Leung<br>Managing Director<br>Simon Wong<br>David Lam | 2546 8313<br>2546 7005<br>2546 7005 | 2858 2613 | All varieties<br>Import & Export |
| Success Food Trading Company LTD | Sino Industrial Plaza<br>8th Fl Rm 64-65<br>9 Kai Cheung Road<br>Kowloon Bay, Kowloon | Mr Steven S.P. Wong<br>Director | 2795 6565 | 2795 4528 | No longer trading seafood |
| East Sea Trading Company | Kincheng Commercial Centre<br>2nd Fl Flat A, 2-2A Carnarvon Road<br>Tsim Sha Tsui, Kowloon | Mr Tang Hoi Tung | 2331 6188 | 2311 6116 | Seafood |
| SZE Lee Shark's Fin Co. LTD. | Yuen Kit Industrial Building Gd. Fl.-1st Fl.<br>137-138 Connaught Road West<br>Sai Ying Pun | Miss Cecilia Tai<br>Secretary | 2549 1137 | 2795 4528 | Shark's fin only |

# APPENDIX 3

# RETAIL PRODUCT PRICES

## HONG KONG

The common unit of weight for products for sale is known as the catty. This is equivalent to 600 grams.

| PRODUCT | LOCAL PRICE HK$ per 600 g | AUSTRALIAN DOLLARS/KG | DESCRIPTION |
|---|---|---|---|
| abalone | HK$1800-6200 | A$566-1500 | wide range of price & appearance |
| abalone | HK$4800-7675 | A$1500-2400? | possible incorrect labelling, extra 0 |
| limpet? | HK$268-480 | A$84-150 | possibly tropical abalone, sauces added |
| limpet? | HK$350-420 | A$110-132 | smaller, longer and narrower than abalone |
| limpet? | HK$460-640 | A$145-200 | large, lighter coloured |
| scallop | HK$608 | A$191 | dark & cracked |
| scallops | HK$430-820 | A$135-258 | related to size |
| scallops | HK$160 | A$50 | pieces broken up |
| scallops | HK$445-560 | A$140-175 | related to size |
| scallops | HK$468-648 | A$147-204 | few splits, possible sauce |
| scallops | HK$328-488 | A$103-154 | dark golden colour |
| scallops | HK$440-520 | A$138-164 | golden, few cracks |
| scallops | HK$568-800 | A$178-250 | darker worth more? |
| scallop | HK$88 | A$28 | small but look good |
| squid | HK$64-98 | A$20-31 | split, mouldy costs less, head on |
| squid | HK$76 | A$24 | split, pressed, mould, head on |
| squid | HK$58 | A$18 | split, curled |
| squid | HK$40 | A$12.50 | very poor shape, ok colour |
| squid | HK$64-68 | A$20-21 | |
| octopus | HK$64 | A$20 | split, dark |
| conch(US) | HK$138 | A$43 | sliced thin, dark spots |
| oysters | HK$98-170 | A$31-54 | related to size, probable sauce added |
| oysters | HK$128-198 | A$43-62 | dark |
| oysters | HK$138-158 | A$43-50 | size dependent |
| gastropod meat (marine snail) | HK$90 | A$28 | cut in half, possible sauce added |
| gastropod | HK$85-220 | A$27-69 | halved, probably sauce added |
| gastropod meat | HK$220 | A$69 | sliced, possible sauce added |
| gastropod meat | HK$50-88 | A$16-28 | |
| gastropod meat | HK$128 | A$40 | |
| beche-de-mer | HK$248 | A$78 | medium |
| beche-de-mer | HK$268 | A$84 | large |
| fish maw | HK$110-680 | A$35-214 | damaged-large, flat golden |
| fish maw | HK$198-380 | A$62-120 | curled edges, holes |
| fish maw | HK$110-880 | A$35-277 | distorted, stained-flatter golden |
| fish maw | HK$240 | A$75 | large, curled edges |
| fish maw | HK$280 | A$88 | distorted |
| fish maw | HK$140 | A$44 | small, distorted |
| fish maw | HK$60 | A$19 | very damaged |
| fish maw cooked | HK$320 | A$100 | eel |
| jew fish | HK$34.20 | A$10.75 | packet of 4 |
| jew fish | HK$30-70 | A$9.50-22 | related to size |
| threadfin salmon | HK$45 | A$14 | 1 kg fresh weight |

| PRODUCT | LOCAL PRICE HK$ per 600 g | AUSTRALIAN DOLLARS/KG | DESCRIPTION |
|---|---|---|---|
| sardines | HK$38-48 | A$12-15 | smaller white one cost more |
| blue sprat | HK$60 | A$19 | large |
| blue sprat | HK$58 | A$18 | large |
| seahorses | HK$840 | A$264 | large |
| seahorses | HK$1200 | A$380 | large |
| pipefish | HK$2100 | A$660 | large |
| prawns | HK$64 | A$20 | medium sized |
| prawns | HK$30-96 | A$9.50-30 | small-medium |
| prawns | HK$160-195 | A$50-61 | Aust sized, split, very flat, shell off |
| prawns | HK$68-98 | A$21-31 | shell on small |
| prawns | HK$60-96 | A$19-30 | very small to medium |
| shark fin | HK$630-1000 | A$200-313 | fully processed |

## TAIWAN

The common unit of weight for products for sale is known as the taigin. This is equivalent to 600 grams.

| PRODUCT | LOCAL PRICE HK$ per 600 g | AUSTRALIAN DOLLARS/KG | DESCRIPTION |
|---|---|---|---|
| squid | NT$280 | A$23 | large |
| cuttlefish | NT$310 | A$26 | split, cuttle still present, mould |
| mullet roe | NT$460-620/piece | A$38-51 | vacuum packet pieces, colour not related to price much |
| cod (gadoid) | NT$225-285/piece | A$18-24 | split, plastic wrapped |
| salmon | NT$410-440/piece | A$34-36 | 2 fillets in vacuum pack |
| salmon | NT$220 | A$18 | whole, salted, vacuum pack |
| shaved fish | NT$150 | A$12 | bulk mackerel and bonito |
| shaved fish | NT$10/10g | A$0.50 | snack packs blown up to protect flakes |
| fish maw | NT$250 | A$21 | pressed flat in sealed bag |
| blue sprat | NT$380-500 | A$31-41 | smaller worth more |
| sardines | NT$260-340 | A$21-28 | like frogmouth pilchards |
| kelp | NT$260 | A$21 | packaged, "tango" |
| kelp | NT$250 | A$21 | even strips well packaged |