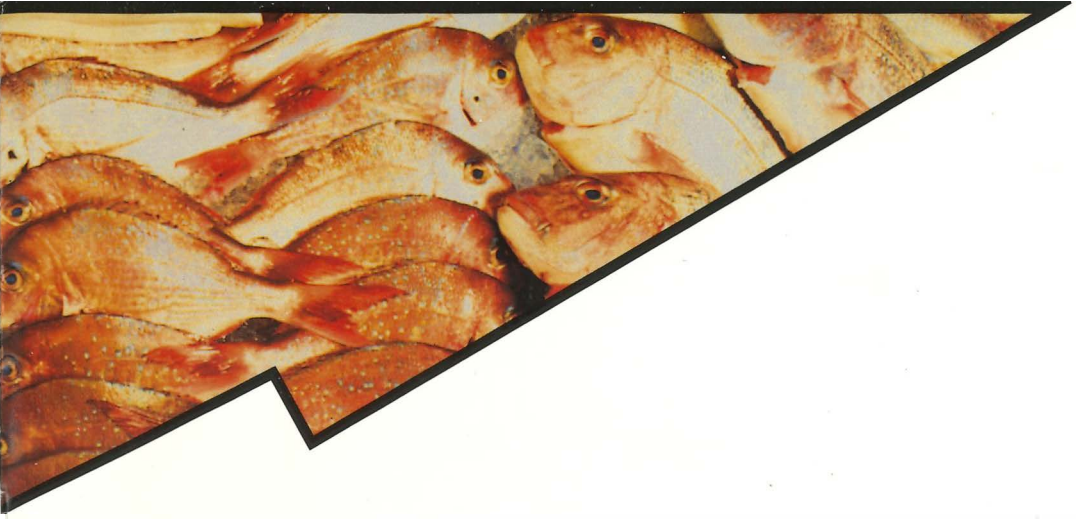

electronic marketing of fisheries products

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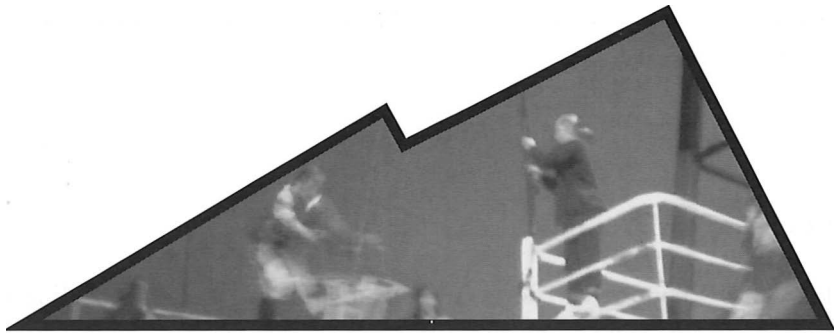

electronic marketing of fisheries products

Perry Smith
Q T Tran
Nick Ruello

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Australian Bureau of Agricultural and Resource Economics
GPO Box 1563 Canberra 2601

Telephone (06) 272 2000 Facsimile (06) 272 2001

ABARE is a professionally independent government economic research organisation.

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Foreword

Previous ABARE projects in fisheries have emphasised the importance of markets working effectively to provide the right signals for both industry and consumers. The adoption of electronic marketing systems by the fishing industry and seafood marketers has significant potential to improve the efficiency of markets and to address a range of industry communication issues associated with fisheries management and marketing.

However, the development of new technologies in any industry raises issues about the potential benefits from their adoption and the conditions necessary for these benefits to be realised. For electronic marketing to be successful in the fishing industry a range of conditions must be met first. The most fundamental of these is the development and introduction of standard product descriptions that could be reliably used as the basis for electronic trading.

This study was undertaken to identify both the potential and the constraints to adoption of electronic marketing systems. As these will vary between different segments of the seafood industry, a case study approach is used to assess the suitability of electronic marketing for operators in the south east fishery and for a range of buyers of seafoods based in Sydney.

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STEPHEN C. BEARE
Acting Executive Director, ABARE

March 1995

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Electronic marketing could be applied to fisheries products

Electronic marketing systems have the potential to address a range of marketing problems facing fisheries products and to influence the efficiency of other areas of the industry's operations. Before such systems could be applied to the fishing industry, however, a significant development program would be required to ensure that the conditions necessary for successful operation were met.

. . . to avoid costs of centralised selling

The major advantages of electronic marketing systems stem from separating the trading function from the physical transfer of products from sellers to buyers. This allows prices to be formed centrally without the costly process of assembling buyers, sellers and products at a single location.

Sellers have access to a wider market

The general advantages of electronic marketing systems to sellers are that they can access a wider range of markets because the product does not have to be physically committed to a particular market prior to sale. Through the improved access to wider markets, producers can potentially increase their profitability through higher prices and lower costs.

Buyers have access to a wider range of suppliers

To buyers, the main advantages of electronic marketing systems result from operating in a broader market. Buyers can operate over a wider range of supplying areas, unconstrained by the logistics and costs of attending sales at dispersed locations, with the result that the costs of trading can be substantially reduced.

. . . without the costs of attending a centralised market

There are potential savings in the costs of buying products as the productivity of buyers can be enhanced because of the higher volume of trades which can potentially be completed in a shorter

period of time than in a physical market, without the costs of attending that market.

Search costs are reduced for both sellers and buyers

Opportunities exist for more direct selling through electronic marketing because the search costs involved for both buyers and sellers are significantly reduced. Buyers are more aware of the range of products available at any time while sellers are aware of the demand for individual products in different markets.

. . . improving targeting of species

These advantages may also improve the use made of catches. Fishermen may often discard fish because they are not aware of marketing opportunities for less well established species or because the costs of searching for markets for those species are high in relation to the expected returns involved. Similarly, if operators alter their fishing activities to target those species in demand and avoid gluts of other species there is potential to improve the use of fish resources.

Transport and handling costs should be reduced by electronic marketing

Electronic marketing can reduce the aggregate costs of transport and handling because the physical transfer of products from seller to buyer are separated from the sales negotiations. More direct selling methods rationalise the amount of product handling. If electronic marketing can simplify the handling between catcher, retailer and consumer — to reduce the amount of time between capture and final retail sale — there are likely to be benefits from improved quality, extended shelf life and, ultimately, increased demand for seafood.

. . . and the domestic market made more competitive

Centralising price formation may create a more competitive domestic market for seafood. The potential gains include better allocation of products between different uses and the creation of a market which is more responsive to buyers' requirements, resulting in increased consumer confidence in seafood products.

An electronic marketing system may also have major spinoffs to industry efficiency in other areas. The system may be used as the major channel for communication within the industry and between the industry and fisheries managers. Communication has been a major problem to the fishing industry because of the spread of the industry, its high mobility, and the need for public involvement in management of fisheries resources. Shared use of the technology could result in a range of other benefits to the industry.

Electronic marketing may be used as a communication channel in the industry

The conditions which would be required to introduce electronic marketing successfully do not currently exist in the domestic fishing sector. The most fundamental of these conditions is the existence of standard product descriptions in domestic seafood trade. While standard descriptions of species and size grades form the basis of export trade in most seafood, significant development work would be required to establish these in domestic seafood trade.

Development work is needed before electronic marketing could be introduced

Standardised product descriptions are required to provide the basis for trading under electronic marketing and ensure that market participants have the confidence necessary to trade seafoods without prior inspection. A system based on species, size grades, date of catch and operator identification may prove sufficient for trading, provided there was a satisfactory protocol for dispute resolution.

Standard descriptions are needed

The net benefits of an electronic marketing system for domestically sold seafood are difficult to assess. Some of the more important potential benefits from electronic marketing systems are inherently difficult to quantify as they will be determined by the efficiency of the system adopted. While electronic marketing could conceivably fit well within the marketing operations of both buyers and sellers, its suitability for trading (and the benefits involved) will differ between different sectors of the industry.

Benefits will depend on the system adopted

. . . and the cooperation of all involved

The feasibility of electronic marketing and associated applications will be substantially influenced by the institutional arrangements for fisheries management and seafood marketing because of the potential to share hardware. For any system to simultaneously address industry communication issues, mainly associated with fisheries management, with the development of a national framework for marketing it would be necessary to achieve cooperation between the parties who stand to benefit.

Benefits extend beyond the fishing industry itself

While the major benefits of electronic marketing would flow to the seafood industry and consumers, some of the benefits of the system — such as those arising from improved product descriptions and market information — would be difficult for developers of the system to capture. This would have an influence on the potential funding arrangements required for the research and development necessary to establish electronic marketing.

1

Introduction

In an earlier ABARE study of the efficiency of seafood marketing (Smith and Reid 1993) it was suggested that alternative marketing arrangements have the potential to improve the efficiency of seafood marketing. Among the options canvassed was the possibility of developing electronic marketing of seafood. Electronic marketing systems may be well suited to the fishing industry's operations, particularly to domestic marketing, where the majority of product is sold in fresh chilled form, requiring the rapid movement of product, and where there are wide variations in both fishing and marketing operations.

Electronic marketing encompasses any form of marketing activity which is undertaken remotely through a computer network. Under an electronic marketing system, buyers and sellers are able to trade by offering or bidding for products through their own computers, networked to a central computer system, recording bids according to a specified sale structure. Such systems allow a large number of buyers and sellers to simultaneously participate in a sale. Electronic marketing systems have been developed and implemented for some agricultural products, such as livestock, but are not widely used at present.

The objective in this project is to identify potential applications of electronic marketing in the fishing industry, some of the likely benefits that may result, and the conditions that would need to be met for these benefits to be realised. Identifying the full extent of the potential benefits and costs of electronic marketing was outside the ambit of this study. The benefits of electronic marketing will vary widely between different user groups, and a full assessment would require detailed information on the current operations of a wide array of potential users. Similarly, the costs will be influenced by the administrative arrangements adopted in establishing the computer network and the technologies used, both of which are subject to considerable uncertainty.

A case study approach was adopted using the south east fishery as an example. Survey information on operators in the south east fishery and Sydney seafood buyers was used to assess the potential feasibility of electronic marketing to their businesses. Previous research into the fishing

industry and the experiences of other industries (particularly the Computer Aided Livestock Marketing system developed by the Australian Meat and Live-stock Corporation) were used to help identify the conditions required for electronic marketing to be feasible.

2

Marketing seafood in Australia

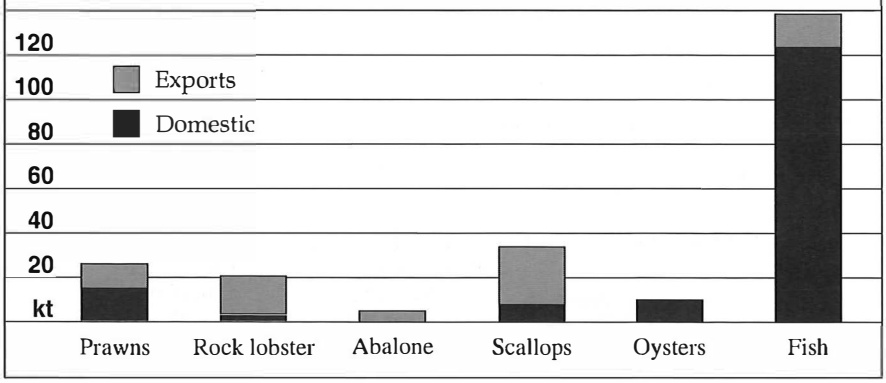
Electronic marketing systems have the potential to directly address a range of problems in marketing fisheries products and to influence the efficiency of other areas of the industry's operations. In the next two sections some features of seafood marketing in Australia which are relevant to electronic marketing, the potential applications of electronic marketing to the fishing industry, the types of benefits, and some possible constraints to adoption are examined.

Australian seafood marketing

While the majority of industry revenue comes from export sales of a range of high valued products such as rock lobster, prawns, abalone and tuna to markets in Japan, Taiwan, Hong Kong and the United States, the majority of product volume (mainly fish) is marketed domestically (figure A).

Australian seafood production is characterised by relatively low catches of a large number of species, which makes it difficult to achieve size efficiencies in marketing. One of the problems is obtaining economies of size in handling (Smith and Reid 1993). As a result, marketing costs between the catcher and the wholesaler often represent 20–25 per cent of the prices paid to operators.

A Australian seafood production and distribution, 1992-93



A variety of arrangements are used between the fishing and retail sectors to market the estimated 140 000 tonnes (liveweight) of domestically caught seafood sold in Australia. The main auction centres in Sydney and Melbourne are the largest handlers of domestic seafood, with total throughput in 1993 around 16 000 and 14 500 tonnes respectively. Smaller auction markets in Perth, Adelaide and Brisbane accounted for a further 12 000 tonnes in total in 1993. Direct sales to wholesalers and retailers account for the majority of the remainder. A flow diagram of domestic seafood marketing, together with the main activities involved, is shown in figure B.

Many domestic markets are regional with relatively low trade between them. In a study undertaken to examine the allocation of fish to the Sydney and Melbourne markets from major ports servicing the south east trawl fishery (Reid and Smith 1991) it was found that the overriding factors influencing

B Domestic marketing channels for seafood

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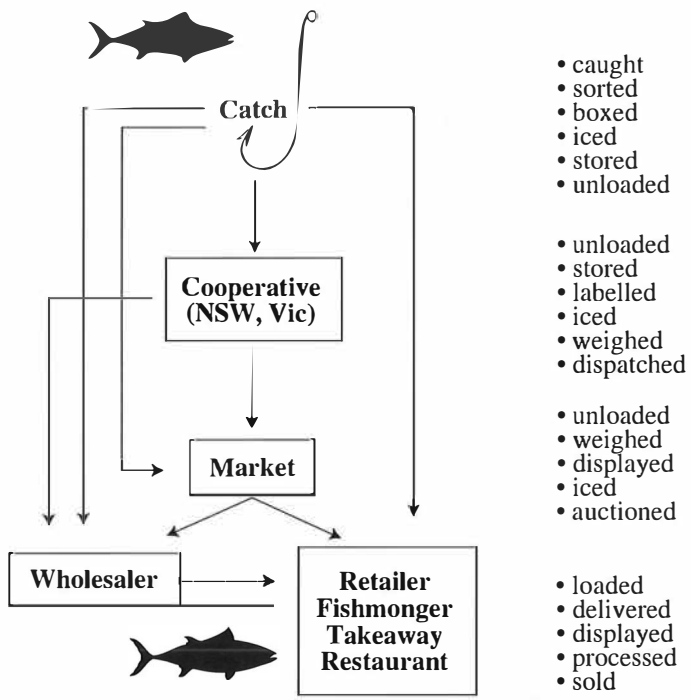


the efficiency of allocation of product between the two markets were the major differences in demand for the eight species examined between the two markets.

Domestic seafood markets are, however, becoming increasingly national as markets in Sydney and Melbourne need to draw supplies from a wider range of sources to meet their requirements. For example, products drawn from interstate sources supplied around 20 per cent of total throughput of the Sydney Fish Market in 1993 and this may increase following promotional activities to encourage greater forwarding of seafood from other states and New Zealand (New South Wales Fish Marketing Authority 1993).

The potential for improvements in efficiency through the use of electronic marketing has already been demonstrated by the use of an electronic dutch auction by the Sydney Fish Market. Under this system, a display, which shows the price, the number of crates being sold, the weight, supplier's name and the species, is linked by computer to buyers' desks where each registered buyer has a terminal. At the commencement of bidding the starting price is set at a level above that which is expected to be received and the display shows the price fall in 1 cent units until a bid is received. The successful bidder then specifies the amount required and the balance is then returned to the auction. This process is repeated until the lot is cleared.

The electronic dutch auction system was adopted to improve the speed of auctions and has been successful in this, increasing from around 400 bins an hour under the previous system to nearly 900 bins an hour under electronic auction (Fish Marketing Authority 1993). The benefits have included reduced labour costs to the Authority and shorter auction times, which allow buyers to complete their purchasing before they commence retail operations.

Under the current marketing arrangements, seafood is still aggregated at one location and buyers still inspect the fish. If the need to aggregate product in one location and inspect the fish could be either reduced or eliminated there may be further benefits to both buyers and sellers. To buyers there are significant costs involved in purchasing, including the time and costs involved in inspecting product, attending auctions and in arranging product delivery. To sellers there are the costs involved in delivering product to market for inspection and sale. If more direct means of selling could be developed these costs could potentially be reduced. Remote electronic marketing may provide such a means.

Consumption of seafood per person is relatively low and a substantial proportion of this is consumed away from home (table 1). As a result, there are a large number of traders involved in seafood trading, including restaurants, caterers, takeaway outlets and fishmongers, most of whom handle relatively low volumes of product. Consequently, it is difficult to reduce marketing costs, which often represent a substantial proportion of final retail costs, with margins between auction and retail generally between 25–100 per cent. The total marketing costs involved between fisherman and the retail level can often represent around 50 per cent of the retail cost.

The results of a survey undertaken in 1990-91 (FRDC 1992) showed that consumer concerns about a range of marketing characteristics were major issues influencing their attitudes toward buying seafood products. These included concerns about product freshness and handling, the potential impact of pollution, and the potential for misrepresentation of seafood. For example, most consumers were suspicious that much of the fresh fish they purchased was, in fact, thawed frozen fish.

There was also a strong perception among buyers from the catering and restaurant sector that many attributes of seafood compare unfavourably with other substitute foods. In the study, buyers were asked to assess a range of comparative statements about alternative meats, including beef and lamb meats, pork, poultry, fresh and frozen fish, and prepared fish products. This comparison highlighted a range of perceived deficiencies in seafoods,

1 Australian seafood consumption

	Fish		Seafood	
	1977	**1991**	**1977**	**1991**
	kg	kg	kg	kg
In home				
Fresh and frozen	2.90	4.26	0.80	0.68
Frozen packed	0.90	0.37	0.09	0.06
Canned	1.81	1.39	0.12	0.05
Other	0.34	0.92	0.02	0.32
Total	5.95	6.94	1.03	1.11
Away from home	1.84	2.38	1.24	1.64
Total	7.8	9.3	2.27	2.75

Source: Fisheries Research and Development Corporation (1992).

including difficulties in obtaining buyer requirements, value aspects and factors influencing product use (table 2).

The survey highlighted a range of problems facing major trade users in their use of fresh and frozen fish. Fresh and frozen fish were the most difficult of the major products for restaurateurs to buy and the most difficult to ensure ongoing supplies. Similarly, the wide fluctuations in price were more apparent for fish than the other foods examined. Buyers believed that the quality of fresh and frozen fish was more variable and that it was more likely to be discarded than the other foods in the study. It was also more difficult to obtain the right sized portions required for their business.

Given the importance of the restaurant and catering sector as markets for domestic seafood, it is important that the problems highlighted in the study

2 Buyer perceptions of seafoods

	Unit	Restaurants	Caterers
Number of respondents	no.	202	99
Attribute			
Availability			
Easily available to buy	%	15.9	na
Supply not guaranteed	%	42.5	47.0
Pricing			
Prices fluctuate too much	%	47.0	39.5
Often too expensive to buy	%	39.0	35.0
Good value for money	%	20.9	11.8
Considered too dear by customers	%	25.4	31.0
Provides a good margin	%	19.1	13.5
Quality			
Quality varies	%	27.5	25.0
Difficult to buy the right sized portions	%	22.0	15.4
Is likely to go off and be thrown out	%	34.1	na
Utilisation			
Don't have the knowledge to buy	%	8.6	10.9
Can be reused	%	5.1	11.6
Knowledge of preparation	%	7.4	na
An essential part of the range	%	24.2	18.7

na Not available.
Source: Fishing Industry Research and Development Corporation (1992).

be considered. A number of these problems are inherent in fishing, such as the variability in the level, timing and, often, the composition of supplies. Seafood industries which depend on capture of wild product have difficulties in adapting production to meet market needs (Smith 1992). Some of the problems reflect the structure of the fishing industry, including the spread of landings over a number of ports and often the remoteness of major producing regions from the principal consuming areas.

There is also a range of factors which are related to the marketing systems used. For example, difficulties highlighted by the restaurant sector in buying the right sized portions, quality variation and ease of purchase are influenced by the marketing practices adopted by the industry. These problems could be substantially addressed by standardised size and quality grading for fish and seafood, if grading were cost effective. However, there is no such system used on the domestic market.

Other factors, such as variability of prices, while mainly a result of changes in fish abundance, can be influenced by fish marketing arrangements in place. For example, it is more likely that prices may be more variable when markets are regionalised and where there is a limited range of cost effective intraregional marketing options. When catches in one region are low, the variability of supplies and prices can be reduced through drawing product from other regions if facilities for timely and cost effective delivery are available. While none of these problems are easily resolved, an electronic marketing system may provide an efficient framework for addressing at least some of them.

3

Potential benefits of electronic marketing systems in the fishing industry

The major advantages of electronic marketing systems follow from the separation of the trading functions from the physical transfer of products from sellers to buyers. This allows price formation to be centralised without the costly process of assembling buyers, sellers and products at a single location. Centralising price formation may increase market competition and yield more efficient pricing. At the same time, decentralising the exchange of products may improve the operational efficiency of marketing activities (for further discussion of operational and pricing efficiency in relation to the fishing industry, see Smith and Reid 1993, pp. 122–8).

The potential advantages may fall into four main areas:

- improved pricing efficiency,
- improved operational efficiency,
- more efficient distribution and
- other applications.

Improved pricing efficiency

For any industry to effectively meet consumer requirements, market signals which accurately reflect those requirements must be available to the industry and the industry must be able to respond to those signals. If the marketing system is based on measures which reflect consumer requirements, participants are more likely to respond to the premiums and discounts associated with various product characteristics.

Improved response to consumer requirements

The absence of adequate property rights in many fisheries will restrict the ability of the industry to respond completely to consumer requirements (Smith 1992). For example, fishing operators often cannot economically control the size of fish caught because if they return the fish it is likely to be caught by another operator. Similarly, there are often factors outside the control of the operators which may restrict the methods that they can employ. For example, the feasibility of adopting dropline technologies to catch sashimi fish will be influenced by trawl operations in the same area.

Nonetheless, it is more likely that operators will respond to consumer requirements through improved targeting and handling as far as is economically worthwhile if they are aware of the benefits involved.

Price discrimination

Domestic producers may be missing valuable opportunities to fully differentiate between the different demands of consumers for products with specific characteristics. For example, demand for a plate sized fish for use in restaurants may be higher than the household demand for this type of fish, which means that it may be in the sellers' interest to differentiate the product according to size.

Electronic marketing systems are based on standard trading descriptions of factors that are important to consumers. If correctly based, trade will result in the formation of premiums and discounts associated with different characteristics according to the consumer demand for these characteristics. Trade in a range of Australian seafood exports (such as prawns) is based on common descriptions (such as species and size), and price differentials are associated with these descriptions because of the differences in demand for these characteristics.

Grading is a central component of a standardised marketing system for food products and is justified when the total revenue associated with graded products is greater than the revenue earned with an undifferentiated price by more than the costs of grading and maintaining separate grades.

Increased consumer confidence

Demand for seafoods may be increased through the improved pricing efficiency associated with electronic marketing. Uncertainty may be reduced by the improvements in description. For example, in the United States, and probably Australia, consumer demand is influenced by perceived health risks and quality considerations. In a US study undertaken to assess consumers' willingness to pay for seafood safety assurances (Wessells and Anderson 1993) it was found that consumers were willing to pay (as much as 10 per cent more than the current price) for assurances which provided indications of quality and safety. To the extent that these attributes constitute the basis for trading, consumer concerns may be transmitted to producers through prices.

Other concerns of seafood marketing which could potentially be addressed within an electronic marketing system framework are the management of the risks of misrepresentation of seafood species by sellers and product safety issues. Both are closely related to the current lack of product standardisation and the difficulties associated with implementing product traceback procedures. Both are more feasible with electronic marketing systems in place.

Improvements in operational efficiency

The separation of the trading of seafood from the transfer of product between the catching sector and buyers may also permit a range of improvements in the efficiency of operations of both the catching and buying sectors.

Sellers have more market options

The general advantages of electronic marketing systems to sellers are that they can potentially increase their profitability by stabilising revenue received and reducing costs through wider market access and better planning. While regional market prices may sometimes be higher on average than the wider market, returns could be expected to be less variable. Producers can access a wider range of markets because the product does not have to be physically committed to a particular market prior to sale. If those products were committed to one market, the seller is effectively 'locked in' because of the costs involved in transferring the product to pursue other options.

With an electronic marketing system, a fishing operator could compare bids for product on board while still fishing. If the operator chose to accept a bid to sell that product, arrangements could then be made for delivery of that product. Similarly, operators could have ongoing access to information on the current prices for all products and plan their immediate fishing operations accordingly.

Buyers can reduce trading costs

To buyers, the main advantages of electronic marketing systems result from operating in a broader market. Buyers can operate over a wider range of supplying areas, unconstrained by the logistics and costs of attending sales at dispersed locations. With electronic marketing systems there is no need

for buyers to attend a physical sale, with the result that the costs of trading can be substantially reduced. There are potential savings in the costs of buying products as the productivity of buyers can be enhanced because of the higher volume of trades which can potentially be completed in a shorter period of time than in a physical market, without the costs of attending that market.

Reduced transport costs

By separating sales negotiations from the physical transfer of products from seller to buyer, electronic marketing can reduce the aggregate costs of transport and handling. It is generally cheaper to transport product only once from seller to buyer rather than the seller incurring the costs of transporting products to a market for sale and the buyer meeting the costs from point of purchase to the point of use. While it may be necessary to tranship product between producer and buyer to ensure efficient delivery, this could be decentralised and involve reduced handling.

Less handling

Any rationalisation in handling may also result in other advantages in relation to the quality of the products involved. The number of times a product is handled generally increases the potential for damage. More direct selling methods rationalise the level of product handling, resulting in improved product quality and a longer shelf life. Under current systems fish awaiting sale may be kept overnight on a market floor at high ambient temperatures. If more direct selling methods were adopted the time spent in storage and handling could be reduced.

Because of the importance of consumer uncertainty about the quality and freshness of seafood products, demand for these products could be strengthened by reducing the elapsed time between catching and sale, and informing consumers about this time lapse.

More direct selling

The potential to use more direct marketing methods in targeting end users have generally been constrained by the difficulties (and costs involved) in identifying individual buyers, particularly given the lack of size economies involved in buying and selling. Opportunities exist for more direct selling through electronic marketing because the search costs involved for both

buyers and sellers can be significantly reduced. Buyers are more aware of the range of products available at any time while sellers are aware of the demand for individual products in different markets.

The potential for more direct trading will depend on the particular sector of the industry and the marketing arrangements currently used. It is likely that more direct marketing opportunities will exist where centralised selling currently exists, as in Sydney or Melbourne, as multiple handling is used to display products prior to sale. While New South Wales fish and seafood marketing arrangements are being changed following the privatisation of the Sydney Fish Market, New South Wales seafoods are generally required to be sold through the markets and cooperatives. However, this will be progressively changed to allow a wider variety of channels to be used, similar to the variety of channels used by interstate and imported products.

There are also potential benefits to be obtained from undertaking existing functions more efficiently. As previously discussed, buyers may avoid some of the current costs of purchasing, such as those involved in attending auctions and inspecting product, and sellers some of the costs associated with delivering product to markets.

Improvements in catch utilisation

Fishermen may often discard fish because they are not aware of the marketing opportunities for less well established species or the costs of searching for markets for those species are high in relation to the expected returns involved. Electronic marketing systems may reduce these costs, making retention of product worthwhile because the costs of entering the catches to the system are low in comparison with the handling and marketing costs involved in consigning the product to market and hoping to attract the necessary bids.

More efficient fishing patterns

Under a regime where fishermen have access to electronic marketing during their fishing operations it is feasible that their fishing behaviours will change in response to the information provided through the system. This has the potential to improve the use of fish resources if operators alter their fishing activities to target those species in demand and avoid gluts of other species. As a result there should be less severe price fluctuations resulting from changes in local supplies.

More efficient distribution

Electronic marketing may improve the distribution of product between markets. An electronic marketing system could incorporate price information on a range of markets, ensuring that prevailing supply and demand conditions over a wider market area are more apparent to both buyers and sellers.

The prospective benefits resulting from improvements in market information arise from being able to take advantage of specific trading opportunities. In the study on the allocation of fish between the Sydney and Melbourne markets (Reid and Smith 1991), some potential benefits from better allocation of product as a result of better information were identified, but these were restricted by the lack of buyer familiarity with the species on both markets. With strong regional differences in demand, prices can be highly volatile, with prices at each market depending mainly on the level of supplies available at that market.

Electronic marketing may result in a smoothing of prices because, if successfully introduced, the market which is created can cover buyers and sellers from a much wider area than do auction markets. While the lack of buyer familiarity with the wide range of species may be an initial impediment to electronic marketing, the system could be expected improve the national acceptance of those species.

For those seafoods which have wide acceptance between regions, such as prawns, the benefits of improved market information are likely to be greater because traders stand to gain from being able to better direct product to those markets with the highest prospective returns. As trade becomes less regionalised, with greater national acceptance of various fish species such as orange roughy and blue grenadier, the benefits of a national information system may also increase.

Timely transmission of market data

An electronic marketing system can readily make available current price trend information to both buyers and sellers. Remote electronic marketing systems have major advantages over other media in the timely transmission of market data because of the speed of transmission. With the greater ease of data tabulation and lower costs of transmission, electronic data transfer can facilitate more informed marketing decisions.

While no such database currently exists, the information required is generally available for both domestic and overseas markets, including price trends on different markets and price differentials between different species and sizes.

Some of the price information currently available on domestic and overseas markets is of restricted use to the industry because of the lack of standardised trade descriptions. For example, fish price quotations in Sydney and Melbourne are on different bases and there are no agreed common size categories. Standardising this price information would allow traders to compare quotations between markets or on the same market at different times or for different sizes. This is also necessary to identify the existence of price premiums and discounts for the product as there are often a range of factors simultaneously influencing those prices.

Other applications

Communication has been a major problem to the fishing industry because of the spread of the industry, its high mobility, and the need for public involvement in management of fisheries resources. The hardware needed for electronic marketing systems can also be directly used for industry communication and data transfer and these applications may be a significant benefit derived from the development of an electronic marketing network.

Improved information flow to fisheries management agencies

With the development and introduction of more active fisheries management techniques, such as with the use of output controls, seasonal and area closures, there is an increasing need for efficient communication with operators in relation to management changes, catches and the like. For example, with individual transferable quota management there are problems with reconciling catches with individuals' quota holdings. Catches made by fishermen have to be reconciled against their quota holding each time that they operate, resulting in a large paper flow between fishing operators and fisheries managers.

Remote electronic marketing systems have the potential to carry much of this information and allow for electronic reconciliation with catches, and could also provide an efficient mechanism for trading quota.

Improvements in fisheries management

An electronic marketing system based on species and size information could yield a range of information for the management of fisheries which, in some cases, could reduce the need for expensive scientific monitoring of catches. Fisheries managers would also be provided with better information in a much shorter period. For example, the information generated from a marketing system based on uniform species names and size grading could enable managers to identify short term changes in the species and size composition of catches at relatively low cost. Where necessary this information could be supplemented by more detailed sampling of catches.

A marketing system could be integrated with logbook systems to provide a single system which would simplify the information requirements placed on the industry and allow direct transfer of data. The information which fishing operators are required to supply fisheries managers, such as through logbooks, places a substantial workload on the industry and on management agencies. The costs of such systems are generally quite large because of the need to enter and verify data, any follow-up action and the like. An integrated data system could potentially reduce these costs, resulting in direct savings to operators and to the management agencies. However, information rationalisation through electronic marketing and associated systems would require that these systems be independently run, with guaranteed security, to ensure data confidentiality. It would also be necessary to maintain the integrity of the system, to ensure that the information is not manipulated to the advantage of any individual or group.

The value of the information could be enhanced through feeding back such information to the industry, together with other information to assist fishing operations. For example, remote sensing information in relation to water temperatures and currents has already been successfully transferred electronically to operators in the east coast tuna fishery and incorporated in fishing operations. Computer linkages established for electronic marketing could allow such information to be more widely used.

4

Requirements of an electronic marketing system

A number of conditions are necessary to establish remote electronic marketing systems in the fishing industry. These include those general conditions which are fundamental to the successful application of electronic markets to any industry, those characteristics which are necessary to apply electronic marketing to seafoods, and those trading conditions necessary for the arrangements to work effectively.

General conditions required for electronic marketing

Henderson, Schrader and Turner (1986) identified the general conditions necessary to successfully apply electronic marketing to any industry as the following:

Potentially competitive markets

Systems would offer few potential benefits in situations where a single seller or buyer dominates. However, they may be particularly useful where there is a local imbalance between buyers and sellers but where the potential for a more competitive market exists.

In the participants' interest

Sellers must perceive the need for a competitive market and buyers and sellers must be willing to trade on a description basis, abide by their commitments to buy or sell and have confidence in the system.

Commodity description

Products to be traded must have characteristics that can be accurately described in terms meaningful to buyers and sellers. These products should also be able to maintain a relatively stable condition from the time they are offered for sale to the time they are delivered to the buyer.

High volume

Commodities must be traded frequently in relatively large volumes to provide the base for competitive trading. Without a significant volume passing through a market, the accuracy of the price formation process may be affected.

Conditions necessary to apply electronic marketing to seafood

While many of the general conditions exist in the fishing industry, there are three main areas where development work would be required to meet the conditions necessary for establishing an electronic marketing system:

- standardised product descriptions,
- agreed trading conditions and
- a means of establishing prices.

Standardised product descriptions are required for buyers and sellers to communicate about the product being traded. Agreed trading conditions, including the conditions of sale, the procedures for payment and disposal and procedures for dispute resolution must be established, and the mechanisms for setting prices must be developed.

Product description and standardisation

The development of uniform product description and objective product standards sufficient to allow trading of fresh seafood and their establishment in the fishing industry is the major prerequisite for electronic marketing. There are two main questions which must be resolved. The first is whether current information used in trading seafood can be standardised. The second is whether this information is sufficient to allow 'sight unseen' trading.

Buyers inspect products to assess product characteristics, 'quality' and freshness. Product characteristics which are important to buyers include the species of fish or seafood, the volume involved, its size and distribution of sizes within a consignment, while quality aspects include its general appearance, colour and the absence of blemishes.

Species

Any system of marketing which draws product from a large number of areas will have to ensure that standard marketing names are used. The large number of species of fish and seafood caught and traded domestically poses problems with the use of various common names, including regionalised names, and misrepresentation of species (see Smith and Reid 1993, pp. 100–6). Recommended marketing names have been developed (Department of Primary Industry 1985) but the use of some regionalised names has

persisted, presumably because producers have been selling to local markets. A national electronic marketing system is likely to reduce the probability that regional names will persist in future.

Weight

The standardisation of weight for fresh seafoods presents some problems for electronic marketing because of weight loss between capture and marketing. The point of weighing varies between operators and fisheries. Weighing can be currently made as vessels are unloading, at a cooperative, at a central market or the buyer's premises or a combination of these.

If electronic marketing was introduced, it might be desirable to establish a consistent point for weighing, such as ex vessel. However, this would be difficult because of differences in fishing operations, icing practices and the problems of accurately weighing products on board vessels. Electronic weighing systems which work on board vessels are available and are used in some fisheries but these are generally expensive to purchase (generally in the range $15 000 to $20 000). An alternative is to establish independent weighing stations (such as at cooperatives). However, this could reduce the flexibility of electronic marketing and would add to costs because of the additional handling.

For some species, a potentially feasible option is to identify the number of pieces in a box as a substitute for weight information. Provided that size grading is accurate, this method can reduce the emphasis on information on the net weight. For most buyers the number of pieces and their size is the most important information as this determines the number of servings to be obtained. However, weight is still the measure most used in trade and it is unlikely that buyers will quickly change their emphasis on box weight.

Pack size

Most countries have a standard weight fish box as the basis for trade for both fresh and frozen products. Pack size is important to both buyers and sellers but there is no standard set of box sizes used for either domestic or export sales and little uniformity of the pack weights from state to state. The Sydney Fish Market has encouraged suppliers to standardise weight per box (such that all but one box have the same weight) to speed up sales. The operators of markets in other states also encourage a standard packing weight and some size grades for the more important species. However,

operators are often reluctant to pressure suppliers for fear of losing the business.

Size grading

While there are some widely used size grading systems for a number of major commodities, including prawns, lobsters and some fish species, there is a large percentage of fresh products entering domestic trade which is ungraded. Development and implementation of grade standards is a prerequisite to electronic marketing and a range of other marketing improvements.

Most of the grades used in Australia have been adapted by exporters from those in the United States, where standardisation is more developed. Only the Sydney Fish Market has a standard product size grading system based on length of some fish and crab species or weight for prawns and rock lobster. This system covers 28 of the more important species in the Sydney market and is based on a small, medium and large categorisation. However, the categories are not always used by producers or enforced by the market staff. More importantly, buyers place little reliance on the gradings as they are frequently incorrect.

The purpose of establishing grades is to allow buyers to more readily identify their requirements, and to effectively convey those requirements to producers and distributors. As previously discussed, an advantage of well established grades to suppliers is that they can often increase total sales revenue by taking advantage of differences in demand of specific user groups.

The need for grades will also vary between species. For those species which have a wide size dispersion and where size is very important to buyers, there are generally greater incentives for grading than for species which do not have a wide dispersion of sizes in a particular lot or where size is relatively unimportant, such as when price is very low. A prerequisite to establishing effective grades is to establish the demand characteristics associated with fish and seafood of different sizes.

Quality descriptions

There is no quality grading system in use in Australia except for state requirements that seafood is 'wholesome' and 'fit for human consumption'. Any which is deemed unfit for human consumption can be condemned. In

New South Wales the Sydney Fish Market has a defacto grading system which recognises two standards: the normal or first quality and an 'inferior' quality which covers seafood with an obvious defect. Other central markets have similar procedures and such seafood is sold 'as is' with no opportunity of redress or return.

Most frozen seafoods in Australia are not quality graded. Exports, however, are subject to quality assurance procedures to ensure that they meet the requirements of the importing country. With many of the higher valued species, specifications on defect tolerances are often written into contracts, and quality disputes are resolved by the parties concerned or, in the case of substantial losses, by an insurance assessor or other third party. Generally frozen seafood quality is more reliable than for fresh product because of reduced deterioration in transit once frozen.

Definitions of quality will depend on the product and on the perceptions of the user. The key question on electronic marketing is whether there is a general set of product characteristics which may allow buyers to differentiate quality aspects of seafoods. From the interviews held with buyers, this may be feasible through identification of the supplier and provision of date of catch information. It was also evident that the majority of buyers interviewed had little faith in a quality assessment by a third party.

The supplier's name provides a major indicator of the quality of seafoods through previous experience or the reputation of that operator. A range of other information which is helpful in allowing buyers to assess quality can be conveyed through supplier name, such as information on the type of fishing, handling and storage facilities of the vessel. The elapsed time between catching and marketing can also be an indicator of the shelf life of the product. While this information alone is not sufficient to ascertain product quality, when used in conjunction with other information it may provide sufficient information for buyers. Moreover, as markets become less regionalised, buyers may become less familiar with the quality standards of different suppliers.

It is important that the relationship between supplier and product quality exists, to ensure that the handling is 'internalised' such that the benefits and costs of differences in handling standards are rewarded or penalised by the market. In the absence of this information, buyers may form an opinion of the quality and reliability of overall national supplies and downgrade prices

for all product, rather than those of individual suppliers. These 'external' costs provide an incentive for the industry to enforce quality standards.

Such information may assist seafood buyers to address the problems of the high level of consumer uncertainty about product freshness. The value of such information could be further enhanced through the introduction of industry quality assurance procedures which would reduce the variation in quality due to handling practices.

There are other options for dealing with an almost universal reliance on visual assessment methods for establishing freshness and quality. An electronic marketing system could, potentially, incorporate video descriptions of the product. The technology currently exists whereby video images can be incorporated within a computer along with other information and transmitted by modem. These systems are presently priced around $12 000 and, while not beyond the means of most larger traders, could restrict the use of electronic marketing.

Establishment of prices

Potentially, the two feasible options to facilitate exchange and price discovery are those of tender or of electronic auction. The two can be used in conjunction, as in the Australian CALM system for livestock (discussed in more detail in the appendix).

Tender system

Under this system catchers would set offer prices for products they are interested in selling, based on their estimates of what the product will bring. This could be based on previous prices, by species and grade, or prices obtained on other markets.

Registered buyers accessing the database would be advised what is available, by species and grade. Buyers can close out the deal by accepting offer prices or they can enter a tender offer, by product and grade, for those products in which they are interested. If the prices are agreed by both buyer and seller they close out the deal via computer. If there is still a disparity they can alter their respective bids until a deal is reached or declined.

The advantage of a tender arrangement is that such a system can function continuously. The disadvantage is that the system is relatively inefficient as

a means of establishing prices because of the potentially large number of offers and bids which may be required before agreement is reached.

Electronic auction

The market could be cleared through auction. The main options available to achieve this include extending the present electronic dutch auction system at the Sydney Fish Market, using the CALM system (outlined in the appendix), or developing a stand alone system.

The dutch auction system developed and used at the Sydney Fish Market has the advantage that it is now well established and is technically reliable. It can be used remotely by buyers and sellers through computer terminals and bids can be made in the same manner as if the buyer were at the market. This option could be appealing to the operators of the Sydney Fish Market as it could substantially increase the use of these facilities.

A disadvantage of auction systems is that they do not operate continuously but occur at a set time. As a result the timing of the auction to suit both buyers and sellers is a crucial issue. Ideally, a seller would like to be able to evaluate the marketing options soon after catching the fish while buyers would like the sales to fit into their commercial operations.

Established trading conditions

The conditions of sale and procedures for dispute resolution are important to both buyers and sellers. The key factor raised by both buyers and sellers (as with CALM) was the need to ensure neutrality to ensure that all parties, whether large or small, were treated fairly and there was a protocol for dispute resolution. Buyers surveyed also strongly believed that a money back guarantee for unsatisfactory goods or goods which do not meet the specifications, order or offer would be required, because of the removal of prior inspection.

While there are a number of permutations, an electronic marketing system for seafood could have the following main elements:

- All sellers would need to have access to an electronic link to send and receive data.
  - This could be either on vessels or on land. Computers on board would substantially increase the flexibility of the system and allow integration

with fisheries management functions, but may require greater maintenance.

- Product would be graded, using standard species and size grading, and the data entered into the computer.
  - The information could be entered on the side of the boxes using an integrated scanner which would also enter the data on suppliers name, species, grade, box number, and date caught.
  - If it is not feasible to grade on board then an option is to have accredited grading establishments (such as cooperatives) undertake these functions.
- Catchers would call up a central unit to transfer data on the catch, product available, the chosen method of sale and, if appropriate, the offer price.
  - They can, potentially, access information on most recent prices on other markets and methods of sale to assist them in making this decision.
- The information on product nominated for sale would be entered on a database to provide an inventory of all product available for sale by species and grade, which would be made available to buyers through their computers. The product would then be sorted into sale mode and would be subject to sale either by auction or by tender.
- On completion of sale the delivery arrangements would need to be implemented and the exchange completed.
- The product specifications would need to be guaranteed by the seller. In the event of disputes, independent arbitration and verification would need to be employed.
  - If the product is not to specification then the seller is generally required to meet the costs of arbitration and make the appropriate adjustment with the buyer. If the product is up to specification then the costs of arbitration would be met by the buyer.
- Information on individual trades will be updated to give the price and volume traded, by product and grade for the day, previous day, week and year to date.

5

Electronic marketing in the south east fishery – a case study

A case study approach was used to examine two sets of factors. First, it was used to assess whether particular groups in the marketing chain can feasibly incorporate electronic marketing in their operations. Second, it was used to assess the likely magnitude of potential benefits from adoption of electronic marketing in relation to their operations.

These factors are examined for two potential groups of users — the operators in the south east fishery and Sydney seafood buyers. Information on current industry practices and financial performance of trawl operators in the south east fishery were obtained from the ABARE fishery survey program. A survey was also undertaken of Sydney seafood buyers drawn from two market segments, wholesalers and retailers, to identify the prospective applications of electronic marketing to buyers of seafood from the fishery.

Fishing sector

The south east fishery is a multispecies fishery located in Commonwealth waters of the Australian Fishing Zone from just north of Sydney to Beachport in South Australia. While over 100 species are caught, the catch is dominated by sixteen commercial species, which are managed under an individual transferable quota arrangement. In 1992-93 there were 105 boats operating in the fishery and the total value of catch was estimated at around

3 Key operating characteristics: south east fishery, 1992-93

	Unit	Inshore trawlers	Danish seiners	Offshore trawlers	All boats
Number of boats	no.	54	18	33	105
Average catch a	kg	150 030 (0)	88 570 (0)	509 460 (0)	252 460 (0)
Fishing receipts	$	431 200 (15)	182 600 (7)	1 226 600 (18)	638 600 (12)
Freight and marketing costs	$	94 800 (20)	48 000 (11)	71 400 (26)	79 400 (14)
Total cash costs	$	371 400 (15)	151 400 (5)	1 050 400 (8)	547 100 (7)

a Average catches were derived from logbook data.
Note: Figures in parentheses are relative standard errors, expressed as percentages of the estimates.
Source: ABARE (1993b).

$67 million (see ABARE 1993b for details of the survey method and results).

The fishery can be considered as comprising three separate subfisheries. The key operating characteristics of each subfishery are shown in table 3. Inshore trawl boats generally operate mostly off the south coast of New South Wales, targeting a range of species for domestic fish markets in Sydney and Melbourne. The danish seine fleet operates in shallower waters, mostly off Lakes Entrance, targeting flathead and whiting, mainly for domestic fish markets. The deep water fleet operates from Tasmanian and Victorian ports, and mainly depends on catching orange roughy for processing into fillets for export and domestic markets.

The inshore and danish seine fleets mainly supply mainland markets. However, in the inshore sector of the fishery there is a greater number of species caught and traded. As a consequence, the number and frequency of marketing decisions required in the inshore sector is much higher than for the danish seine fleet, which catches only two main species in lower volumes, makes less trips, and sells through fisheries cooperatives (table 4).

In the inshore sector of the fishery it is estimated that marketing activities took around 33 hours a week in total, compared with less than 4 hours a week for danish seiners. Offshore boats operated less frequently, generally coinciding with the availability of orange roughy, had a much higher catch per trip, and generally sold through processors.

4 Percentage of boats using marketing channels: south east fishery, 1992-93

	Inshore boats	Danish seiners	Offshore boats	All boats
	%	%	%	%
Sold to fish cooperatives	60.8 (22)	100.0 (0)	0.0 (0)	49.2 (14)
Sold to fish markets	42.7 (31)	10.5 (60)	27.9 (57)	32.8 (26)
Sold interstate	19.8 (58)	0.0 (0)	0.0 (0)	10.6 (58)
Sold to wholesaler or processor	29.9 (43)	0.0 (0)	38.4 (0)	27.4 (31)
Sold to retailer	23.3 (50)	0.0 (0)	0.0 (0)	12.4 (50)
Other direct sales	19.8 (58)	0.0 (0)	18.1 (83)	16.0 (47)

Note: Figures in parentheses are relative standard errors, expressed as percentages of the estimates. The percentage may add to more than 100 as boat owners had more than one outlet to sell the catch.

The divergence in operations between the three sectors of the south east fishery is reflected in the relative importance of marketing costs (table 3). For inshore trawlers the costs of freight and marketing represented, on average, nearly 22 per cent of fishing receipts while for the danish seine sector they represented 26 per cent of total fishing receipts, due to the relatively low value of the principal species. By comparison, marketing costs for the offshore fleet were less than 6 per cent of total fishing receipts, reflecting both the different marketing arrangements which apply to deep water species and the high level of integration in this sector.

Given these factors, there would appear to be greater potential for electronic marketing to be adopted by the inshore and danish seine sectors than in the offshore sector. However, the potential gains are likely to be higher in the inshore sector than in the danish seine sector, because of the inshore sector's higher catches and current marketing practices. The main potential gains in the inshore sector appear to lie with more direct marketing between the vessel and final buyers.

For more direct marketing to be successful, operators would need to sort and grade product to a standard acceptable to buyers. All inshore and danish seine boats undertook some form of grading of catch on board vessels, to sort catches by species and grade by size (table 5). By comparison, most offshore boats did not grade, presumably because they were targeting a single species and the catches were generally destined for further processing.

The main reason for sorting and grading product on board is to identify non-salable fish for discarding. Inshore boat operators estimated that around 17

5 Grading practices: south east fishery, 1992-93

		Inshore boats	Danish seiners	Offshore boats	All boats
Sort on board by species	%	100.0 (0)	89.5 (7)	0.0 (0)	68.3 (2)
Grading by size	%	90.9 (9)	100.0 (0)	0.0 (0)	65.3 (7)
Grading by date caught	%	10.1 (88)	0.0 (0)	0.0 (0)	5.4 (88)
Share of catch discarded	%	17.0 (14)	16.0 (19)	1.0 (54)	12.0 (11)
Average time grading on board per trip	hr	16.0 (21)	13.1 (16)	0.0 (0)	10.7 (17)

Note: Figures in parentheses are relative standard errors, expressed as percentages of the estimates.

per cent of their total catches were discarded for a range of reasons, the most prevalent of which was the absence of markets for the fish, either by virtue of its size or the species involved, or because it was not of salable quality because of net damage (table 6). A few inshore operators also graded on the basis of the date caught, keeping the catches from different trawls separate. Grading accounted for a large amount of the available time between trawls.

The main factor limiting the amount of grading on board vessels in the inshore sector was that operators did not perceive that there were sufficient market benefits in grading the catch more closely than at present (table 6). Presumably, if there were a closer relationship between prices received and product grades, grading would receive greater attention. There would appear to be no major constraint to adopting more accurate grading in this sector, provided that there are sufficient market benefits in doing so.

By comparison, in the danish seine sector, operators were more aware of the market benefits of grading (possibly because of the close organisation of this sector around one cooperative) but the smaller vessel size was perceived as the main constraint to introducing more stringent grading on board vessels.

Operators in both sectors could gain if electronic marketing systems assisted them to find markets for a proportion of those catches which are currently discarded. While the level of discarding by offshore boats was much lower, electronic marketing system may have considerable potential to find markets for alternative products to those currently caught. This could become more important as offshore boats target a range of other species as access to orange roughy resources is reduced.

6 Reasons for discarding catches: south east fishery, 1992-93
Percentage of boats

	Inshore boats	Danish seiners	Offshore boats	All boats
Boat too small	89.9 (10)	73.7 (11)	14.8 (86)	64.7 (10)
Lack of storage space	10.6 (65)	10.8 (60)	0.0 (0)	7.5 (51)
No established market	100.0 (0)	50.4 (19)	0.0 (0)	61.8 (3)
Unmarketable quality	80.6 (12)	61.6 (15)	42.8 (40)	66.1 (11)
Other reasons	30.4 (41)	10.5 (60)	13.7 (87)	22 (34)

Note: The percentage may not add to 100 as boat owners could provide more than one answer to the question. Figures in parentheses are relative standard errors, expressed as percentages of the estimates.

7 Factors restricting grading on board: south east fishery, 1992-93
Percentage of boats

	Inshore boats	Danish seiners	Offshore boats	All boats
Insufficient market benefit	29.7 (40)	6.7 (63)	0.0 (0)	17.0
Limited time due to fishing	7.0 (91)	0.0 (0)	0.0 (0)	3.7 (91)
Requires more crew	7.0 (91)	6.7 (63)	0.0 (0)	4.9 (71)
Reduced storage space	12.3 (66)	33.6 (27)	0.0 (0)	12.2 (37)
Lack of deck space	3.50 (69)	33.6 (27)	0.0 (0)	7.5 (26)
Other factors	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

Note: The percentage may not add to 100 as boat owners could select more than one factor in answer to the question. Figures in parentheses are relative standard errors, expressed as percentages of the estimates.

The commercial feasibility of electronic marketing systems would need to be demonstrated to the majority of operators in the fishery. While 62 per cent of inshore boat operators surveyed believed electronic marketing would be feasible, only 11 per cent of the danish seine operators and 18 per cent of offshore operators believed that electronic marketing would be suited to their operations.

The size of many of the marketing benefits would need to be established through a program of market research and trials. Even then, many would remain unquantifiable as they would need to be incorporated in trading operations for some time before the benefits became evident. However, by adopting some conservative assumptions, it is possible to demonstrate the general magnitude of some of the potential benefits of electronic marketing to operators.

Both the inshore and danish seine sectors could benefit from increased demand through longer shelf life of the product if more direct marketing techniques could be adopted. If electronic marketing could reduce the elapsed time between catch and the retail level by one day this could add 10–15 per cent to the shelf life of most products. This was estimated by buyers to increase prices they were prepared to pay by around 2 per cent. If applied across all product sold, this would increase total revenue to the inshore sector by around $8600 per vessel a year and to the danish seine sector by around $3600 a vessel per year.

Similarly, better allocation of fish between markets may also result in increased sales revenue, assumed from the earlier study (Reid and Smith 1992) to be around 1 per cent.

More direct trading could reduce the total marketing costs of operators by rationalising the number of times that the product is handled, potentially reducing aggregate commissions and freight costs. If these benefits are assumed to be around 5 per cent of the operators' marketing costs (a reduction in total marketing margins from 25 per cent to 23.75 per cent in the inshore sector), the average benefit would be $4740 a year to inshore fishermen and $2400 to danish seine operators. However, trials would be required to assess the extent of potential savings because the distribution of trading costs between sellers and buyers would change under more direct trading.

If electronic marketing can reduce the search costs involved in finding markets for some of the fish which is currently trashed, there are likely to be further benefits. For example, a reduction of 20 per cent in the amount of fish trashed, if assumed to return operators $0.75 per kilogram, would be worth $3825 a year to inshore operators and $2125 a year to danish seine operators. Again, trials would be required to assess this potential.

The startup costs of electronic marketing would comprise the cost of establishing an onboard computer, which with satellite communications is currently around $10 000 per unit, although with wide application this cost may fall significantly. Assuming a three year expected life, the annual cost of an onboard unit would be around $5800. On the assumed savings to inshore operators, electronic marketing could net an additional $15 600 a year or around $0.10 per kilogram of fish landed.

The costs of an 'on land' facility consisting of a standard computer and modem would be much lower (around $3500 per unit) but would provide a less flexible system.

Fisheries management applications

Electronic marketing systems could also provide a range of management benefits, including more efficient communications systems and data flow. For example, they could be a means of facilitating communication between operators and fisheries managers more efficiently than current methods, resulting in a range of benefits to all parties involved in the fishery. The main areas of interaction and transfer of information occur in relation to licence administration, quota transactions and in monitoring catches. The individual transferable quota management system imposes a particular need for monitoring catches to ensure that individual quotas are not exceeded.

Catch monitoring in the fishery is currently undertaken through a specifically designed quota monitoring system and through a logbook program. While the logbook program is the major source of scientific assessment, the quota monitoring system is the main management tool. The quota monitoring system requires operators and buyers to submit to managers a return providing details of the catches made so that this can be offset against the operator's quota holding.

Logbooks are based on operators providing shot by shot data on catches. There is some (but not complete) overlap between the collection systems, with the main differences being in the effort detail sought for determining catch per unit effort indicators. Both systems require a significant amount of time on behalf of the operator and the collection and verification staff. With two systems operating simultaneously, the information workload imposed is substantially greater than would be the case if the systems could be integrated. The management systems in the south east fishery have generated a very substantial transfer of information between managers, boat operators and processors, covering permits, quota transactions and catch status reports (table 8). This imposes considerable costs on all involved.

The benefits of information rationalisation through a single system based on an electronic marketing network are likely to include simplifying the information demands placed on operators, while also providing operators with the information they require in a more useable form. The rationalisation of the collection, transmission and handling of data could also reduce the costs. Fisheries managers would also be provided with better information in a much shorter period. However, information rationalisation through

8 Number of licence and quota transactions: south east fishery, 1993-94

Provider of information	Type of transaction	Estimated transactions
		no.
Management	Issue of permits	380
	Quota transfers	
	Leases	2759
	Transfers	401
Operator	Estimated landed catch	11 100
Buyer	Quota use	11 100
Operator	Logbooks	17 082

Source: Australian Fisheries Management Authority.

electronic marketing and associated systems would require that these systems be independently run, with guaranteed security, to ensure confidentiality and integrity of the data.

The suitability of electronic marketing to seafood buyers

There is a large number of traders of seafood in the Sydney area, covering a range of operations, including wholesalers, retail fishmongers, takeaway outlets and restaurants with varying levels of specialisation in seafoods. While it is difficult to assess the potential suitability of electronic marketing systems to seafood buyers across this range, the feasibility of any system will be largely influenced by how much buyers use it. If buyers do not have confidence in the system there is little potential for more direct selling through electronic marketing.

To identify the prospective suitability of electronic marketing to buyers, interviews were held with 40 Sydney wholesalers and retailers (from a population of around 200 who use the Sydney Fish Market) in March 1993. Within this sample, there were wide differences in the nature and size of operations, particularly in relation to wholesaling (table 9). The sample included two large operations which traded in a complete range of seafood, with the balance small specialist wholesalers who met the seafood orders of restaurants. The survey was conducted using personal interviews with the principals of the companies, based on a structured questionnaire covering seafood purchasing behaviour, cost involved and attitudes toward the feasibility of electronic marketing.

9 Sample characteristics: Sydney seafood buyers

	Number in sample	Estimated average weekly throughput
		kg
Wholesalers	12	10 300
Retailers	28	1 700
Fishmongers	11	3 000
Takeaway outlets	8	810
Restaurants	9	696

Source of supplies

Despite regular attendance at fish markets, most buyers purchased seafood products from a number of sources inside and outside the Sydney Fish Market depending on their needs (table 10). While most finfish were bought at the market auction, most shellfish purchased by wholesalers and retailers were sourced outside of the Sydney Fish Market. As a result, most traders of seafoods could be expected to incur relatively substantial search costs in obtaining their supplies. Electronic marketing systems may be suited to buying operations because they can provide information on the product available from a range of sources through a computer terminal, so helping to reduce these search costs.

For buyers in both categories, attendance at the markets was a major component of their overall operations. On average, wholesalers spent around 29 hours a week in buying products in the Sydney Fish Market. For retailers (fishmongers, takeaway outlets and restaurants), average time spent purchasing fish was around 19 hours a week. Fishmongers spent more time

10 Proportion of shellfish and fish purchased from respective suppliers: Sydney seafood buyers

	Crustaceans	Molluscs	Finfish
Wholesalers	%	%	%
Sydney Fish Market	15	6	50
Fish cooperatives	1	0	1
Fish farm	0	3	0
Wholesaler in Market	4	5	11
Wholesaler elsewhere	65	74	26
Retailer	1	0	7
Commercial fishermen	10	0	0
Importer	4	12	5
Total	100	100	101
Retailers			
Sydney Fish Market	21	14	72
Fish cooperatives	4	0	2
Fish farm	3	0	0
Wholesaler in Market	38	31	23
Wholesaler elsewhere	29	54	2
Retailer	0	0	0
Commercial fishermen	4	0	1
Importer	1	1	0
Total	101	99	100

in buying fish (average 25 hours a week) than operators of takeaway outlets and restaurants, who spent 17 and 13 hours a week respectively.

The transaction costs involved in buying seafoods under current methods varied widely between the different types of traders covered in the study. For wholesalers the average costs of buying seafoods was estimated at around $0.26/kg, compared with an average of $0.60/kg for the retailers examined. For the group of retailers the costs varied widely, reflecting the differences in throughput, with the costs for fishmongers estimated at $0.39/kg, takeaway outlets $0.62/kg and restaurants $0.84/kg. Labour cost involved in hiring people or paying buyers to attend the Sydney Fish Market was found to be the major cost in purchasing products, representing almost half the total costs of wholesalers and more than half of retailers' costs. Costs of hiring boxes and transporting products were the other main costs involved (table 11).

Buying costs ranged from around 7 per cent of costs for wholesalers to around 16 per cent for restaurants. When combined with the average marketing costs for sellers of around 21–25 per cent of the wholesale price to deliver fish to auction, there would appear to be scope for more direct trading of seafood to reduce costs. However, it would be necessary to demonstrate to both buyers and sellers that any system which may be developed will integrate with their operations.

Freshness was the principal factor guiding the selection of seafood, followed by size and grading and then price (although price was more important to

11 Composition of total costs in buying seafood products: Sydney seafood buyers

	Wholesaler	Retailer
	%	%
Telephone	8	4
Transport	17	12
Handling	6	6
Box hire	18	11
Parking	2	2
Labour	48	63
Other	1	2
Total	100	100

12 Features of electronic marketing sought: Sydney seafood buyers

	Wholesalers	Retailers
	%	%
Accurate size grading	80	90
Date of catch	80	90
Independent assessment	50	70
Guarantee of quality	65	80

retailers than wholesalers). Freshness was also identified as an important factor in choosing supplier. In all cases freshness was assessed through visual assessment such that buyers would need to be convinced of the feasibility of other measures, such as date of catch or quality assurance as a substitute for personal inspection. While there was only low discarding of seafoods, the main impact of uncertain freshness was to reduce the net return for the product because it was necessary to discount the fish or to direct it to less valuable uses.

Electronic marketing systems could convey information about quality attributes that were the most important criteria in selecting products to purchase. Wholesalers and retailers placed different emphasis on the measures required for trading if electronic marketing were to be developed, reflecting their different roles. Wholesalers were more concerned with the need for accurate size grading, with less perceived need for independent assessment and guarantees of quality than retailers (table 12). Both groups believed that standardised product descriptions would assist their operations, irrespective of electronic marketing.

Electronic marketing is unlikely to encounter major resistance from wholesalers if it is accompanied by development of appropriate standards and safeguards. Electronic marketing would expand the proportion of products which could potentially be purchased without prior inspection without introducing a new concept to the wholesale sector. Larger wholesalers currently purchase a significant volume of their seafood without prior inspection, from fish farms, cooperatives, processors around Australia and from New Zealand suppliers. Buyers trading products without prior inspection cited the need for trust in suppliers about quality and quantity as an important criterion in selecting where to buy. This is less significant for frozen products than for fresh products because of the lower deterioration involved in the distribution chain.

6

Factors influencing net benefits of electronic marketing

Electronic marketing systems have the potential to result in major improvements in the efficiency and profitability of the fishing industry, but they require significant changes to current marketing practices to be effective. Before the feasibility of electronic marketing can be conclusively established it is necessary to establish the feasibility of developing product standardisation, and the other conditions required, and introducing those in the domestic market.

Benefits of product standardisation

Standardised product descriptions to allow seafoods to be traded without total reliance on visual inspection are required for electronic marketing to be feasible. Without reliable species and size grading, buyers of seafoods are unlikely to have the necessary confidence in the product to trade widely without recourse to visual inspection. Development and implementation of those standards is a major undertaking.

There are two general areas of payoff from developing standard product descriptions irrespective of the development of electronic marketing. The first is through the potential savings in trading costs. It was evident from the interviews with buyers of seafood in Sydney that the majority of buyers like to inspect the seafood before they buy or take delivery because of the absence of accepted product standards on the domestic market. The potential for savings through more direct trading is large, given the high costs associated with buyers having to search for products and attend markets to screen product before purchase as opposed to being able to inspect product on delivery.

The second area of potential benefit is higher prices. This depends on the value of the information provided by product standardisation and grading to users, and on the costs of providing this information. Whether or not prices will rise is difficult to ascertain before the system is introduced. Observed prices for a commodity sold under one method of selling will not provide a direct indication of the price buyers are willing to pay for the information provided under another. It is often difficult to distinguish between the price differential resulting from grading from the differentials

in the value of the commodity itself (Gleeson, Lubulwa and Beare 1993). However, trials conducted overseas and the results of consumer surveys suggest that there are benefits in providing this information.

Not all products are amenable to grading and it could be expected that the returns from grading will vary between species. It is more likely that there will be benefits when operators in the fishery supply the same basic product to markets with significantly different demand characteristics, such as to fishmongers and restaurants. Similarly, the costs of grading could be expected to vary in different sectors of the industry, as illustrated by the south east fishery case study.

It may also be necessary to standardise product handling practices at an appropriate level. This would require development of a defined handling standard to minimise the uncertainty from variations in handling practices. This standard could be developed as part of a quality assurance program or at a lower level, depending on the existence of net benefits from adopting higher standards. The adoption of quality assurance programs is generally based on increasing net returns by meeting the requirements of a specific group of consumers.

The implementation costs of product standardisation include those of developing the appropriate quality assurance and product grading systems and of ensuring that these systems can be incorporated within the operations of sellers and buyers. These costs are likely to be significant given the problems likely to be experienced in implementing a standard framework for trade throughout Australia, and the present lack of any extension services in fisheries.

Technical feasibility of electronic marketing well established

Electronic marketing is technically suited to domestic seafood marketing. Any system which is developed must be capable of being adopted by the wide range of groups involved in seafood marketing. A range of potentially feasible options is available to the industry. These include extending the dutch auction system developed by the Sydney Fish Market to incorporate remote selling or applying the CALM system (with modifications) to fisheries products. Similarly the use of electronic marketing on board vessels would appear to have no technical restrictions. Other applications already operational or being developed include global positioning systems,

satellite communications and electronic transfer of remote sensing information.

With product standardisation in operation the main costs involved in establishing an electronic marketing network are those of developing the appropriate computer applications and communications technology. The principal application costs include:

- the capital costs of system development, including the costs of hardware and software needed to operate the system;
- the costs to traders of accessing the system; and
- system running costs.

System running costs will be substantially influenced by both the trading and administrative arrangements adopted. If a suitable system of product description can be developed and the costs of adhering to that system can be internalised to the trading parties, the costs could be well below those of the CALM system. However, if inspection by a third party is involved these costs would be significantly increased.

Benefits of electronic marketing difficult to quantify

The net benefits of an electronic system of domestic seafood marketing are difficult to assess for a range of reasons. Some of the more important potential benefits from electronic marketing systems are inherently difficult to quantify as they will be determined by the characteristics of any system adopted.

While electronic marketing could conceivably fit well within the marketing operations of both buyers and sellers, its suitability for trading (and the benefits involved) will differ between different sectors of the industry. Such benefits can also be short lived once buyers and sellers establish a trading relationship.

In the south east fishery case study the main potential marketing benefits are likely to fall to the inshore and danish seine sectors through higher prices as a result of better shelf life and a reduction in total marketing costs resulting from more direct sales. By comparison, there are currently few potential marketing benefits to its adoption by the offshore sector of the industry given the nature of their operations. However, this could change rapidly if either the species composition or the relative profitability of export

and domestic markets changed through such factors as exchange rate fluctuations.

Some other potential impacts of a national electronic marketing system are inherently unquantifiable. For example, one impact would be that fishing operators would be aware of wider market opportunities within Australia and buyers more aware of the domestic industry's potential to meet their requirements. Electronic marketing could conceivably enhance import replacement opportunities through improvements in the availability of domestic product outlined previously.

Electronic marketing systems potentially have large spillover benefits by virtue of the suitability of the concept to addressing industry communication problems. The systems have a range of applications in the fishing industry, including those of improving fisheries management. However, almost all of these potential benefits are contingent on other developments. As an example, the conditions required to realise the benefits previously outlined in relation to the south east fishery are summarised in table 13. In these circumstances it is not feasible to assign a value to the contribution that electronic marketing systems would make to individual programs but only the payoffs to the aggregate programs themselves (Lal, Holland and Collins 1994).

Commercial feasibility may depend on public benefits

Viewed solely as an alternative means of commercially marketing catches, electronic marketing would potentially face the same problems as those experienced by CALM — that is, trying to appropriate all of the benefits of the system. Even as a commercial operation, many of the benefits are likely to be public in nature, a factor which has had a significant influence on the operations of the CALM system (Industry Commission 1993).

For the system to be amenable to private operation, the rights of ownership of the service must be enforceable to exclude non-owners from using it. There is significant potential for 'free riding' on marketing transactions. For example, once a buyer/seller relationship has been established through electronic marketing it is possible for the parties to continue to transact business outside the electronic marketing framework and avoid the costs involved.

13 Summary of potential benefits

Nature of application	Nature of benefits	How achieved	Condition required
1. Marketing			
• More direct trading	• Lower marketing costs • Higher returns	• Increase direct sales • Reduce handling time • Improve quality	• Grading and buyers using system
• Better market allocation between markets and within market	• Higher net revenue • Higher total revenue	• Improve allocation • Take advantage of differences in market demand	• Consistent trade data available on system for different markets
• Increase consumer demand	• Higher prices	• Lower quality uncertainty	• Grading to address consumer concerns
2. Catching			
• Improved use of species	• Less dumping • Better targeting	• Lower search costs in finding market • Improve information available to operators on markets, other data such as water temperature, currents	• Consistent framework for trade data available on system
3. Management			
• Integration of information	• Reduced information required • Better decisions on TAC • Reduced time required • Lower information costs	• Improve information for stock assessment for operator and receiver	• Secure database • Incorporate length/ discard information • Integrate system logbook with quota management
• Improved market for quota	• Easier trading	• More open markets	• Integrate quota market in system
• Reduced management costs	• Lower levies	• Reduced costs of communication	• Data confidentality

Similarly, the development of standard product descriptions is not amenable to commercialisation. It would be difficult (and undesirable) to exclude non-participants from using any standardised grading system developed in conjunction with electronic marketing. Once a system is established it would be desirable to have it widely adopted.

For these reasons the development of electronic marketing systems have tended to fall within the public domain although the systems are amenable to commercial operation at a later stage.

The development of an electronic system of seafood marketing is likely to have additional public benefits to those in other industries because of its potential to contribute to more efficient fisheries management and communication. However, for these benefits to be realised it will be necessary to ensure that the system also has benefits for the private sector. Otherwise there are unlikely to be sufficient incentives for the industry to adopt the system.

The institutional arrangements for fisheries management and seafood marketing in Australia are a major factor influencing the feasibility of electronic marketing and associated applications. For any system to simultaneously address industry communication issues, mainly associated with fisheries management, and the development of a national framework for marketing it would be necessary to achieve a commonality of purpose between the groups who potentially stand to benefit.

There are many advantages in developing a single system but a variety of permutations are possible, including separate ownership of the communications component from the marketing component. Similarly, a degree of public ownership may be necessary to obtain many of the fisheries management spinoffs.

Appendix

Electronic marketing in the meat and livestock industries

Electronic systems have been developed to undertake a range of marketing processes within the agricultural sector, including computerised grading and weighing systems and the establishment of least cost transport and inventory systems. These have been successfully combined with other activities, such as accounting and ordering, to develop integrated multiple tasking systems within the firm. However, the wider use of computers to achieve integration of activities across industries is less common.

The best known electronic marketing system used in Australian agriculture is Computer Aided Livestock Marketing (CALM) which was developed to sell a range of livestock through remote terminals and allows market participants to bid interactively to determine prices in a way similar to physical auctions. The system has been operating since 1987.

There has also been widespread research and development activity in other rural commodities which, if successful, will establish the conditions necessary to implement electronic marketing systems more widely.

The project was commenced in 1974 by the (then) Australian Meat Board in response to a perceived need to reduce the off-farm costs of beef production following a large fall in beef prices. The main advantages of auctioning cattle by electronic means were seen to be the potential for increasing buying competition from a wider area than for other marketing methods which require personal attendance of buyers, and lowered buying costs. Meat quality was expected to be improved, due to the better feedback to producers resulting from payment on objective quality measures, and the more direct movement of stock to abattoirs, which reduced both bruising and stress associated with saleyards. The main potential disadvantages were expected to result from the difficulty and cost of describing stock in some areas, problems of small and mixed lots and the impersonal nature of some electronic systems.

A high level of consultation was undertaken with all groups in livestock and meat marketing in developing the system. As a result, it was determined that electronic marketing should be initially established on a small scale and expand in line with commercial demand. It was also concluded that the

organisation established to operate electronic marketing should be run by a body independent of buyers and sellers (Agricultural Business Research Institute 1983).

Most buyers and sellers favoured the use of selling by description as the basis of the system, and development of standardised product descriptions was needed as an essential part of any system. To achieve this, an effective extension program was necessary to familiarise producers, agents and buyers with any system prior to its introduction. Independent assessors were needed initially but producer assessment with post-sale adjustment of price was seen as important in the long term. Some national coordination of accreditation standards would have been required.

The need for independent assessment was particularly important to livestock buyers. Only half of all buyers were prepared to purchase stock on the assessments of suitably accredited producers or agents on the basis that the final price could be adjusted for misdescription. The key problem raised by buyers was that of bias in the assessment process. Adjustment of prices following misdescription was only a partial compensation for badly described stock that may have been completely unsuitable for any markets held by the processor. Buyers with orders for specific types of product would find it particularly difficult to place misdescribed animals and may lose markets as a result.

CALM was established on an operational basis by the Australian Meat and Live-stock Corporation in 1987. Under CALM, two types of selling were established — an electronic auction system, with a weekly sale for cattle and twice weekly sale for sheep and lambs, and a continuous bid and offer system. Under the latter system, producers list stock for sale at a specified reserve price (which can be revealed or concealed) and sales can be made at any time. The sale lot can be switched between auction and bid and offer. It is also possible to trade forward.

Under CALM there are four options for trading:

Per head basis – price is established on the basis of dollars per head for all livestock in the lot.

Liveweight basis – price is established in cents per kilogram for the aggregate live weight of livestock in the lot, as ascertained by certified scales.

Carcass weight basis – price is set for the aggregate weight at abattoir for all carcasses of the lot, subject to adjustments for bruising specified in the bruising schedule.

Quality grid basis – price is established for the carcass weight of each animal in the lot, subject to variation on the basis of weight, fat and dentition relativities specified by the purchaser, and bruising specified by the bruising schedule (CALM Services 1990).

The system relies on the accurate description of livestock by the vendor. Disputes in relation to product descriptions are initially resolved by reference to the relevant agent. If the agent is unable to resolve the dispute, it is referred to a panel of arbitrators who may determine the rules to apply to the arbitration and the awarding of costs. The purchaser is required to pay the amount in dispute to the CALM organisation, pending determination of the dispute.

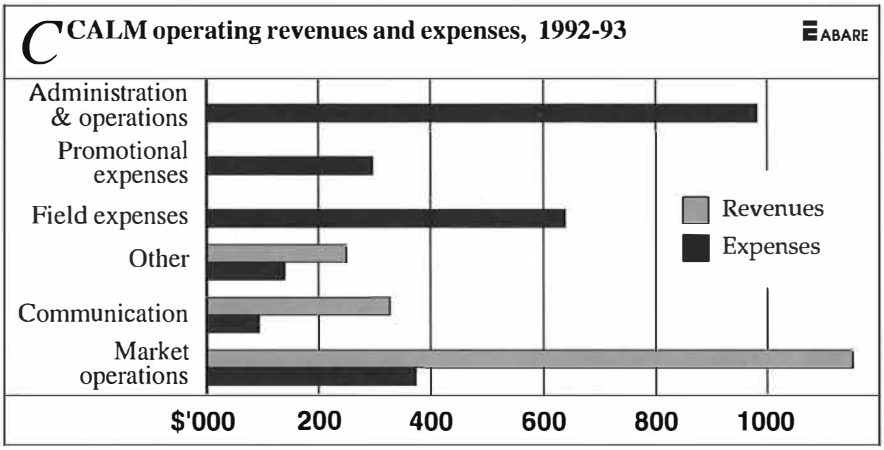
While the throughput of livestock sold under CALM has increased strongly (table 14), it handles only a small proportion of the total livestock sold. In 1991 CALM was used extensively to administer the national flock reduction scheme, resulting in a major boost in the number of sheep sold and numbers have remained over 1 million for the past two years. The number of cattle sold was around 1 per cent of total turnoff in 1989-90 and 1992-93 (Furmage and Rudwick 1994).

CALM has been operating its livestock trading operations at a net loss since inception although these losses were anticipated and are being reduced. In 1992-93 CALM's total loss was $1.7 million with the shortfalls covered by the AMLC general industry levy. Key components of these losses are the

14 Livestock sold through CALM

	1989-90	1990-91	1991-92	1992-93	1993-94 s
Cattle	204 141	243 421	272 121	224 824	312 579
Sheep	615 767	1 334 403	853 740	1 054 306	1 085 300
Lambs	625 573	564 054	376 469	275 102	430 191
Pigs	45 979	40 366	40 466	54 660	87 597

s Estimate.
Source: Australian Meat and Live-stock Corporation (1993).



high field costs associated with inspection operations (figure C) and the failure to achieve the growth in throughput anticipated (Johnston 1994).

Given the potential advantages, a relevant question is why hasn't electronic marketing been the success originally envisaged. One reason is that many of the benefits associated with CALM are of a public nature and consequently are difficult for the organisation to capture. For example, sellers may use CALM initially but once a trading relationship is established with a processor they may sell direct to that processor. Similarly, the benefits of the improved price discovery and information and making the producers more aware of the differences in end use values through carcass assessment are difficult to assess (Industry Commission 1993)

While the CALM system is potentially efficient, the producers' choice of marketing system will be substantially determined by the expected net returns likely for each of the options available to them. To assess whether direct marketing resulted in higher net returns to beef and lamb producers, a series of commercial trials were conducted under a project commissioned by the Meat Research Corporation (ACIL Australia 1991) These trials involved selling stock through a number of marketing methods available to livestock producers, including:

- selling liveweight through saleyards
- selling liveweight direct to processors
- selling liveweight through CALM
- over the hooks selling direct to processors

  - with an agent
  - without an agent
- over the hooks selling through CALM.

The more direct methods of selling to processors 'over the hooks' resulted in higher net returns to producers than through the liveweight methods. Over the hooks selling direct to processors and through CALM produced similar results for producers. Around half of the gain from over the hooks selling came from higher prices — due mainly to lower uncertainty associated with carcass performance from live animals. The remainder of the gain in net sales proceeds came from lower marketing costs (mainly through choosing not to use agent services).

Selling direct to processors allowed livestock sellers to gain many of the benefits of electronic marketing while avoiding the costs of the CALM system. Under the arrangements for selling livestock through CALM very few of the parties involved with previous marketing methods (such as agent commissions) are avoided, while the additional steps associated with electronic marketing (such as pre-sale assessment) may add to the costs. Over the hooks selling allowed the seller to share the benefits of more direct selling (such as direct transport, reduced bruising and better use of abattoir facilities) while reducing the number (and cost) of marketing intermediaries.

It is unlikely that over the hooks selling would have been as viable an option without the investment in the CALM system because of the widely accepted product descriptions introduced under this system. The development of a uniform national description was undertaken in response to the increased emphasis being placed on quality and consistency in meat trading. The development of a language which allows the attributes to be transmitted between traders and producers was essential if quality aspects were to be improved. Many processors pay producers on the basis of the individual characteristics of the carcass, resulting in changes to breeding and production programs to better meet consumer requirements.

The ability to accurately describe the product being traded to the satisfaction of buyers is a key requirement of electronic marketing systems. As a consequence, a major factor determining the use of the CALM system has been the ability to standardise product descriptions, and to develop objective descriptions such that they can be consistently replicated, particularly if there is high variation in product characteristics and if there are major differences in product value associated with these characteristics.

To this end the Authority for Uniform Specification for Meat and Livestock (AUS-MEAT) was established concurrently with CALM in 1987, to develop and administer a national description for meat and livestock. Its objectives are to develop and manage a uniform description language and to develop and supervise codes of practice, quality assurance and accreditation schemes within the industry which ensure consistent product.

The AUS-MEAT program is a comprehensive trading system which includes:

- a quality assurance program, which is required to be implemented by export establishments to meet the AMLC export licensing requirements;
- a quality assessment program for beef;
- an accreditation system for domestic processing, wholesaling, retailing and food service operations; and
- a quality accreditation system for the feedlot industry.

The service is run by a separate board under the AMLC and employs 70 full time staff. In 1992-93 it had an annual operating deficit of $8.3 million, met from AMLC levies. The AMLC expressed the view that the system could not be developed without statutory support because of high initial costs and the free rider problem whereby others could use the system, free of the high establishment costs involved (Industry Commission 1993). However, the value of the services is determined by whether consumers are prepared to pay for the additional certainty provided by the system through higher prices, and whether these exceed the costs of the service.

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Electronic marketing of fisheries products

Electronic marketing systems have the potential to address a range of problems in the marketing of fisheries products in Australia. For such a system to be feasible, a number of conditions would need to be met first.

A case study is used in this report to establish the suitability of electronic marketing systems to the needs of fishing operators and seafood traders.

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