Overview of the current international trade in ornamental fish, with special reference to Singapore

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Summary: The value of international trade in ornamental fish in 1992 was US$247 million, based on import statistics, or US$140 million, based on export statistics. Between 1983 and 1992, annual growth of imports and exports averaged 21% and 16%, respectively.

More than 100 countries are involved in this trade. The top five exporting countries in 1992 were Singapore (32%), Hong Kong (11%), the United States of America (USA) (11%), the Netherlands (7%) and Germany (6%). The top five importing countries were the USA (26%), Japan (17%), Germany (9%), the United Kingdom (9%) and France (7%).

The bulk of ornamental fish traded internationally are freshwater in origin and farm-bred. Marine ornamental fish species and invertebrates are mainly wild-caught. An estimated one billion ornamental fish are exported annually, involving one thousand species or more. Mass-cultured fish species – e.g. guppy, tetra, angel, swordtail, platy, goldfish, koi – have long been established in the market and will continue to constitute the major market share.

The author discusses the results of a trial on quality enhancement of the shipment of guppies, and makes recommendations on treatment to minimise stress and disease transmission.

KEYWORDS: International trade – Ornamental fish – Singapore.

INTRODUCTION

An ornamental fish is a thing of beauty to be admired. The graceful swimming of fish in an aquarium is also a very relaxing sight and is said to have a therapeutic effect. Not surprisingly, the keeping of ornamental fish is a popular hobby, among young and old alike, and especially among city dwellers.

An excellent report on international trade in ornamental fish was published by the International Trade Centre in 1979 (3). This paper is intended to supplement the earlier work.

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STATUS OF INTERNATIONAL TRADE IN ORNAMENTAL FISH

Imports and exports

International trade in ornamental fish is a multi-million dollar business. According to the latest statistics on this trade published by the Food and Agriculture Organisation of the United Nations (FAO) (2), for the period 1983-1992, global import values (declared by importers of consignments brought into the country concerned) rose from US$48 million in 1983 to US$247 million in 1992, whereas export values (declared by exporters of consignments to their own governments) rose less steeply from US$37 million in 1983 to US$140 million in 1992 (Appendix I). The average annual value of imports for the period was US$130 million, with an average annual growth of 21%, while the figures for exports were US$82 million and 16%, respectively. Despite the world recession in the late 1980s and early 1990s, the percentage growth in the ornamental fish trade still managed to reach double figures in 1992. This indicates a healthy industry with tremendous growth potential, especially in the light of the opening up of markets and resources in China and Eastern Europe.

Freight costs

The difference between import and export values is due mainly to handling and freight costs, the export values being ‘freight on board’ (FOB) and the import values ‘cargo and freight’ (C&F). Freight costs may be twice as high as the actual wholesale cost of the fish, although 1.3-1.5 times is nearer to the norm. As ornamental fish are mainly shipped by air, airline companies are an important factor in the final cost of fish to the hobbyist.

MAIN GLOBAL EXPORTERS

By value

In terms of absolute value, the top five global exporters in 1992 were Singapore, Hong Kong, the United States of America (USA), the Netherlands and Germany. These countries held the top five positions between 1983 and 1992, with Singapore leading by a large margin throughout this period (Appendix II). Singapore has therefore been regarded as the ornamental fish capital of the world.

Market share

The five top exporting countries also consistently maintained a lead in terms of market share by value (Appendix III), accounting for an average of 73% over the ten-year period. In 1992, Singapore commanded a 32% share, with Hong Kong and the USA each accounting for 11% (Appendix IV). In 1992, however, the market share of the top five countries dropped to 66%. This shows that there are now other countries producing large numbers of ornamental fish and making strong entries into the export market. These countries include the Czech Republic (and others in Eastern Europe), Israel and Malaysia. In addition, exports from Africa are not included in the FAO statistics. According to Bassleer (1), African states – mainly Nigeria, Zaire and the Republic of South Africa – supplied Europe with ornamental fish to a value of US$2.5 million in 1992.
Percentage annual growth

For each of the top five exporting countries, the average percentage annual growth over the ten-year period reached double figures, ranging from 12.8% for Singapore to 26.1% for Germany (Appendix V). Weak growth and even negative values were recorded in 1991, although most countries recovered in 1992.

By continent

In terms of grouping by continent, the main exporting countries were in Asia, which accounted for 63% of exports between 1983 and 1992, followed distantly by the Americas and Europe, each with a 16% share (Appendix VI). This trend is unlikely to change in the future, as most of the fish exported are tropical species, and are exported from tropical countries such as Singapore, Indonesia, the Philippines, Malaysia and Thailand (Appendix VII), which are within the group of countries constituting the Association of South-East Asian Nations (ASEAN).

MAIN GLOBAL IMPORTERS

By value

In 1992, the top five global importers, in terms of value, were the USA, Japan, Germany, the United Kingdom and France. As with the exporting countries, these countries were also consistently in the top five positions between 1983 and 1992, with the USA being the leading importer (Appendix VIII).

Market share

In terms of market share by value, the top five exporting countries also consistently maintained a lead, accounting for an average of 76% of imports over the ten-year period (Appendix IX). The market share of these countries fell, however, to 68% in 1992, with imports to the USA accounting for 26%, to Japan 17% and to Germany 9% (Appendix X). Once again, other countries are emerging on the scene as important buyers of ornamental fish, indicating a potential for expanding sales.

Percentage annual growth

In terms of percentage annual growth, values for the top five importing countries showed wide fluctuations over the ten-year period (Appendix XI). The value of imports to Japan, however, has been steadily increasing in the 1990s, while imports to France have also registered strong growth, especially in 1992.

By continent

In terms of grouping by continent, Europe and the Americas are the main importers, accounting for 38% and 33% of market demand, respectively (Appendix XII). Many countries in Europe import ornamental fish (Appendix XIII), and the members of the European Union form a huge buying bloc for ornamental fish. In general, developed countries are the major importers.
CASE STUDY ON EXPORT TRADE
FROM SINGAPORE

General

Involvement of Singapore in the ornamental fish trade goes back more than fifty years, and the Republic has become a one-stop shop for this trade: it is not only the leading exporting country but is also the seventh largest importer. Experience of the fish breeder in coming up with exquisite varieties and strains, good handling and packing capabilities of the exporters (in ensuring fish survival rates of at least 93% during shipment) and strategic geographical location, coupled with excellent air and telecommunication links, are some of the important factors contributing to the success of Singapore as a centre for the ornamental fish trade.

By value

The value of exports of ornamental fish from Singapore was SGP$80.32 million (US$50 million) in 1994, with SGP$74.35 million (US$46 million) or 93% derived from freshwater, and the remaining SGP$5.97 million (US$4 million) or 7% from marine (Appendix XIV). The percentage annual growth for 1994 was 9%, while the average value over the preceding ten-year period (1985-1994) was 8%, although this dropped to 5% for the period between 1990 and 1994.

Monthly variations

Monthly variations in exports of freshwater ornamental fish can be discerned during the year. The highest levels in September to April coincide with the end-of-year festive seasons and the autumn to early spring period, when people usually spend more time indoors; the lower levels in May to August coincide with the summer holidays, when people usually leave on vacation and hence cannot look after fish at home (Appendix XV). The highest increase in fish exported is therefore from August to September, and the sharpest decline from April to May. This could of course vary from year to year but the variations would be of a similar character.

Destination of exports

Singapore exports to more than sixty countries world-wide. In terms of value of fish (FOB), the top ten countries which imported from Singapore in 1994 were as follows: Japan, the USA, the United Kingdom, Germany, France, Italy, Spain, the Netherlands, Belgium and Australia (Appendix XVI). The USA and the United Kingdom traditionally occupied the top positions, but the entry of Japan as top importer in 1994 is not surprising in view of the sharp annual percentage increases registered by Japan over the previous few years. In terms of numbers of fish, Singapore exports approximately 300 million individual fish annually, and the USA tops the list of importers (Appendix XVII). Importers in the USA, however, tend to buy the less expensive varieties of fish, averaging < SGP$0.20 (US$0.13) each, while Japanese importers and others prefer the more expensive varieties, averaging > SGP$0.20 each (Appendix XVIII).
Types of fish exported

Using the months of March and September in 1994 to view the types of fish exported in terms of numbers, the main groups are ranked as follows: guppy, tetra, platy, gourami, molly, goldfish, catfish, swordtail, barb, angelfish, rasbora, cichlid, danio, loach, fighterfish, shark, discus and carp (*koi*). Almost four million guppies were exported in each of the two months, and this volume clearly stands out against the other groups (Appendix XIX).

In terms of value, however, the discus group — having a high unit price of SGP$20.50 (US$12.80) per fish, as opposed to SGP$0.26 (US$0.16) per fish for guppy — emerged as a close second (Appendix XX). There is a trend among Singapore fish breeders to specialise in exquisite varieties of guppy and discus, and high-value fish such as the endangered dragon fish.

Individual buying preferences

Variations in fish groups imported by each country could be discerned from the data for March and September 1994. The preference for guppy in Japan is also reflected in the USA (Appendices XXI and XXII), while European countries (e.g. the United Kingdom, Germany and France) prefer tetra, with guppy taking the second or even third position (Appendices XXIII, XXIV and XXV).

Distribution system

The distribution system for ornamental fish is relatively well developed (Fig. 1). The fish farmer (who raises young fish to market size on the farm) and the breeder (who specialises in breeding varieties, strains and new species) usually sell the fish to a wholesaler, who can also be an importer specialised in buying fish from farms in the region. For new breeds and supplies, the farmer/breeder usually buys from the importer (either wholesaler or importer/exporter). The wholesaler usually buys in bulk and redistributes the fish to exporters or local retailers. Exporters, who can be importers themselves, in turn sell the fish to importers overseas. Farmers/breeders may also sell their fish to exporters or — a more common occurrence at present — export directly themselves. Some of the exporters have also turned to farming, to guarantee a more stable supply for themselves. There is therefore a trend towards vertical integration in the industry, leading to better management control over output and over the quality of the fish exported.

Accreditation scheme for exporters

In view of the high daily turnover handled by Singapore exporters, it is not practical for individual bags of fish being shipped to be checked for clinical signs of disease. The Primary Production Department, a government agency which oversees the development of the ornamental fish industry in Singapore, therefore administers an accreditation scheme for export packing premises which monitors not only the condition of the fish and the quality of the packing water used, but also the management practices adopted by the exporter, thus ensuring adherence to strict hygiene and sanitation standards. Examples of such standards include the use of only dedicated packing premises, the presence of holding tanks in such premises, installation of footbaths at all entrances to the holding tank area, reservation of a
Distribution system for the ornamental fish trade within, into and from Singapore

special area for packing, utilisation of reservoir tanks for packing water, use of new plastic bags for packing, prohibition against keeping of birds and pets (other than fish) in such premises, and prohibition against cooking and smoking within the premises.

FINDINGS OF A RECENT QUALITY ENHANCEMENT TRIAL

Trial

A 2×2 variable trial was performed in March 1995 to enhance the quality of guppies destined for shipping out in plastic bags (K.H. Ling, L.C. Lim and L. Cheong, unpublished findings, 1995). The variables were ‘high parasite incidence’ (HPI) (batch 1) vs ‘low parasite incidence’ (LPI) (batch 2), with each batch being subjected either to treatment (treatment group) as described below, or to no treatment (control group).

The treatment protocol comprised four steps, as shown in Figure 2.

Only ectoparasites were checked, and these included body and gill parasites such as Trichodina, Gyrodactylus, Costia and cestode cysts. Reid (4) reported that Gyrodactylus and Trichodina are usually found in live-bearers (i.e. fish, such as the guppy, which give birth to their young directly and do not lay eggs), and also called for adequate control of these parasites through chemical control (e.g. dipping or bathing the fish in formaldehyde, salt or organophosphates).

Percentage parasite incidence

In the HPI batch – i.e. 16.6% with Gyrodactylus and 10% with cestode cysts – an initial one-hour bath reduced the percentage incidence of Gyrodactylus to 3.3% and
Control group

Step 1: Four bags containing 200 fish/bag obtained from exporter for trial

Step 2: Water in three bags replaced completely; fish kept in bags for 1 h. Fish in remaining bag examined for parasites

Step 3: After 1 h, fish from two bags placed in new bags; held for 36 h at 23-24°C to simulate flight conditions. Fish in remaining bag examined for parasites

Step 4: Bags opened after 36 h. Fish from one bag examined for parasites. Fish in remaining bag placed in tank and observed for 7 days, to simulate retail, then examined for parasites

Treatment group

Step 1: Four bags containing 200 fish/bag obtained from exporter for trial

Step 2: Water in three bags replaced completely, addition of 20 ppm formalin, 2 ppm acriflavine and 2 ppt coarse salt; fish held for 1 h. Fish in remaining bag examined for parasites

Step 3: After 1 h, fish from two bags placed in new bags, addition of 2 ppm acriflavine and 2 ppt coarse salt; held for 36 h at 23-24°C. Fish in remaining bag examined for parasites

Step 4: Bags opened after 36 h. Fish from one bag examined for parasites. Fish in remaining bag placed in tank and observed for 7 days, then examined for parasites

ppm: parts per million  ppt: parts per trillion

FIG. 2

Treatment protocol for a quality enhancement shipment trial on guppies
cestode cysts to 6.7%, while final bathing for 35 h completely eliminated both parasites (Table I). All fish were free of the parasites during the seven-day holding period.

**TABLE I**

*Quality enhancement shipment trial on guppies: incidence of parasites in the treatment group*

*March to May 1995*


<table>
<thead>
<tr>
<th>Parasites</th>
<th>Initial</th>
<th>After 1 h</th>
<th>After 36 h</th>
<th>After 7 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Batch 1 (HPI group)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Trichodina</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Gyrodactylus</em></td>
<td>16.6</td>
<td>3.3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Costia</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cestode cysts</td>
<td>10</td>
<td>6.7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Batch 2 (LPI group)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Trichodina</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Gyrodactylus</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Costia</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cestode cysts</td>
<td>3.3</td>
<td>3.3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

HPI: high parasite incidence  
LPI: low parasite incidence

For the LPI batch – i.e. having only 3.3% with cestode cysts – the one-hour bath did not have any effect on eradicating the parasite, but the final 36 h bath eliminated the parasite completely (Table I), and no parasites were found in the fish during the seven-day holding period.

For the control group, the incidence of *Gyrodactylus* in the HPI batch remained unchanged (at the initial 13.3%) after one hour, despite a complete water change in the bag; the level increased to 20% after 36 h, and finally fell to 7% after 7 days in the holding tanks. Cestode cyst incidence (initially 10%) was also not completely eliminated, but remained at 6.7% after holding for 7 days (Table II). Similarly, for the LPI batch, cestode cysts were not completely eliminated (Table II).

**Survival**

Treated fish in the HPI batch displayed higher survival (99.3%) than the control group (78.2%) after holding for 7 days (Table III). In the LPI batch, fish in both treatment and control groups showed good survival rates of 100% and 98.7%, respectively (Table III). This stresses the need for fish to be in healthy condition and to have a low degree of parasite incidence prior to export, to ensure that fish remain alive and healthy even after arrival at the final destination, purchase and keeping by the hobbyist.
TABLE II
Quality enhancement shipment trial on guppies: incidence of parasites in the control group
March to May 1995

<table>
<thead>
<tr>
<th>Parasites</th>
<th>Initial</th>
<th>After 1 h</th>
<th>After 36 h</th>
<th>After 7 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch 1 (HPI group)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichodina</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gyrodactylus</td>
<td>13.3</td>
<td>13.3</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>Costia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cestode cysts</td>
<td>10</td>
<td>10</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Batch 2 (LPI group)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichodina</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gyrodactylus</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Costia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cestode cysts</td>
<td>6.7</td>
<td>6.7</td>
<td>3.3</td>
<td>3.3</td>
</tr>
</tbody>
</table>

HPI: high parasite incidence
LPI: low parasite incidence

RECOMMENDATIONS AND CONCLUSION

Recommendations

Ornamental fish destined for export should obviously be treated prior to export to rid them of parasites, thereby reducing stress to the fish and ultimately improving the condition and survival of the fish. Treatment in bags before and during transportation, as performed in the trial, is a practical and effective means of improvement, especially for trade involving high volumes and high daily turnover, as for trade in guppies. Where possible, fish should be held in tanks to adequately condition them for the long journey. Packing premises should therefore have sufficient holding tanks for this purpose.

TABLE III
Quality enhancement shipment trial on guppies: survival rates of fish
March to May 1995

<table>
<thead>
<tr>
<th>Group</th>
<th>Survival (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial</td>
</tr>
<tr>
<td>Batch 1 (HPI group)</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>100</td>
</tr>
<tr>
<td>Treatment</td>
<td>100</td>
</tr>
<tr>
<td>Batch 2 (LPI group)</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>100</td>
</tr>
<tr>
<td>Treatment</td>
<td>100</td>
</tr>
</tbody>
</table>

HPI: high parasite incidence
LPI: low parasite incidence
To ensure that such treatments are properly performed, exporters must not only be licensed by the Government but also accredited to a scheme whereby their management protocol can be monitored, to maintain high standards of hygiene and sanitation in the packing premises.

Ultimately, the source of the fish must be examined. For farm-bred fish, the farms must also implement good farm management principles. The use of organic manure as fertiliser in ponds should be discouraged, to minimise the risk of disease transmission to the fish. Pelletised feeds should also be developed, to reduce nutrient loading and consequently eutrophication of the pond water. Good water conditions should also be maintained, either through filtration and recirculation (for farms with limited water supply) or through more regular water replacement (for farms with a good external supply of water).

Farms must also be adequately isolated from each other, to minimise disease spread arising from movement of people and fish, and from discharge of farm effluent in the vicinity. The precautions taken by ornamental fish farmers in Israel to maintain strict isolation of each farm (e.g. air-filled ‘bubble’ houses) could be used to achieve such isolation.

CONCLUSION

The ornamental fish industry is a well-established and stable industry, which will continue to grow as more people begin to appreciate the therapeutic benefits of keeping and watching fish. The trend will be towards having aquariums as a form of living art in homes and offices. Being largely confined in aquariums and garden pools, ornamental fish pose minimal danger of adverse impacts on the ecology or genetic diversity of native populations. Nevertheless, with an estimated 1,000 million ornamental fish (involving 1,000 species or more) being exported annually from over 100 countries, the ornamental fish industry must concern itself with potential health hazards originating from the movement of these fish around the world. The experience of Singapore shows the benefits of licensing and accreditation of export packing premises. A concerted international effort must be made to formulate a code of practice for good husbandry, handling and transportation in the ornamental fish industry, as most of these fish are now farm-bred.

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APERÇU DES ÉCHANGES ACTUELS DE POISSONS D’ORNEMENT DANS LE MONDE ET NOTAMMENT À SINGAPOUR. – L. Cheong.


Ce commerce concerne plus d’une centaine de pays. Les cinq premiers pays exportateurs, en 1992, étaient Singapour (32 %), Hong Kong (11 %), les États-Unis d’Amérique (11 %), les Pays-Bas (7 %) et l’Allemagne (6 %). Les
Cinq premiers pays importateurs étaient les États-Unis d'Amérique (26 %), le Japon (17 %), l'Allemagne (9 %), le Royaume-Uni (9 %) et la France (7 %).

Le poisson d'ornement faisant l'objet d'échanges internationaux est, pour l'essentiel, un poisson d'eau douce élevé en bassins. Les poissons d'ornement et les invertébrés marins sont, pour la plupart, capturés par des moyens traditionnels. On estime à un milliard le nombre de poissons d'ornement exportés chaque année, soit un millier d'espèces, voire plus. Les espèces de poisson élevées en masse, telles que le guppy, le tétra, l'angelot, la limule, le platy, le poisson rouge et la carpe miroir sont depuis longtemps sur le marché et elles continueront à représenter les plus grandes parts de ce marché.

L'auteur analyse les résultats d'un test sur l'amélioration de la qualité des expéditions de guppy, et donne quelques recommandations sur les moyens de réduire le stress et la transmission des maladies.

MOTS-CLÉS : Commerce international – Poissons d’ornement – Singapour.

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PANORÁMICA ACTUAL DEL COMERCIO INTERNACIONAL DE PECES ORNAMENTALES, CON ESPECIAL REFERENCIA A SINGAPUR. – L. Cheong.

Resumen: En 1992, el comercio internacional de peces ornamentales engendró movimientos de capital por valor de 247 millones de dólares, según las estadísticas de importación, y de 140 millones de dólares según las de exportación. Entre 1983 y 1992, las importaciones y las exportaciones crecieron, por término medio, en un 21% y un 16% respectivamente.

Más de 100 países participan en este comercio. En 1992, los cinco primeros países en cuanto al volumen de sus exportaciones fueron Singapur (32%), Hong Kong (11%), Estados Unidos de América (11%), Países Bajos (7%) y Alemania (6%). En lo que se refiere a las importaciones, los cinco primeros países fueron Estados Unidos (26%), Japón (17%), Alemania (9%), el Reino Unido (9%) y Francia (7%).

La gran mayoría de peces implicados en este comercio son de agua dulce y producidos en vivero. Los invertebrados y peces ornamentales marinos son básicamente ejemplares capturados en estado salvaje. El volumen de exportaciones anuales de peces ornamentales puede estimarse en mil millones de ejemplares, pertenecientes a por lo menos mil especies distintas. Las especies producidas de forma masiva –el guppy, el carácido, el pez ángel, el limulo, el platy, el pez dorado y la carpa– gozan de una larga y sólida implantación en el mercado, y seguirán en el futuro constituyendo la mayor parte de las transacciones comerciales.

El autor examina los resultados de una investigación sobre la mejora de la calidad en las condiciones de transporte del guppy, y propone una serie de recomendaciones sobre el tratamiento que se ha de aplicar para minimizar el estrés y la transmisión de enfermedades.

PALABRAS CLAVE: Comercio internacional – Peces ornamentales – Singapur.
REFERENCES


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*  
Appendix 1


Source: FAO, 1994
Global exports of ornamental fish: the five leading exporting countries and others (1983-1992)

Source: FAO, 1994
Appendix III

Global exports of ornamental fish: market share of the five leading exporting countries (1983-1992)

Source: FAO, 1994
Appendix IV

Global exports of ornamental fish: exports (US$ x 1,000) and market share (%) of the five leading exporting countries (1992)

Source: FAO, 1994
Appendix V

Global exports of ornamental fish: percentage annual increase/decrease of the five leading exporting countries and world total (1984-1992)

Source: FAO, 1994
Appendix VI


Source: FAO, 1994
Appendix VII

Leading exporting countries of ornamental fish

Source: FAO, 1994
Appendix VIII

Global imports of ornamental fish: the five leading importing countries and others (1983-1992)

Source: FAO, 1994
Appendix IX

Global imports of ornamental fish: market share of the five leading importing countries (1983-1992)

Source: FAO, 1994
Appendix X

Global imports of ornamental fish: imports (US$ x 1,000) and market share (%) of the five leading importing countries (1992)

Source: FAO, 1994
Appendix XI

Global imports of ornamental fish: percentage annual increase/decrease of the five leading exporting countries and world total (1983-1992)

Source: FAO, 1994
Appendix XIII

Leading importing countries of ornamental fish

Source: FAO, 1994
Appendix XIV

Ornamental fish exports from Singapore: monthly variations in freshwater and marine fish by value (1994)

Source: Trade Statistics, Singapore, 1995
Appendix XV

Ornamental fish exports from Singapore: monthly variations in freshwater and marine fish by quantity (1994)

Source: Trade Statistics, Singapore, 1995
Appendix XVI

Leading ten countries importing ornamental fish from Singapore: by value over ten years (1985-1994)

Appendix XVII

Leading ten countries importing ornamental fish from Singapore: by quantity over ten years (1985-1994)

Appendix XVIII

Average unit prices of ornamental fish imported from Singapore: based on sales to the ten leading importing countries (1985-1994)

Appendix XIX

Principal groups of ornamental fish exported from Singapore: by quantity (March and September 1994)

Source: Outward Declarations, 1994 (outward declarations are forms filled in by exporters, to declare the contents of their consignment before export)
Appendix XX

Principal groups of ornamental fish exported from Singapore: by value (March and September 1994)

Source: Outward Declarations, 1994
Appendix XXI

Principal groups of ornamental fish exported to Japan from Singapore: by quantity (March and September 1994)

Source: Outward Declarations, 1994
Appendix XXII

Principal groups of ornamental fish exported to the United States of America from Singapore: by quantity
(March and September 1994)

No. of fish (x 1,000)

Groups of fish

Guppy Tetra Platy Gourami Molly Swordtail Cichlid Rasbora Barb Angelfish

March September

Source: Outward Declarations, 1994
Appendix XXIII

Principal groups of ornamental fish exported to the United Kingdom from Singapore: by quantity
(March and September 1994)

Source: Outward Declarations, 1994
Appendix XXIV

Principal groups of ornamental fish exported to Germany from Singapore: by quantity (March and September 1994)

Source: Outward Declarations, 1994
Appendix XXV

Principal groups of ornamental fish exported to France from Singapore: by quantity (March and September 1994)

Source: Outward Declarations, 1994