

**Waterproof Labelling and Identification Systems  
Suitable for Shellfish and Other Seafood and  
Aquaculture Products. *Whose Oyster is That?***

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## FOREWARD AND DISCLAIMER

This report has been prepared for NSW Fisheries and the Fisheries R & D Corporation. It is based on information gathered by the author from published reports and unpublished documents and by means of interviews with persons believed to be reputable and reliable. I believe the report to be accurate but it contains evaluations of future events and I accept no responsibility for the information contained herein, hence readers should make their own inquiries to satisfy themselves on all matters.

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## NON-TECHNICAL SUMMARY

98/360	Waterproof labelling and identification systems suitable for shellfish and other seafood and aquaculture products
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### OBJECTIVES:

1. To evaluate technology and products currently available for the individual tagging and identification of seafood products.
2. To identify the most appropriate technology and products (systems) and possible improvements to existing systems to enable for the on-farm tagging and identification of shellfish.
3. To evaluate the economic cost to industry of implementing the on-farm and market place use of appropriate systems.
4. To evaluate the positive and negative impacts in the market place resulting from the labelling of product.
5. To design an integrated 'paddock to plate' trial to investigate both the on-farm feasibility of an appropriate tagging system(s) and the reliability of a tagging system(s) for market place product identification and traceback.

## NON-TECHNICAL SUMMARY:

This report outlines the results of investigations into the feasibility of cost effectively marking or labelling individual oysters and other shellfish for product differentiation and to facilitate rapid and efficient recall of product in the event of a potential public health incident.

A number of different types of plastic tags, manufactured in Australia and overseas, can be glued or otherwise secured to oysters and other shellfish but the cost of these tags is prohibitive for all but the most expensive products such as abalone or lobster.

While there is a vast assortment of inexpensive adhesive labels used in the food and beverage industry there is currently no commercial label (or experimental adhesive) that will adequately adhere to a typical damp oyster as packed at an oyster farm.

Thus there is no cost effective label or mark that will survive 'paddock to plate' distribution for most shellfish and allow for positive and rapid product identification for a food safety related traceback operation. However a number of adhesive labels were identified that could be securely attached to a vast assortment of *clean and dry* shellfish including oysters, pipis, abalone, crabs and crayfish.

The cost of these labels ranges upwards from a cent each for the small type commonly seen on apples and kiwi fruit. Such a small label could carry sufficient information for product identification and recall for food safety purposes and some brand differentiation but would be too small for any promotional message.

A one cent added cost for a label (at the farm gate) plus the labour cost for thorough cleaning and drying oysters for label attachment would financially cripple or destroy most oyster farming businesses.

The question of cost effectiveness of larger, slightly more expensive labels (costing about several cents each) for promotional purposes would depend on the value of the individual seafood product itself and the company's volume of throughput and financial resources. These could be an economically attractive marketing tool for the processors or marketers of large and/or valuable seafood item such as an abalone or lobster.

The absence of a mark or tag suitable for paddock to plate distribution for individual shellfish is commonly perceived as the fundamental problem with shellfish safety, particularly so for oysters.

The key weaknesses however lie more with the shellfish processing and seafood marketing sectors and the food service industry in:

- A lack of awareness of the community's, government's and oyster producer's strong concerns about the safety of oysters.
- insufficient attention to food hygiene and temperature control.
- the inadequate identification (not necessarily labelling) and record keeping on the mixing and distribution of high risk seafood product such as oysters from different sources.

The marketing and food safety outcomes sought by the oyster producers can be achieved by improving the handling, labelling and record keeping practices used with the prevailing trade units of a dozen, a bag, bottle or a case of oysters or the one, ten kilograms etc of shellfish sold by weight or with self serve buffets.

In short, with good hygiene practices (GHP) and good manufacturing practices (GMP) which should underpin the food safety plan that all food businesses must soon implement to meet the requirements of the Australia New Zealand Food Authority, the problem of shellfish

identification/origin can be resolved for minimal cost. A paddock to plate tag for individual oysters is not absolutely essential.

**Shellfish in even the smallest trade unit for a retail or restaurant sale can be identified in a cost-effective manner to both satisfy brand marketing requirements and allow for rapid and reliable identification and traceback with labels or tags costing only a few cents each. The potential problem with the origin/identity of oysters stacked on a self-serve buffet table can also be overcome with better record keeping on the part of the food service outlet.**

This approach is also consistent with the seafood industry's SeaQual national aims for better management of seafood quality.

In their quest for an innovative or technological solution to an almost universal problem the Australian seafood industry has failed to recognise that the solution ultimately rests with the people themselves.

We therefore propose that a national oyster industry strategy be developed, with the support of the Ministerial Council on Fisheries and Aquaculture, to:

- review current handling of oysters.
- produce a Code of Practice for oyster processors.
- formulate a set of recommended handling practices for all sectors of the seafood industry and the food service industry for:
  - minimising the mixing of high-risk product,
  - clear identification or labelling of product at all times, and
  - maintenance of reliable records of all product mixing and sales, to enhance the overall safety and public image of oysters in Australia.

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## 1. INTRODUCTION

The ability of government health agencies or industry to efficiently traceback and recall dangerous seafood is often impeded by the inability to reliably and quickly identify the precise origin or source of contaminated or otherwise faulty product.

In such instances these agencies often rely on painstaking epidemiological techniques to identify the source of contaminated product. Where the source cannot be clearly identified, are often required in the interest of public health and safety to take action against all possible sources of contaminated product and quarantine or recall safe products held by innocent producers and merchants.

This scattergun approach has in some instances lead to significant and unwarranted damage to the reputations of these innocent companies. The adverse publicity surrounding the 1997 Hepatitis A public health incident attributed to the consumption of Wallis Lake oysters had far reaching consequences beyond the oyster or shellfish industries and affected the sales of almost all seafoods across many parts of Australia.

The individual tagging or labelling of shellfish as well as other seafood would greatly enhance the speed and efficacy of product identification, traceability and recall of contaminated or suspect product. This would allow health agencies and industry to act swiftly, targeting only the product which has been unambiguously implicated in a potential or actual problem.

This action would greatly reduce costs incurred by both Government and industry during a food safety incident and minimise the risk and cost of the unwarranted adverse publicity to the producers of safe product in such an event.

A reliable tagging/labelling system would provide a valuable tool to build and maintain public confidence in seafood as a safe and wholesome product.

The national adoption of labelling/tagging of all product would also provide a more cost effective marketing opportunity for shellfish producers wishing to promote their particular species or brand of product in local or export markets.

Some producers and marketers also recognise the competitive advantages of providing their customers and consumers with more information such as processing or packing dates, seasonal condition or fatness of product and a bar codes on all product.

An interesting market development in northern Europe and the USA is *eco-labelling* the differentiation of products which are produced or manufactured with less damaging impacts on the environment than competitive products or brands; MacMullen (1998) has recently reviewed this in regard to the UK fishing industry and the labelling of 'dolphin friendly' canned tuna.

The need for the development of a system of product differentiation and labelling for oysters was stressed in a recent review of the NSW oyster industry (ACIL 1997). The development of product differentiation and labelling of oysters was also a recommendation of the Wallis Lake Taskforce, established by the Premier of NSW to investigate the 1997 Wallis Lake oyster incident.

## 2. NEED

Oyster industry leaders in South Australia and Tasmania have strongly endorsed the concept of product marking or individual tags, particularly in the aftermath of the recent Wallis Lake incident. They have supported the lodging of a research application to the Fisheries Research & Development Corporation to undertake the current study of *'waterproof labelling and identification system suitable for shellfish and other seafood and aquaculture products'*.

It should be noted that several Tasmanian oyster producers have undertaken some exploratory research on the feasibility of marking oysters with adhesive labels or by ink jet printing. Harry Shaw, a Sydney resident and long term investor in Tasmanian aquaculture, has undertaken much of this research, since 1990, and long been a strong advocate for product differentiation in the oyster industry.

The subtitle to this report *'Whose oyster is it?'* came from a chapter heading in one of Mr Shaw's personal records on the oyster industry, and it is a pleasure to acknowledge his long standing efforts in promoting the need for better labelling of oysters.

## 3. OBJECTIVES

The objectives outlined in the terms of reference for the study were:

1. To evaluate technology and products currently available for the individual tagging and identification of seafood products.
2. To identify the most appropriate technology and products (systems) and possible improvements to existing systems to enable for the on-farm tagging and identification of shellfish.
3. To evaluate the economic cost to industry of implementing the on-farm and market place use of appropriate systems.
4. To evaluate the positive and negative impacts in the market place resulting from the labelling of product.
5. To design an integrated 'paddock to plate' trial to investigate both the on-farm feasibility of an appropriate tagging system(s) and the reliability of a tagging system(s) for market place product identification and traceback.

This study was essentially restricted to molluscan shellfish, with a strong focus on oysters, because of the time and budgetary constraint on the project and because of the outstanding needs of the oyster industry given the safety concerns of government, industry and consumers about these shellfish.

The general discussion in this report on tags and tagging of shellfish is applicable to finfish as well as shellfish, unless otherwise indicated.

## 4. METHODS

The methodology used in developing this report included:

- Internet search and a literature search of relevant work in this field to ascertain current status and leads to possible new tags and marking materials and devices.
- General inquiries in the plastics, food and beverage industries for other labelling, marking or tagging technology which may be applied to shellfish.
- Inquiries to Australian and overseas tag manufacturing companies as to the availability of tags that may be useful for oysters and other shellfish.
- Discussion with oyster processors (oyster shuckers) and growers and seafood merchants regarding their requirements and interest and attitude regarding individual labels and tags for market differentiation and product traceback and recall purposes.
- Practical test of the efficacy of various adhesive labels and labelling materials on a variety of shellfish.
- Comparison of the attributes (positive and negative) and the indicative costs of different systems and adhesive labels for various shellfish.
- Review the barriers or constraints to the adoption and implementation of any proposed system.

## 5. CURRENT LABELLING AND TAGGING PRACTICES

With several notable exceptions, Australian seafood producers have not taken much interest in tagging or otherwise marking their seafood products for brand (market) differentiation or to facilitate product traceback and recall.

The exceptions are several salmonid producers of Tasmania who tag their fish for brand differentiation and product promotion and the oyster farmers and pipi harvesters who are obliged by State regulations to label containers (bags or cartons) of shellfish.

Another notable departure from common practice is that of the lobster fishermen of NSW who are required to individually tag their lobsters as part of the NSW Fisheries' licensing requirements and the quota management for that State fishery. The fishermen buy and affix a plastic tag to the lobster, which bears a number and the words NSW Fisheries.

Some tuna fishermen also affix a tag of some type to individual fish to identify their fish at the Sydney Fish Market auction and/or in a bulk bin holding fish from several fishermen or vessels. These tags range from a plain aluminium sheet tag tied to the tail, with the vessels name inscribed on it by hand, to the printed plastic proprietary tags such as the *Multi-tag* bearing the vessels name and a unique number on each tag.

It should be noted that these three tagged seafoods: salmon, lobster and tuna all represent high value product where each item is relatively large and worth at least \$20.00 to the producer.

Australian producers are not much different in their attitude to tagging seafood than most of their colleagues overseas : it is commonly undertaken when compulsory rather than as an aid to marketing or product traceback or recall purposes.

The United States of America is a little different in that it has a small number of companies tagging individual finfish and crayfish for product differentiation, promotion or other marketing reasons. One Canadian company, Ketchum produces more than 20 types of tags (catalogue in Appendix 1) for affixing to different fish species and the lobster *Homarus americanus*.

Most Australian fishermen and farmers, however have not identified a net benefit in tagging their fish and cite the cost of the tags and the labour required in tagging as the main constraint to individually tagging or labelling their fish or shellfish.

Almost a decade ago in the early years of the barramundi farming industry, it was compulsory under Queensland State regulations to individually tag farmed barramundi before they were distributed into the marketplace. Once the compulsion was removed farmers stopped tagging fish in order to save themselves about 20 cents on each fish which was valued at about \$4-5 each.

In addition to the financial considerations discussed above there is also a lack of awareness, or an element of indifference, amongst many primary producers and seafood merchants to the consumers' growing concerns about food safety and the need for reliable labelling or tagging of seafood.

This is evidenced by these merchants requesting farmers to not mark cases of seafood with the packing date and some farmers acceding to these requests.

This situation is puzzling given that there is no advantage to the farmer in doing so and that in some cases there is the prospect of a penalty under the State food regulations for failing to have the

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necessary information on packaged goods. Furthermore, the need to adequately label packages of seafood has been highlighted in recent Codes of Practice developed for the handling of farmed prawns and barramundi and endorsed by the national associations representing these two commodity groups.

### **5.1. Australian Shellfish**

Shellfish farmers are obliged by State health regulations to label or tag bags and cartons of oysters, and in some instances other shellfish, with prescribed information including:

- Name and full street address.
- Packing date.
- Lease number and location where grown.
- Number of oysters in container.
- Company batch number.
- And in NSW, purification plant number.

Packaged oysters offered for sale, such as a bottle or a dozen opened oysters on a plastic wrapped styrene tray, are required to carry the following information:

- Lease number.
- Packers name and address.
- Packing date and use by date.
- Number of oysters in container.

These regulations on bulk and retail packs were implemented to assist industry and government authorities in product traceback and recall in case of public health problems. Similar labelling regulations are found overseas for oysters and other bivalves such as mussels.

Since 1 December 1998 NSW pipi harvesters have been obliged to label or mark containers of pipis as part of the biotoxin safety plan mandated under a NSW Fisheries management regulation and all bags or cases have to carry the following information:

- Fishers name and address.
- License number.
- Area of harvest.
- Date harvested.

However no farmers or merchants have yet undertaken to marking or tagging individual shellfish although there has been a varying degree of interest amongst some oyster farmers and a little research by the Tasmanian industry over the past decade as well as several attempts at branding and labelling dozen lots of opened oysters in specially developed plastic trays.

The main impediment to individually tagging or labelling of shellfish such as oysters has widely been perceived to be the absence of an economical and effective tag or label that can remain firmly attached and legible from the farm to the plate.

Hence the funding of this desktop research project to examine the situation by the Fisheries Research & Development Corporation.

## 6. INFORMATION AND PRACTICAL REQUIREMENTS

### 6.1. Information Requirements

The information that may be affixed to a single shellfish indirectly by means of a tag or label or engraved or marked directly onto the shell can be divided into the following three categories:

- Essential (or mandatory)
- Desirable
- Optional

***Essential:***

- Farm/lease number or fishing license number.
- Date of harvesting (for unopened shellfish).
- or packing/processing date for shucked molluscs or otherwise processed shellfish.

***Desirable:***

- Producers/processor's/merchants name.
- Producers/processor's/merchants address.
- Product type, species or marketing name.
- Brand name.
- Bar code on retail or trade packs for stock management by customers and for electronic data processing in supermarket and department stores.

***Optional (Promotional, QA & Nutritional information):***

- Quality Assurance logo or information.
- Nutritional information or data.
- Advertising material.
- Other promotional information or message.

The information designated as ***essential*** is for the positive identification of seafood for product traceback or recall when there is a potential risk to public health and safety.

It parallels the requirements in current food regulations for containers of shellfish but takes account of the limitations on the information that can be carried on most shellfish given their small size.

It should be noted that current Australian food standards (regulations) only prescribe the type of information that must be affixed to seafood held in containers and sold as packaged goods (eg tray pack of a dozen or a bottle of oysters); there are no regulations governing the labelling of seafood sold loose as a single individual items (eg one oyster), by weight (eg one lobster or a kilogram of prawns) or by count ( eg a dozen oysters).

The ***desirable*** category of information would more fully and clearly identify the product and its origins and a bar code can facilitate the electronic monitoring of stock volume and movements and data processing, while the ***optional*** information allows for a Quality Assurance logo or information and promotional messages.

(An Australian company Horticulture Software Solutions (in Katherine NT) has recently developed a barcode system and software that can be used with a hand held scanner to provide individual carton traceability for multiple growers or different products on a pallet of goods).

The amount of information that can be attached to a single item of seafood product will of course

depend on the size of the product; a mud crab carapace has the room to carry more information than a pipi shell with conventional labels or tags. The value of each piece of seafood will also constrain the volume of information that can profitably be carried on the product.

Electronic chips/tags have been disregarded in this report because of their high cost at this time.

While there is no shortage of information that would fit into the promotional category the size of shellfish other than lobsters, crayfish and some crabs would preclude all but the tiniest message or information.

Finally, the tag or label for a single seafood item needs to be large enough to carry essential information but cannot be too large or obtrusive and spoil the appearance of the seafood on a diner's plate.

## 6.2. Practical Considerations

There are many factors that need to be examined in order to assess the overall utility of any particular tag or label for shellfish product identification and differentiation.

- Efficacy of tag or label.
- Cost of tagging /labelling materials.
- Cost of applicator device or machinery.
- Labour cost of application.
- Any hidden long term costs.
- Drawbacks or negative attributes. Any quality or time loss due to the actual process of tagging/labelling or to the time expended in applying tag or label?
- Overall utility or value of the tag /label.

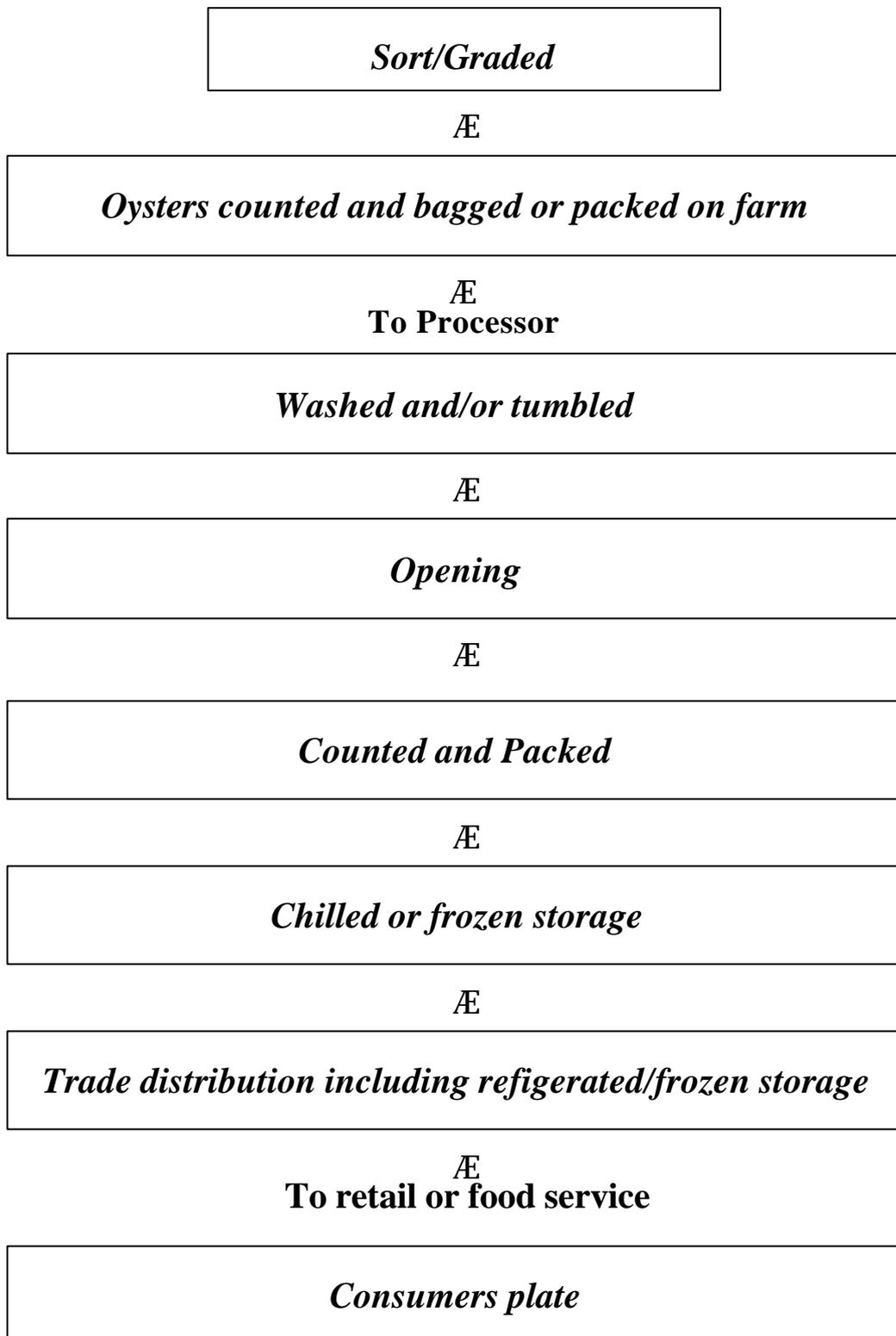
The evaluation of the efficacy of tags or labels, in turn has to take account of:

- Adhesiveness or attachment to the wet shellfish.
- The waterproof/water resistant and legibility characteristics of the label material.
- Adhesiveness or attachment under varying storage conditions:
  - \* adhesiveness during dry storage of up to one week.
  - \* adhesiveness during refrigerated storage  $-1$  to  $+10^{\circ}\text{C}$  for up to two weeks.
  - \* adhesiveness during frozen storage of at least 6 months at  $-5$  to  $-30^{\circ}\text{C}$ .

These sets of criteria are based on what might be regarded as a typical or likely history in the harvesting, marketing and consumption of oysters, as depicted on the next page. It also includes the type of procedures and conditions likely to be experienced by other shellfish such as lobster and mussels.

These criteria do not take account of cooking by boiling or steaming, therefore with some crustaceans to be sold cooked it may be necessary to test durability in a specific cooking process. A processing flow chart showing typical handling practices for market sized oysters from the farm to the plate is shown in Fig. 1.

**Figure 1.** Processing flow chart showing typical handling practices for market sized oysters from the farm to the plate.



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## 7. TAGGING, MARKETING AND LABELLING SYSTEMS

### 7.1. Ink Jet Printing

Trials with Pacific oyster shells were initiated in 1991 by several Tasmanian producers as a means of differentiating their product from other Pacific oysters from South Australia and Port Stephens and to promote their Tasmanian origins and clean growing waters image (H Shaw, personal communication).

The Tasmanian Pacific oysters were marked with an outline of the map of Tasmania by means of inkjet printing on the outside surface of the lower shell by a Melbourne printing company.

Although machinery and technology is now readily available, it is rather expensive with a suitable ink jet printer costing at least \$15,000 and the oysters having to be fed into the printer manually one at a time.

A machine capable of conveying oysters along a feeder belt and align the oyster correctly for printing as desired, to mechanise and speed up the entire operation, is not available.

This capital cost of about \$15,000-20,000 for the printer alone coupled with the minimal quantity and variable quality of printing (inconsistent results) are responsible for this approach coming to a halt.

The Sydney branch of *Imaje* the company which undertook the inkjet printing trials in 1991, carried out a series of printing trials on clean dry Sydney rock oyster shells and clean dry scallop shells in January 1999 as part of the present investigations. (Contact details on *Imaje* may be found in Appendix 2).

The shells were individually manually printed and all oyster shells carried a brand name and date. The legibility ranged from passable to good and about 75% of the print was clear and unambiguous. An automated line is unlikely to produce better results (on oysters) as far as clear legibility of the legend is concerned.

An indicative figure of about \$50,000 has been quoted for a prototype machine to 'feed' oysters along a conveyor to an automated inkjet printer.

A 100 % success rate for inkjet printing cannot be guaranteed for a prototype automated printing system or objects fed by hand; therefore quality control measures with visual inspection by humans would need to be implemented to ensure that every oyster shell had all of the essential information clearly legible.

This additional human control measures would reduce the savings to be achieved by automated printing and makes the system too expensive for all but the largest producer with massive throughput of oysters.

The results of trials with scallop shells were far more encouraging. Scallop shells because of their more uniform and smoother shells and clean pale colour carried clear legible markings and about 95% of the legend was unambiguous.

The size of scallop shells is such that all essential and much of the desirable or optional information can also be carried on typical shells.

The unit cost of an opened half shell scallop is such that branding or marking with essential information may be attractive to innovative scallop producers with large volumes of half shell product to be marked.

Farmed abalone are a far more valuable seafood item again and therefore the cost of inkjet branding may be even more attractive to abalone farmers wishing to differentiate and promote their product by such means. However the results obtained on abalone will be less uniform than on scallops because of the greater variability in external surface of scallop shells and they will vary according to the roughness of the individual shell itself.

The NSW pipi has a smooth clean shell and has the potential to carry a clear and detailed information but their small size and low value compared to an oyster or scallop makes the cost of such branding and marking prohibitive.

Yabbies, and some crab and crayfish species with a relatively smooth clean carapace (ie not rough or very dark in colour) also appear to be amenable to ink jet marking. The larger lobsters also have a smooth clean shell surrounding each abdominal segment that could provide ample surface area for considerable information of an essential and optional nature.

Blue or red colour inks are available and provide some choice to provide a better colour contrast on the various shellfish.

Given the low cost of ink consumables (less than half a cent per shell) the ink jet printing may have appeal to innovative marketers of the more valuable shellfish such as abalone, crabs or crayfish for promotional purposes despite the seemingly high capital costs of such a system.

An interesting example of inkjet printing and market promotion in the food industry at the moment can be seen on several brands of organic eggs, which carry messages such as 'Free Range' eggs.

## **7.2. Embossed Oyster Shell**

Another approach taken to mark oyster shells with a logo or brand, in Marlborough Sound, New Zealand, was by providing special settling slats with a logo embossed all over the surface of this settling material.

Oysters settling on the embossed catching slats grow on and around the logo and thereby have a permanent mark embossed/indented in the base of the shell.

This approach also has its limitations regarding the quality and quantity of information conveyed. This embossing is apparently something of a hit and miss affair as not all oysters have a clearly recognisable logo on the shell and some have no signs of the logo at all.

Therefore this technique also has not proceeded beyond the trial stage (E. McCarthy personal communication).

## **7.3. Tags/Labels**

The traditional plastic operculum tags used in biological studies or more recently in brand marketing and differentiation, for example as commonly used in Australia on gilled and gutted Atlantic salmon or ocean trout, has been proven as a cost effective device for tagging individual finfish.

The salmon industry has succeeded in marking fish with a tag carrying an attractive brand logo and company name which serve to identify the product and the company and thereby promote both.

This toggle type of tag cannot be attached to most commercial molluscan shellfish but a small toggle tag carrying some essential type of information can be affixed to many crustacean species, including prawns and crayfish with a simple hand held device.

The efficacy of toggle tags has been well proven in fish and prawn migration and growth studies around Australia and in many other countries.

Prawns and other crustaceans can also be tagged with a polythene streamer tag bearing some essential information and these too have been proven in the field with various biological studies.

A plastic tag or label can be affixed to oysters and other molluscs, crabs and crayfish with the so-called super glues (cryanoacrylate). These shellfish labels (tags) as they have become known, have not been used commercially on farms but have proven successful in experimental or research work with oysters and scallops (W Borgeson and K Ross, respective, personal communication).

Although these types of tags manufactured by a Canadian and an American company (Ketchum Manufacturing Inc and Floy Tags respectively; Appendix 1 & 2) have been advertised extensively they have not been widely adopted by the seafood trade and the only significant commercial use is on the American lobster *Homarus americanus* for brand promotion purposes.

Will Borgeson, a researcher at the University of California, has satisfactorily used a small Bee-tag, a German multicoloured (banded) mini tag about 1mm diameter colour coded and carrying a serial number to mark and identify individual oysters on an oyster lease over a two year period.

Ear tags, numbered plastic tags have been affixed to scallops by means of wire tied into a hole drilled into one 'ear' of the shell. This type of tag also has been restricted to research or experimental work and has not used for identifying seafood in the marketplace.

The toggle tags, streamer tags and disc tags are available in Australia from an Adelaide manufacturer (Hallprint) and Ketchum Manufacturing Inc as well. These two companies as well as Floy Tags all produce a vast range of toggle tags and disc tags designed for a variety of finfish and shellfish species.

Ketchum also has automatic equipment for dispensing glue and for affixing the disc tags (to lobsters etc) and automated device for affixing toggle tags. See Appendix 2 for contact details for all of these tags and companies.

The following table summarises the approximate cost of various types of tags and the indicative labour costs for manually applying such tags. The costs quoted are for the standard size of each type which allow for only one to two words and a number alone; larger models which can carry more information would be more costly.

Indicative costs are given because it is impossible to provide actual labour costs for the application of each type of tag given that different parties working under entirely different circumstances have used them.

The indicative costs provide a useful comparison of the relative costs of applying each type of tag (Table 1). Note that this table only takes the cost of a simple legend with few words and no graphics, it does not take account of the plate/film cost of extra printing or use of a logo.

**Table 1.** Comparison of Tagging Systems.

<b>Tag type</b>	<b>Tag cost per tag* (cents)</b>	<b>Labour cost (approx.)</b>	<b>Total in cents (c)</b>
Hallprint toggle	45 +	Several cents	50
Hallprint disc	13 +	25 cents	38 +
Ketchum shellfish label (glued tag)	3	25 cents	28
Ketchum toggle tag	5	Several cents	8-10
Floy discs	12	25 cents	37
Floy T bar tag	33	Several cents	36+
Hallprint streamer	55	Several cents	58+
Floy streamer	57	Several cents	60+
Bee tags	15-20	25 cents	40-45

\*Based on purchasing in 10,000 to 100,000 lots.

It is evident from this table that the total cost of materials and labour for most tags exceeds the farm gate cost of a single oyster, mussel or other Australian bivalve mollusc. The cheapest (shellfish) tag suitable for use on oysters - a Ketchum shellfish label - would be approximately 28 cents.

This time/labour adds to marking costs but it also has a hidden cost in that it significantly slows down the throughput of shellfish in a days work for a farmer or oyster processor; this can be a major impediment at peak seasons or days (e.g. Xmas week) when seafood demand exceeds available personnel capacity.

The cheapest tag system of all, the Ketchum toggle type of tag, is not suitable at all for use on opened oysters.

The above costs do not take account of the cost of a gun or other tagging machine for the toggle tags. A simple handgun costs more than \$150.00 while an automatic tool costs more than \$3,000.00.

#### **7.4. Adhesive Labels Trials**

A series of commercially produced labels and a number of labels hand cut from adhesive sheets provided by several companies were evaluated on oysters against the key criteria discussed in Section 8.

Oysters were selected as the test item because preliminary work had indicated that oyster shell represented the most challenging substrate for any labels. Table 2 summarises the observations on the shells of molluscs examined in preliminary label trials.

**Table 2.** Comparison of Shell Characteristics.

<b>Shellfish</b>	<b>Grooves/crenulation on</b>	<b>Loose /flaky/muddy exterior</b>
Oyster Sydney, native and Pacific	Yes, very irregular	Yes, often loose flaky and muddy; variable
Pipi	No, very smooth	No, very clean
Cockle, Sydney	Grooved	Partly muddy, variable
Scallop, commercial	Grooved	Partly muddy
Mussel, blue	Fine/ shallow grooves on most mussels	No but often with encrustation or tube worm
Abalone, black lip	Irregular surface	Often with heavy encrustation

The table below summarises the results of observations on oyster shell with the four most promising adhesive labels. Other labels tried in preliminary work but which were dismissed after preliminary trials on wet and dry shells included Associated Labels' SFM moisture proof label and Meto Weatherproof large 'Use By' label. Further details on these labels are given in Appendix 3.

While all of the four labels stuck to a clean dry shell if firmly attached by hand none had sufficient adhesion to a typical damp shell (clean or muddy) to be able to recommend their commercial use from the farm gate to plate at this time.

These labels have a cost of approximately one-cent each depending on the volume purchased and the size of the label; several of these labels can be attached to various clean dry shellfish and used satisfactorily for promotional purposes (Table 3).

**Table 3.** Summary of Observations on Oyster Shells.

<b>Label Property</b>	<b>Raflatac</b>	<b>3M</b>	<b>Meto</b>	<b>JAC FI</b>
Durability in Water	V Good	V Good	V Good	V Good
Adhesion under water	Good	Good	Good	V Good
Durability when Refrigerated	V Good	V Good	V Good	V Good
Durability Frozen	V Good	V Good	V Good	V Good
Adhesion:				
On wet shell	Nil	Nil	Nil	V Poor
On dry shell	V Good	V Good	V Good	V Good

#### *7.4.1. Adhesion to wet or damp surfaces*

No labels would attach to oyster or other shells which were wet and the adhesives seem to represent the major problem as the paper stock can satisfactorily handle most other handling operations. Adhesion was very poor on loose (dry) muddy surfaces also.

Adhesion was also unsatisfactory when surfaces were just damp. No labels would stick to slightly damp oysters, the condition in which they commonly leave the farm for delivery to processors and other customers.

#### *7.4.2. Durability and adhesion in water*

All labels were held fully immersed in water for periods of 48 hours to assess their durability and legibility when wet. All labels were still intact, and the paper stock in good condition and were sufficiently durable and legible when wet.

#### *7.4.3. Adhesion to shells under water*

Labels attached to a clean dry shell were able to withstand splashing and a little wetting but most could not remain attached to shells after 2 hours total immersion. All labels remained attached for 15-30 minutes but most would lift off the shells when fully immersed for more than one hour.

The exceptional label was the Jac FI it would remain attached to clean dry oyster shells for more than one hour's immersion but would loosen off almost all of the shells within two hours.

#### *7.4.4. Adhesion to dry surfaces*

Adhesion was directly related to the type of surface: smoother cleaner surfaces such as those on pipis or single seed oysters provides greater contact and adhesion while rough, flaky or muddy surfaces provided less contact and adhesion.

Furthermore firmer pressure and extra time was needed to ensure good adhesion on crenulated/grooved surfaces such as oysters and cockles and the flaky/muddy surfaces on some oysters and cockles.

Attachment to dry oyster shells with a covering of dry mud--which had not been sufficiently well washed during the various processing steps -- was variable and hence not satisfactory overall.

Best adhesion was noted with pipis with their clean smooth shell. Adhesion to mussels was variable and essentially reflected the smoothness and cleanliness of the surface of each shell.

The labels would remain firmly attached and resist considerable handling and several minutes of tumbling of oysters -- without water --and attachment was generally regarded as satisfactory in the dry condition.

#### *7.4.5. Durability when refrigerated*

All four labels remained securely attached, intact and legible after seven days in a refrigerator and met this criteria for durability.

#### *7.4.6. Durability Frozen*

All four labels remained securely attached, intact and legible after four weeks frozen storage.

Longer-term tests would of course be necessary to confirm this short-term test.

### **7.5. Visible Implant Tag**

North West Marine Technology in the USA has developed a pliable fluorescent elastomer material, which can be injected into a transparent or translucent area of tissue using a special applicator. Several colours with codes from A00 to Z99 allow for over 2000 combinations per colour.

This *Visible Implant Alphanumeric* tagging system has been tested with satisfactory results on white shrimp *Penaeus vannamei* in the USA (Godin *et al* 1996) where a tiny fluorescent pink tag was injected into the first abdominal ('tail) segment underneath the translucent shell.

The manufacturers claim that this internal tagging system may have some applications in the commercial environment with other seafood. Costs of this tagging system are not available at this time.

The major drawback of this system is the small size of the implant and the consequent limitations on the information that can be carried and it does not appear to have any practical application, at this time, particularly for molluscan shellfish.

## 8. TRADE ATTITUDES AND PERCEPTIONS

Oyster producers in three states, and processing companies and seafood merchants (wholesalers and retailers) in Sydney, were contacted. They were personally interviewed to explore their perceptions and attitudes to the concept of individually marking oysters or seafood generally (in the case of seafood merchants) for product differentiation and promotion in the marketplace and for product traceback and recall purposes.

Interviews were purposely loosely structured to be able to get general perceptions on the subject and identify the benefits or drawbacks such a scheme might have for the oyster trade and their business in particular.

A variety of businesses (large, small, innovative and older style etc) were contacted to explore all possible scenarios and attitudes and these are summarised below while some of the verbatim comments are included as Appendix 4.

There is no reason to believe that processors or seafood merchants in other states would have markedly different attitudes to those reported by their Sydney colleagues.

### 8.1. Oyster Producers

General comments nominated by interviewees: **It is impossible to individually label/tag an oyster (in a cost-effective manner) but it would be a good idea if it could be done.**

#### 8.1.1. *Potential Benefits*

While there was widespread recognition of the benefits in relation to food safety traceback and recall few felt that they would be interested in branding or other promotional uses.

The marketing companies or groups operating in NSW, Tasmania and South Australia already sell their product under a brand and can see merit in others producers labelling their product so that all product is clearly differentiated.

#### 8.1.2. *Potential impediments nominated by interviewees*

Costs. NSW farmers in particular say they cannot afford any more costs at all. The industry culture is not conducive to radical or costly changes in working practices.

#### 8.1.3. *In short*

All oyster producers reported that they could see the benefits of individual labelling and would like to implement some effective system if they could afford to do so. However there was little enthusiasm in the discussion of many interviewees. Therefore the consultants believe that there is not strong grass roots support for the adoption of a system of individual marking or tagging.

## 8.2. Oyster Processors

### 8.2.1. General comments

- Don't see the need for it; we have good records [to trace back].
- Its impossible.
- Nothing will stick to oysters from farm to the plate.
- We couldn't do it; it would be too costly.

### 8.2.2. Potential benefits nominated by interviewees

- Nil
- After probing, most interviewees agreed that product marking/labelling would help in product traceback and recall in cases of public health risk.
- No mention of promotional opportunities.

### 8.2.3. Potential impediments or problems nominated by interviewees

- Feasibility: Too hard/impossible to get reliable tag from farm to plate.
- Consumers in restaurants may spill the oyster over themselves if they raise one up above their eyes to look at the label/mark on the shell.
- It should not be too big or look ugly.

### 8.2.4. In short

Almost all processors are unaware of the concern that government, consumers and many seafood industry leaders have about the safety of 'high risk' seafood such as raw oysters and cooked prawns. They believe that their current practices and record keeping are adequate and that it would be too costly to individually mark oysters if it is at all possible.

They claim that they could not afford to do so even if a suitable tag or label was available.

## 8.3. Seafood Merchants

### 8.3.1. General comments nominated by interviewees

- I don't know.
- A good idea (as long as we don't have to do it).
- I can't see any problems with the idea as long as it doesn't put up prices.

### 8.3.2. Potential benefits nominated by interviewees

- Better traceback and recall possible.
- Greater awareness of food safety and the need for date marking [for better stock control and rotation on first in first out basis].

### 8.3.3. Potential impediments or problems nominated by interviewees

- Added costs to farmers and a potential price rise in oysters.
- Customers would be too fussy and return product that is safe to eat but not attractive.

#### 8.3.4. *In short*

Seafood merchants do not have any problems with the concept provided it does not push prices up, but they do not see much potential benefit either.

This sector also is also mostly unaware of the concern that government, consumers and many seafood industry leaders have about the safety of 'high risk' seafood such as raw oysters and cooked prawns. They too believe that their current practices are adequate and that it would be too costly to individually mark oysters if it is at all possible.

## 9. BENEFITS OF TAGGING OR LABELLING

### 9.1. Consumer and Community Benefits

There are various types of benefits which consumers may gain from product labelling of seafood:

- Avoidance of unwanted brands i.e. those from a particular company or a particular region that the consumer wishes to avoid.
- Conversely consumers could select a favoured brand or a favoured region with far greater confidence than with the *status quo* where labels in shop windows are considered unreliable.

Regional branding and promotion is a strong and increasingly important marketing force which has not gone unnoticed by most oyster producers but been underestimated by many other enterprises in the seafood industry.

- Similarly, consumers could more easily avoid a particular species or seafood product that is not wanted for dietary, religious or other reasons.

It should be noted that these benefits accrue to consumers with individual item labelling or with labels attached to batches or packages of seafood.

In short the introduction of labelling of species and company/region allows the consumer the opportunity to make informed decisions and select or avoid seafood of their choice with some confidence.

This is particularly important for the *yopi*'s. These are the:

- very young
- very old
- pregnant
- immune system compromised

Persons in the community, i.e. those considered most vulnerable or 'at risk' in the community in relation to consumption of various high risk foods such as raw oysters or cooked prawns.

The implementation of reliable labels could reduce the concerns of this part of the community and general consumer concerns about any particular area in the country and perhaps thereby assist in raising the consumption of seafood overall in Australia.

Product labelling obviously offers great benefits to the community, government and industry when there is a potential public health danger, as discussed below.

### 9.2. Traceback and Recall of Dangerous Product

The labelling of individual items or batches of seafood with a distinctive company name or unique brand name and address would allow for a rapid traceback and recall of any product deemed to be dangerous to public health.

Any investigation of product implicated in seafood borne illness or a public health scare could be undertaken far more quickly if all seafood products were clearly identified as to its origins (farm/vessel/factory etc) throughout the marketing chain from the producer or processor to the consumers.

Product recalls could also be undertaken in substantially less time and at a lower cost to government and industry and the aggregate saving in time would reduce the human suffering and economic impact of any public health incidents.

The consumer and the community at large are both affected by food borne illness because they all share in the medical costs (directly and indirectly) and the wider community suffers from the lost employment and economic activity which results.

The American Food and drug Administration (FDA) examined the costs and benefits for the USA seafood industry in using Hazards Analysis Critical control Points ( HACCP) principle to improve food safety. It estimated the value of experiencing fewer seafood related illnesses a result of ‘ a better seafood supply’ to be between US\$15 and 75 million per year ( NOAA 1996).

Paradoxically, while it is commonly assumed that the Australian public has a reasonable or good understanding of notable geographical names, there is anecdotal evidence which questions the ability of some people to recall regional names, such as Wallis Lake, or identify where a particular estuary is located.

For example, in December last year a motel operator at Forster (on the shores of Wallis Lake) commented to a colleague that some of her guests did not realise that the adjacent lake was the area implicated in the recent public health incident with oysters.

Geographical names are of importance in finfish products too. Ciguatera poisoning is a seafood marketing and health problem with an ecological origin. Platypus Bay inside Hervey Bay in north Queensland has a notorious reputation for harbouring ciguateric spanish mackerel (Holmes et al 1994) while other parts of Hervey Bay do not generate these public health problems with fish.

Unambiguous tags on potentially ciguatoxic fish (species) caught from potentially dangerous areas would of course assist in rapid product recall in times of public health problems. However, the application of tags on fish may in itself lead to unnecessary consumer concerns about fish from other areas with no history of food poisoning.

### **9.3. Trade Benefits**

The clear labelling of all shellfish on the premises in any type of business would generate greater awareness and act as a constant reminder of consumer and government concerns about the safety of seafood for all parties handling seafood for sale: i.e. producers’ processors, seafood merchants and restaurateurs.

This could therefore be quite a powerful reminder for junior level staff and ‘old hands’ who may not appreciate the social and economic costs of food poisoning and the growing community concerns about food safety or those staff who are critical of a persistent boss’ demands for personal and plant hygiene.

Although it is extremely difficult to quantify the value of such a hidden benefit to staff training and hence to food safety it would nevertheless be a substantial one given the current difficulties and costs of effective staff training across all food businesses.

The voluntary national adoption of a practice of labelling individual items of shellfish and finfish by all seafood producers and packers would demonstrate to the community at large, and the seafood consumer in particular, that the Australian seafood industry is indeed responsive to their concerns about food safety.

In short it would give the seafood industry an opportunity to establish itself as a world leader in such matters and the associated publicity would enhance seafood sales in the short to mid term and perhaps over the long term too, in both the domestic arena and overseas.

A unilateral initiative by the Australian seafood industry would have value for the oyster industry in particular given the extensive negative publicity surrounding the Wallis Lake problem in 1997 and the subsequent legal proceedings.

An unpublished study on NSW seafood retailer's attitudes by Ruello & Associates in January and July 1997 found that seafood sales levels had not returned to normal for 83% of businesses four months after the peak of the Wallis Lake oyster incident. This study did not attempt to quantify the loss of revenue or the economic cost to industry but it demonstrates some of the widespread impact of unfavourable media publicity.

A recent American report gives another insight into the economic impact of a shellfish safety scare in Canada and the need to minimise financial damage to industry by having clear labelling.

The loss of sales (in Montreal alone) due to a one month ban on the sale of mussels and the related publicity over a few months during the summer of 1990 represented approximately 15% of the leading producers annual sales; dollar values were not quoted in order to protect the commercial confidentiality (Wesley *et al* 1994).

The clear labelling of all seafood would help to reduce the number and magnitude of problems and increase aggregate sales of seafood over the long term by reducing the anxiety some consumers now feel regarding the safety of some seafoods and their apprehension to purchase seafood of any kind.

In the USA, researchers have reported that consumers assessment of oyster safety are related to their past frequency of consumption of oysters, to prior illness from oysters, to exposure to negative publicity about shellfish and to other demographic factors (Lin *et al* 1991).

Furthermore, the American FDA study cited earlier (NOAA 1996) found that there is a massive gain to the nation (estimated as \$US 3 to 14 billion) from better health and reduced deaths associated with increased seafood consumption.

It is noteworthy that the Australian beef industry's strong labelling and traceback system was used very effectively to quickly protect Australia's reputation and market share in the USA in 1994 when minced meat was implicated in a major hamburger scare.

For the seafood processors and merchants the labelling of all seafood items with a date mark (processing or packing date) by the producer would greatly assist in stock management in regard to:

- clear reliable identification of all items, in a refrigerated or dry store, particularly when two (or more) lots of oysters etc are used to make up one sale,
- the rotation of stock (on a first in first out basis) to minimise the average age/time in store and the risk of selling old product that has little or no shelf life remaining.

Although the costs of poor stock control have not been quantified it is a substantial one in terms of dollars because of the business losses incurred when unsatisfactory product has to be replaced or refunded or a loss of a customer when old seafood is sold and eaten.

Although the economic benefits of the introduction of product labelling/tagging in regard to public health costs, food safety concerns and aggregate seafood sales are difficult to quantify. At this time there is sufficient information to suggest that they would exceed the costs (as discussed earlier in Section 9) even though many businesses report that they cannot afford any further operating costs

(Section 10).

The branding of individual shellfish has long been talked about but not yet implemented in Australia. Overseas, the tagging of American lobsters *Homarus americanus* in the United States and Canada is the only example of note in the shellfish industry but this individual brand tagging is the exception rather than the rule amongst lobster processing/marketing companies.

In Australia oysters have traditionally been sold unbranded and the most notable product differentiation relates to the naming of the geographical origins such as Tasmanian or South Australian (for Pacific oysters) or Wallis Lake or Hawkesbury River etc (Sydney rock) as is seen on cartons or bags of unopened oysters.

Most individual farmers do not have all year round supply and have not developed sophisticated marketing or brand promotional programs.

Part of the South Australian oyster industry has worked in a collaborative manner by selling Pacific oysters under their OYSA brand. In Tasmania TASEA has been set up as a marketing company to market the oysters produced by its shareholders. Both of these companies have a price premium of about 25 cents per dozen on most unbranded oysters marketed by competing producers.

In NSW the brand promotion and advertising of fresh oysters in the half shell was initiated in a formal manner in late 1992 by the Australian Oyster Marketing Cooperative Ltd. This company got under way well but soon came into financial difficulties, reportedly as a result of under capitalisation, inexperienced management and a flawed marketing plan, and closed within two years.

A group of farmers on the south coast of NSW grade and brand their oysters in a uniform manner and market their product collaboratively and report that they achieve a small but significant price premium for their extra work.

The marketing and economic benefits of the brand promotion enjoyed by these three oyster marketing companies/groups would continue with any move to individual marking of shellfish but there is no evidence from discussion with oyster farmers, processors or seafood merchants to suggest that any existing price premium would be increased by such a move to individual tags or labels.

The traditional and general response of oyster processors and merchants is to discourage and resist any mooted price increases.

#### **9.4. Summary of Benefits**

Reliable identification:

- Quicker and safer product traceback and recall
- Which allows more informed choice by customers and consumers re species, region, company and use by date.

*This all enhances consumer confidence and thereby helps to increase sales over the longer term.*

Better stock control and stock rotation for everyone in the seafood marketing chain means better quality (fresher and safer) product for consumers and less wastage for business and consumers.

*This too in turn raises consumer confidence and helps to boost seafood sales over the longer term.*

## 10. IMPEDIMENTS OR BARRIERS

There are various impediments or barriers to adoption of individual labelling or tagging. The cost of application of any tag or label and the prevailing industry culture are the two key impediments to changes. Together they represent a formidable combination.

As discussed earlier any tagging/labelling system must be practical and inexpensive for the particular type of seafood but it must also be adopted rapidly and widely throughout the country by a seafood industry and food service industry which have had some difficulty appreciating the strength of government and community concerns about food safety.

### 10.1. Industry Culture

A system of product labelling or tagging from producer to the consumer can only succeed if it is voluntarily carried out on a substantial volume of a particular seafood commodity or it becomes mandatory through government regulation.

If the majority of the tonnage of a particular seafood commodity is branded or the market leader/major producer starts the practice then market forces will assist in the adoption of the practice by other players in the particular commodity sector.

However with partial adoption of labelling practices i.e. if only an insignificant number of producers or a small volume of the trade in a particular seafood item is labelled, indifferent or unscrupulous operators can continue to trade and thrive (in what is essentially the *status quo*) without any market loss, financial penalty or public censure if they sell inferior or perhaps even dangerous seafood unlabelled.

*Rapid widespread adoption is necessary to ensure that unbranded product is treated with caution or suspicion and bought only as a last resort by seafood merchants and consumers alike so that all producers and merchants quickly implement any new reforms.*

The voluntary adoption of individual product labelling (as opposed to a government imposition) would require widespread seafood industry, food service industry and consumer support.

The latter is already evident judging from the volume and tone of media reports regarding food safety but some parts of the seafood industry have yet to appreciate the strength of the prevailing concerns in the wider community and may not be so supportive of changes to current practices.

The producers or marketers of inferior or dangerous product are unlikely to endorse any reforms with any vigour and some may even actively resist any proposed changes.

The adoption of any new product labelling system should therefore be preceded by a national consultation and public relations program to:

- outline the reasons for its introduction
- explain how it is proposed to function
- and the benefits for government, industry and the consumer.

## 10.2. Costs

The major impediment to the widespread application of a label or tag to individual shellfish (for food safety reasons or brand promotion) has probably been the cost. As indicated earlier effective tags for shellfish are available, albeit at some cost.

All parties in the seafood marketing chain from producer to the retailer/restaurateur can see some merit in individual labelling provided they do not have to pay for it.

They all emphasise that any increase in the cost of shellfish such as oysters, no matter how small a price rise, would have a substantial negative impact on their sales and profitability.

The combined cost of a cheap adhesive label and the application labour would probably equal or exceed the farm gate value of all the cheaper shellfish such as pipis, mussels and very small Sydney rock oysters.

For a large oyster, worth 40 cents at the farm gate, a 3 cent additional cost for labelling each oyster would drastically reduce, or in some cases totally, eliminate the profit for the farm.

It is unlikely that some future mechanical innovation to speed up the application of a tag or label will be much help to Australian farmers given the small volume of output and poor financial situation of many, particularly the Sydney rock oyster farmers.

Most NSW oyster farmers argue that they cannot afford any further costs at all because current costs of production and purification are very high. Oyster producers in the other states also say they cannot afford the cost of individual labels or tags.

## 11. CONCLUSIONS AND RECOMENDATIONS

There are a number of proprietary brand adhesive labels that will stick to a clean dry oyster, and many other shellfish, and remain intact and legible from a processor (oyster opener) to the consumers plate.

Similarly there are a number of proprietary brand plastic tags that can be glued to an oyster or other shellfish to provide a positive and rapid identification for brand marketing or product traceback.

However there is no label or tag that can be applied in a cost effective manner to a typical damp oyster on the farm which will survive the common handling and processing procedures in the marketing chain from the 'paddock to the plate'.

Plastic tags can be glued to shellfish such as oysters in an effective manner but the cost of the tag alone (at least 3 cents) would substantially raise the price of the oyster while the tag and application costs in total would make oysters prohibitively expensive.

Several of the commercially available tags could however be applied cost effectively to the more costly or larger shellfish such as abalone, crabs or lobsters for brand promotion and/or product traceback purposes.

The application of an adhesive label to a clean dry oyster for branding and product differentiation purposes can be achieved for a relatively modest sum but one that is prohibitive for the majority of oyster farmers.

Ink jet printing is also an option for brand promotion for a number of molluscan and crustacean shellfish of substantial value and relatively clean and uniform shells (such as scallops and cooked mud crab). It cannot be recommended for product identification for traceback purposes for many shellfish because the printed image is not always sufficiently legible.

Most bivalve molluscs have a farm gate or beach value of about 3-30 cents each and an additional handling cost of just one cent each (a minimum cost for a small paper label, without any labour costs) for any label, tag or inkjet printing would have a substantial impact on profitability for most farmers or harvesters of wild shellfish such as oysters, pipis or mussels.

The NSW oyster industry has traditionally been troubled by public health problems due to biological contamination of live oysters in the growing waters. However the industry's continued success also relies on the safe handling of oysters by the processors and merchants and the food service industry who help distribute the product to consumers.

These market intermediaries are in fact a weak link in the marketing chain because they are mixing product from different sources and many are unaware of the high risk nature of seafood eaten without further processing or heat treatment and the potential problems inherent in such mixing practices in the absence of detailed records.

The absence of a cost effective method for labelling individual shellfish is commonly seen as a weakness in the seafood marketing chain even though farmers label the bags or cases of oysters leaving their packing sheds.

However the real problem is the mixing of product by processors, merchants and the food service sector and the ineffective labelling/identification of product and inadequate record keeping practices.

Problems arise when oysters or pipis etc are not clearly identified or labelled and unable to be positively identified and quickly traced back along the marketing chain to the producer.

The key issue is reliable identification rather than labelling per se; individual paddock to plate labelling/tagging is not absolutely essential.

The marketing and food safety outcomes sought by the oyster producers can be achieved by improving the handling and labelling practices with the traditional trade units of a dozen, a bag, a bottle or a case of oysters or the one, ten kilograms etc of shellfish sold by weight.

Shellfish in even the smallest of these trade units for retail or restaurant sale *can be* identified in a cost effective manner to both satisfy brand marketing requirements and allow for rapid and reliable identification and traceback with a variety of labels costing from one to a few cents each.

The potential problem with the origin or identification of oysters stacked on a self serve buffet at clubs etc can also be overcome with better handling and record keeping by the food service establishment.

*A national strategic plan can be implemented to overcome the current weaknesses in the distribution and processing of shellfish and guide the industry to a desired outcome. This strategy could strengthen the food safety of oysters from the paddock to plate and build consumer confidence in Australian oysters*

We believe that a national strategy or action plan would be a better investment of R & D funds at this time than further research and development on labels or tags. Even if a suitable adhesive is developed and a cost effective tag or label is available some time in the future there still will need to be changes to current practices, along the lines proposed below, to improve the safety of oysters.

The proposed strategy should include:

- Industry consultation and communication via seafood industry workshops in selected areas around Australia to outline the problems with the *status quo* and explore pragmatic solutions to general and regional problems.
- Development of a Code of Practice for oyster processors.
- Fast track development and delivery of a trade education and training program on oyster handling for oyster processors, seafood merchants and the food service sector.

**While this strategy would focus on oysters, other shellfish businesses and indeed the seafood industry generally, would enjoy some of the benefits of this proposal too.**

The proposed trade education and training program should integrate with and build on the existing shellfish quality assurance programs (SQAP's) in each state. and as a minimum cover:

- The need for reliable labelling and product identification, focussing on consumer and government concerns about food safety and the cost to the seafood industry of foregone sales from repeated adverse publicity about seafood.
- Basic food hygiene and temperature control.  
A curriculum item for any training on food safety.

- Cost effective methods of product labelling.  
*For unopened oysters, bottled oysters, 10 dozen case or a one dozen tray of opened oysters to meet the business needs and ANZFA food safety requirements.*
- How in-house product labelling/identification and record keeping procedures can make food safety plans better and also facilitate or strengthen any company QA programs.

In short, the implementation of good hygiene practices (GHP) and good manufacturing practices (GMP) which normally underpin a truly effective food safety plan or Quality Assurance program to ensure safe food.

This approach is consistent with and reinforces the national aims of the Australia New Zealand Food Authority (see below) and the seafood industry's SeaQual strategic plan.

To gain the necessary widespread seafood industry support it is essential that reform is undertaken nationally and that the strategy be initiated by a high level prestigious entity such as the ministerial Fisheries and Aquaculture council and the workshops be launched by an appropriate minister in each state.

A Fisheries and Aquaculture Ministerial Council sponsorship would highlight the importance of the strategy and the workshops and a personal invitation to a limited number of industry leaders from a Minister is needed as an incentive to gain attendance by the selected influential participants.

The timing is opportune right now because most oyster processors, seafood merchants and food service businesses are aware of the imminent need to implement food safety plans to meet the reforms proposed by the Australia New Zealand Food Authority. A truly effective food safety program would include procedures for reliable identification of all high risk products such as oysters to allow for product traceback and recall.

Therefore the changes needed in the seafood marketing chain to make shellfish safer can easily and sensibly be accommodated within the food safety plan all food businesses are required to implement soon and hence do not represent any special burden to any particular group: the oyster producer, processor, wholesaler, retailer or food service operator.

This industry action should be supported with the enforcement of the relevant food regulations by the appropriate state authorities.

In this way the responsibility for and the cost of implementing reliable shellfish product identification or labelling is shared by all of the relevant groups in industry and government.

---

## 12. REFERENCES

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- Godin, D. M. *et al.* Evaluation of a fluorescent elastomer internal tag in juvenile and adult shrimp *Penaeus vannamei*. *Aquaculture*, 139: 243-248.
- Holmes, M.J., Lewis R.J., Sellin, M. and R. Street, 1994. The origin of ciguatera in Platypus Bay, Australia. *Mem. Qld Museum* 34(3): 505-512.
- Lin, C., T. Jordan, J. Milon and E. Babb, 1991. Determinants of subjective food safety perceptions. *J. Agribusiness* 9(1):71-84.
- Lemarie, D., Smith, D.R, Villela, R.F. and D.A., Weller. 1996. Evaluation of tag types and adhesives for marking freshwater mussels. Conference poster presentation. Available on the www on <http://www.lsc.nbs.gov/acl/posters/tagging/tagfram.HTM>.
- MacMullen, P.H., 1998. A report to the Fish Industry Forum on the Marine Stewardship Council and related topics. Sea Fish Authority Consultancy Report CR152. 42 pp + appendices.
- NOAA, 1996. Our living oceans. The economic status of US Fisheries. NOAA Technical Memorandum NMFS –F/SPO-22. 130pp.
- Wessells, C.R., C.J., Miller and P.M., Brooks, 1994. Toxic algae contamination and demand for shellfish. A case study of demand for mussels in Montreal. University of Rhode Island URI/OSU Research Paper series RI 94-106.

### **13. INTELLECTUAL PROPERTY**

It is not anticipated that any intellectual property will arise from this project.

### **14. STAFF**

The following staff were employed at and by NSW Fisheries to work on this FRDC Project:

**Mr Damian Ogburn B.Sc M.Sc.**  
Principal Manager Aquaculture  
12% of Time

**Mr Nick Ruello B.Sc M.Sc.**  
Principal; Ruello & Associates Pty Ltd  
100% of Time

## **15. APPENDICES**

### **Appendix 1: Ketchum catalogue**

# Ketchum

MANUFACTURING INC.

## SEAFOOD AND AQUACULTURE TAGS

SINCE 1913

Catalogue #98

FINFISH GILL TAGS  
 LOBSTER TAGS  
 STEAK AND FILLET TAGS  
 RECIPE TAGS  
 ICE PICK (P.O.P.) TAGS  
 LIVE OPERCULUM TAGS  
 SHELLFISH TAGS AND SEALS



**SAN MONICA SEAFOOD**

SEA SCALLOPS VANCOUVER  
 8 to 12 scallops per lb  
 Farm raised  
 Chemical free. Dry packed  
 Origin: Vancouver Island

**\$63.49** LB.

**HANDY SOFT SHELL CRABS**

**Special**

SEA SCALLOPS  
**\$29.79** Kg

LAKE STURGEON L9L 92-0002

**Ketchum Manufacturing Inc.**  
 386 Barkley Avenue Ottawa, Canada K2A 2G8  
 Tel: (613) 722-3451 Fax: (613) 722-5612  
 e-mail: ketchum@sympatico.ca www.ketchum.on.ca

# PLASTIC GILL TAGS

Strengthen customer loyalty and attract new customers by using Ketchum Gill Tags.

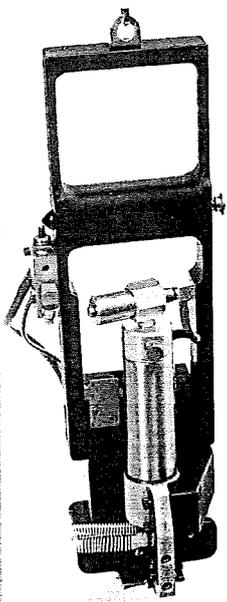
- HACCP Certification
- Brand Loyalty
- Place of Origin
- Product Species
- Grade Identification
- Health Inspection
- Nutritional Labelling
- Product Quality
- Freshness Dating
- Handling Information
- Cooking Instructions
- Fillet Promotion



Ketchum Gill tags are manufactured from food approved plastic and are printed with food approved inks.

# SEAFOOD TAG APPLICATION SYSTEMS

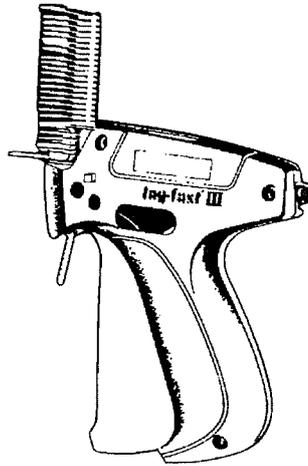
## AUTOMATIC GILL TAGGING MACHINE



Ketchum's automatic gill tag machine is an efficient and high speed attaching system designed for our line of plastic seafood tags. This machine utilizes compressed air and is suspended over the packaging table. Our automatic attacher provides the operator with a one-handed, quick and easy method of applying tags to the gill cover of fresh fish.

## TAGGING TOOLS AND ACCESSORIES

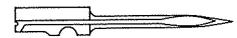
ACTUAL SIZE



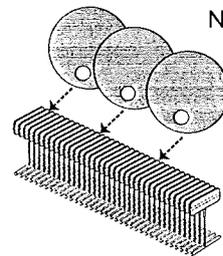
Tool with

**#8973-075**  
1/2" Paddle  
Fasteners

Ketchum seafood tags can be supplied already attached to "T" End plastic fasteners; this will allow for ease of application.



**#8958N-075**  
Needles only

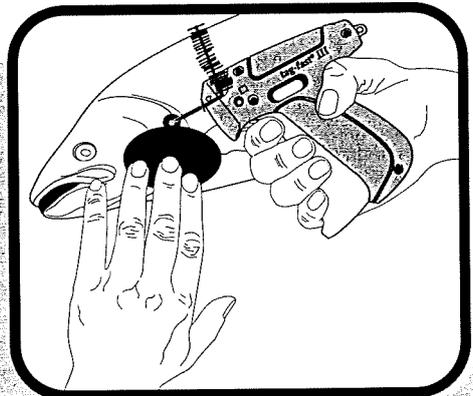


"T" End Plastic Fastener

Seafood tags can be attached to every 2nd fastener on the row.

## CONSECUTIVE / LOT NUMBERING

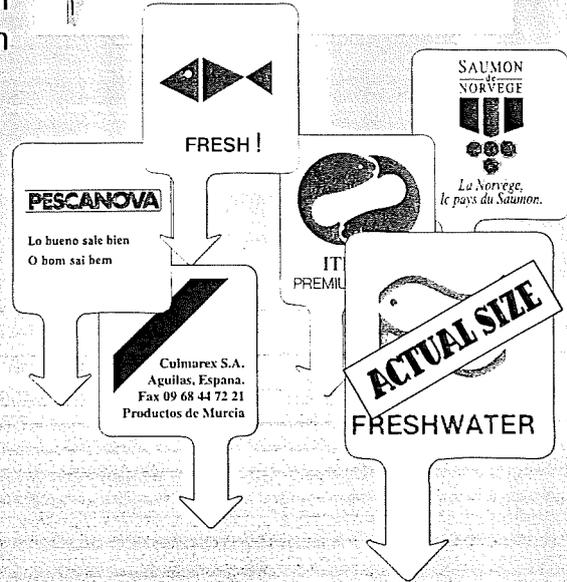
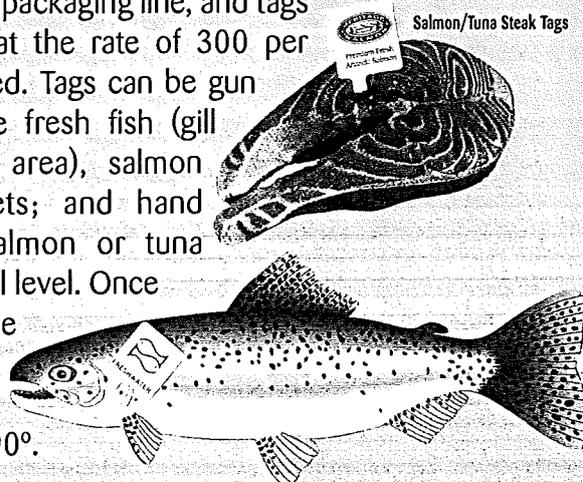
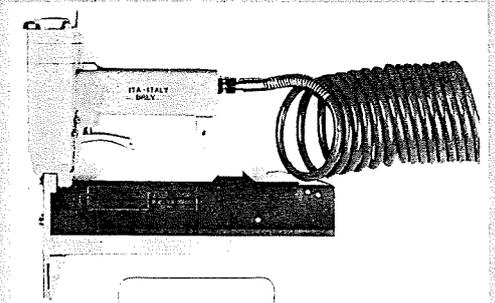
Our modern jet printing facility enables us to print consecutive or constant numbers, weight or other measurements, on many of our existing shapes of plastic seafood tags.



# I.T.A. AUTOMATIC TAGGING SYSTEM

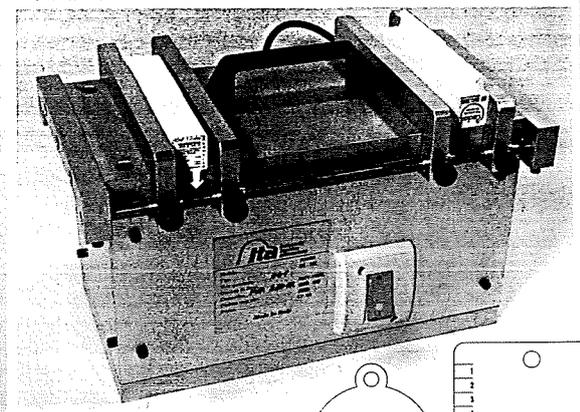
The I.T.A. automatic tagging system has been utilized by the poultry industry worldwide for grade identification and promotional reasons for many years. This system has now become an acceptable method for seafood promotion either in whole fish, salmon steaks, or fillets.

Ketchum produces tags in heat sealed cartridges of 200; two of these cartridges are then inserted into the compressed air driven gun. The I.T.A. automatic gun is suspended from a suspension pulley, above the packaging line, and tags can be applied at the rate of 300 per minute, if required. Tags can be gun applied to whole fresh fish (gill cover or other area), salmon steaks and fillets; and hand inserted into salmon or tuna steaks at the retail level. Once inserted, these tags stand out from the product from 45° to 90°.



# QUALITY CONTROL DATING SYSTEM

Freshness dating programs are becoming a necessity in the marketplace. Ketchums has responded to this need for a dated seafood tag by introducing a unique system which can be operated easily in the processing plant. This dating system consists of a machine that has circular saws which cut a notch in certain locations on the outside of the tag to correspond to a month and day. These tags can be supplied in cartridge form for ease of insertion, or loose for individual hand insertion.



**Heritage Salmon**  
Premium Fresh Atlantic Salmon

**POLLO SE DICE Prøver**  
POLLO ENCEBERRADO CON MENUDOS  
SENAÑA Nº 1007  
INDUSTRIA ALIMENTARIA  
DE REGULACION CALIDAD, S.A.

**BOKTAE**  
ΕΛΛΗΝΙΚΟ ΚΕΤΟΝΟ

**ΚΑΛΗΜΕΡΑ**  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

**ΚΑΛΗΜΕΡΑ**  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

# SEAFOOD IDENTIFICATION / PROMOTIONAL TAGS

KETCHUM SEAFOOD IDENTIFICATION/PROMOTIONAL TAGS ARE MANUFACTURED FROM FOOD APPROVED PLASTIC AND ARE PRINTED WITH FOOD APPROVED INKS.

- BAG TAGS • PACKAGE INSERT TAGS • ROAST/FILLET TAGS • LOBSTER/CRAB TAGS
- SIZE TAGS • INSPECTION TAGS • STATE/COUNTRY OF ORIGIN
- NUTRITIONAL INFORMATION • COOKING INSTRUCTIONS
- GRADE IDENTIFICATION • FRESHNESS RATING • INVENTORY CONTROL



## COLOUR IDENTIFICATION TAGS

KETCHUM COLOUR I.D. TAGS CAN BE USED FOR A WIDE VARIETY OF APPLICATIONS. THEY ARE AVAILABLE IN 12 DIFFERENT COLOURS AND CAN BE SUPPLIED WITH A JET PRINTED CONSECUTIVE NUMBER, LOT NUMBER OR A DATE INDICATION.

(SIZE: 1-7/8" x 2")

COLOURS: RED, ORANGE, BLACK, GREY, PINK, YELLOW, BROWN, DARK BLUE, LIGHT BLUE, LIGHT GREEN, DARK GREEN, PURPLE



# AQUACULTURE TAGS & ACCESSORIES

## Net/Pen Tags

RC-518A-075

- 3-1/2" high x 2-1/4" wide x 3/16" thick
- 1" diameter hole
- Nylon
- Red, Blue, or Black
- Consecutively numbered and/or screened/engraved with a company name and/or logo
- On one or both sides



## Versa Tag



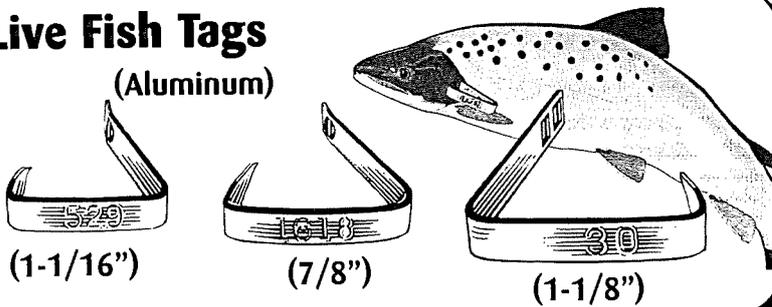
ACTUAL SIZE

(KT-3009-075)

NYLON - 1-3/4" x 5/8" x 1/8"  
6 colours Consecutively numbered

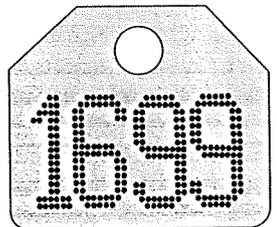
## Live Fish Tags

(Aluminum)



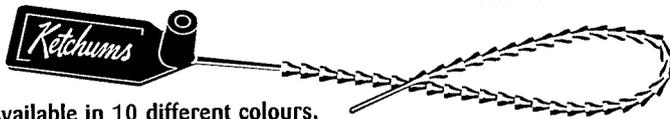
## General I.D. Tags

(KK-1080-075)  
Yellow or White  
.015 PVC  
3" x 2-9/16"

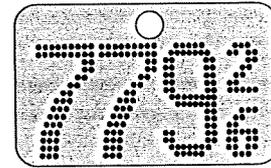


## Plastic Cinch-up Seal

XKT-844-075



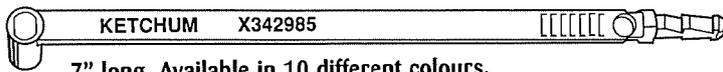
7" long. Available in 10 different colours.  
With/without consecutive numbers and/or lettering.



(KK-1090-075)  
Yellow or White  
.015 PVC  
3" x 1-7/8"

## Plastic Dual Lock Seal

XKT-609-075

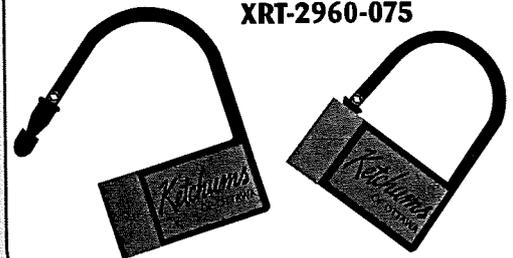


7" long. Available in 10 different colours.  
With/without consecutive numbers and/or lettering.

## Plastic Padlock Seal Red

3/4" closed diameter.

XRT-2960-075

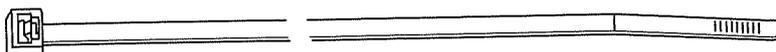


## Plastic Cable Tie

5-1/2" - XK-8376-075

7-1/2" - XK-8387-075

5-1/2" or 7-1/2" Natural Nylon



## Polyurethane Tags

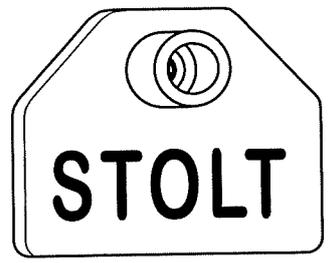
1-5/8" wide x 1-3/8" high  
Available in yellow, orange, white,  
green, or blue.

Can be jet printed with a consecutive  
number or a company or month name.



ACTUAL SIZE

RT-3204F-075



ACTUAL SIZE

# Ketchum

SINCE 1913

# POINT OF PURCHASE TAGS

(ICE-PICK TAGS)

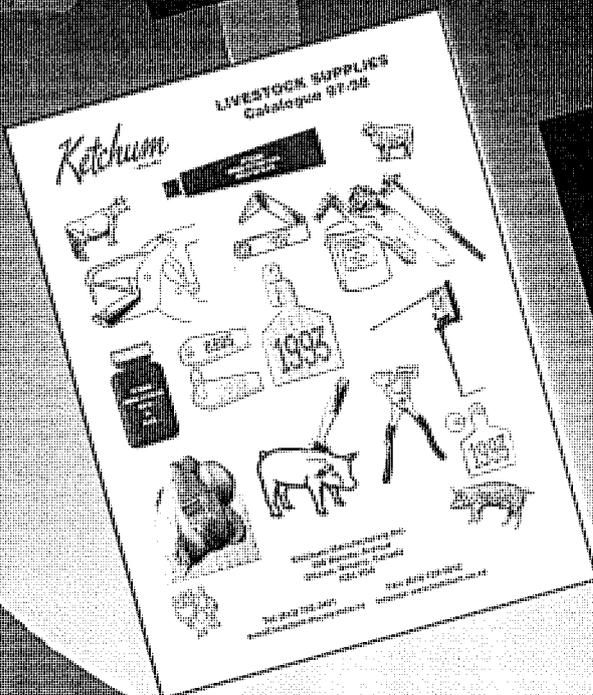


Our catalogue of POINT OF PURCHASE Materials is now available - Please request a copy.

**KETCHUM MANUFACTURING INC.**

396 Berkley Ave. Ottawa, Ontario, Canada K2A 2G6 Tel: (613) 722-3451 Fax: (613) 722-5612 e-mail: ketchum@sympatico.ca www.ketchum.on.ca

# Other Catalogues Available From Ketchum



**Ketchum Manufacturing Inc.**  
 396 Berkley Avenue, Ottawa Ontario, Canada K2A 2G6  
 Tel.: (613) 722-3451 Fax: (613) 722-5612  
 e-mail: [ketchum@sympatico.ca](mailto:ketchum@sympatico.ca) [www.ketchum.on.ca](http://www.ketchum.on.ca)

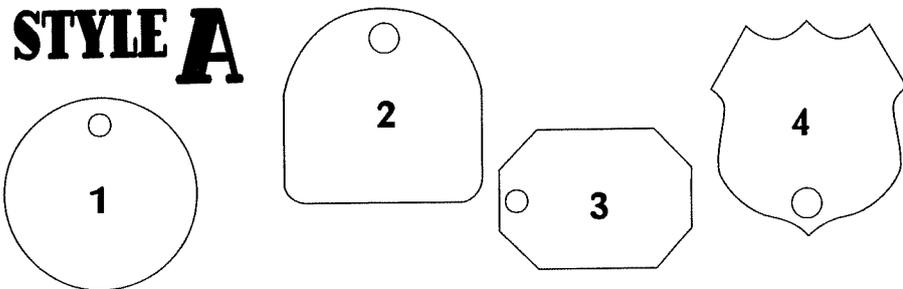
## PRICE LIST SEAFOOD & AQUACULTURE TAGS

CATALOGUE - 98 March 1998

Pages 1,2,4...

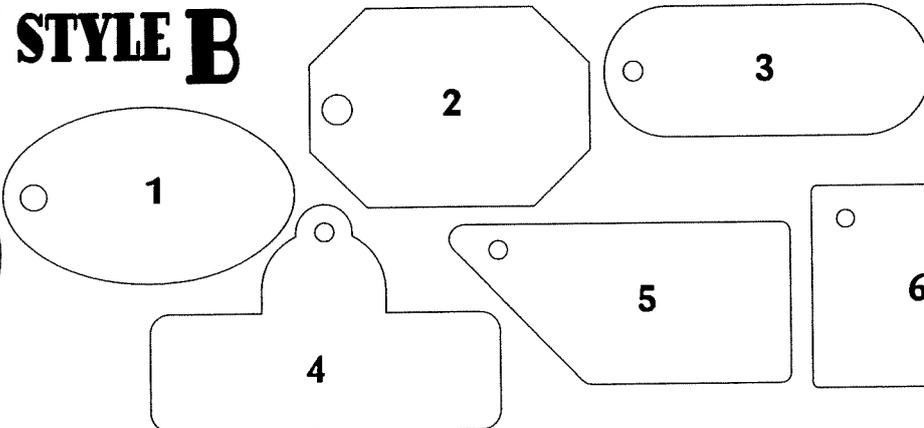
- Gill Tags & Identification/Promotional Tags.
- Film/plate charge applicable to all Gill tags and Identification/Promotional tags.
- \$275.00 (Cdn), \$215.00 (U.S.) per colour, per side.
- Most tags may be consecutively or lot numbered.
- For quantities over 100,000 - please ask for a quotation.

### STYLE A



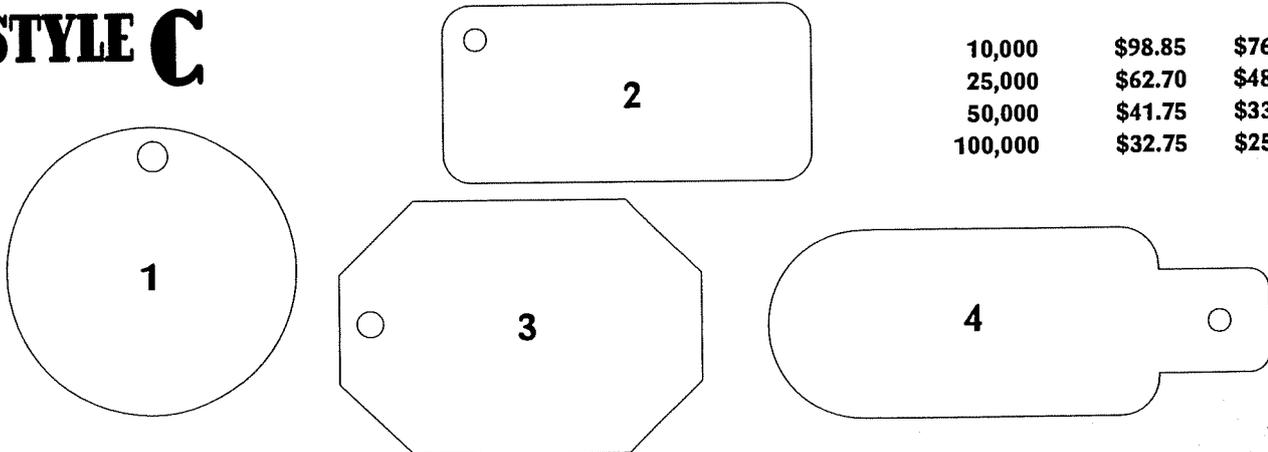
Quantity	\$ Cdn.	\$ U.S.
	Price per 1,000	
10,000	\$94.25	\$72.55
25,000	\$56.95	\$43.85
50,000	\$35.50	\$28.05
100,000	\$25.75	\$20.35

### STYLE B



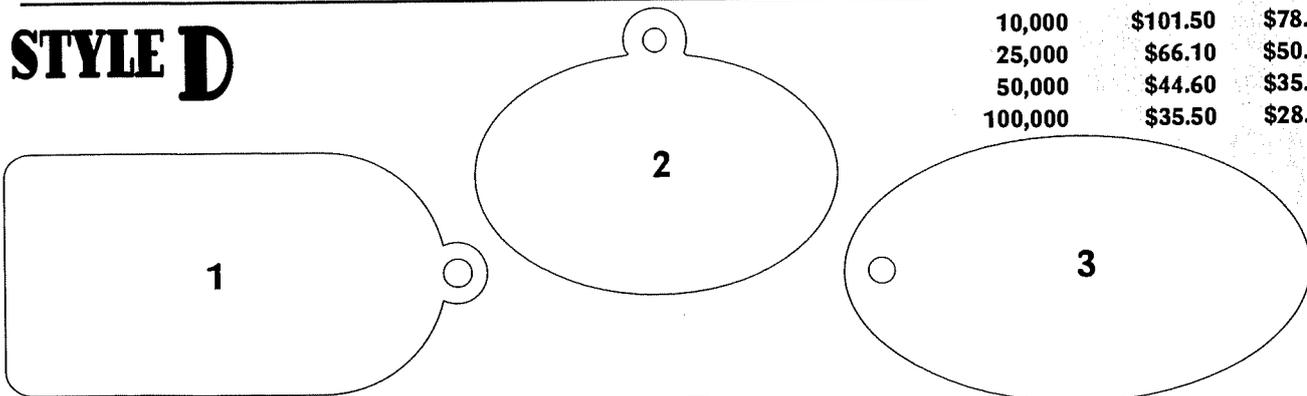
10,000	\$95.75	\$73.75
25,000	\$58.80	\$45.30
50,000	\$35.25	\$27.85
100,000	\$26.60	\$21.00

### STYLE C



10,000	\$98.85	\$76.10
25,000	\$62.70	\$48.30
50,000	\$41.75	\$33.00
100,000	\$32.75	\$25.90

### STYLE D



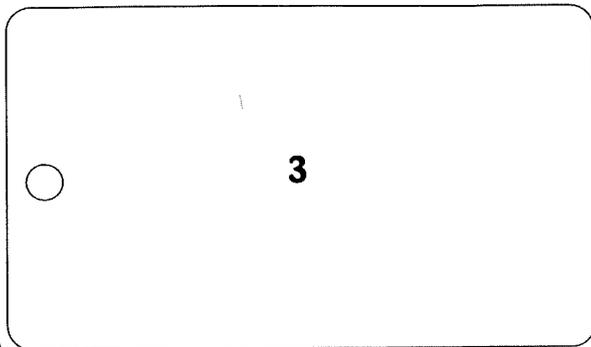
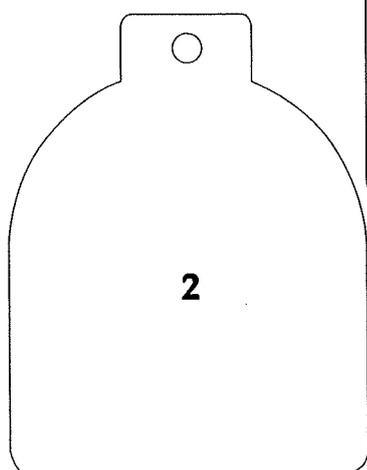
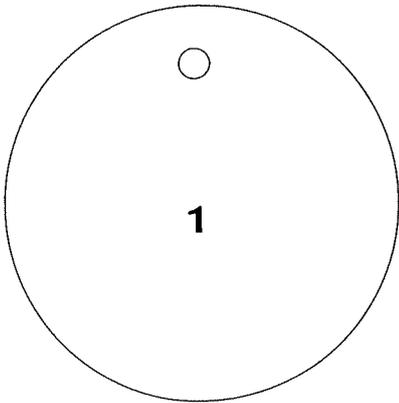
10,000	\$101.50	\$78.15
25,000	\$66.10	\$50.90
50,000	\$44.60	\$35.25
100,000	\$35.50	\$28.10



**PRICE LIST — SEAFOOD & AQUACULTURE TAGS**  
**MARCH, 1998**

**Pages 1,2,4...**

**STYLE E**



Quantity	\$ Cdn.	\$ U.S.
	Price per 1,000	
10,000	\$113.50	\$89.70
25,000	\$78.10	\$61.70
50,000	\$50.30	\$39.75
100,000	\$42.30	\$33.45

**Page 2...**

	\$ Cdn.	\$ U.S.
<b>Automatic Gill Tagging Machine</b> .....	\$2,800.00	\$2,150.00

**Tagging Tool and Accessories for Plastic Seafood Tags:**

#8958-075	FDA Approved Tagging Tool .....	\$72.90 ea.	\$56.15 ea.
#8958N-075	Needles Only .....	\$9.15 ea.	\$6.90 ea.

**1/2" Paddle Fasteners:**  
**#8973-075**

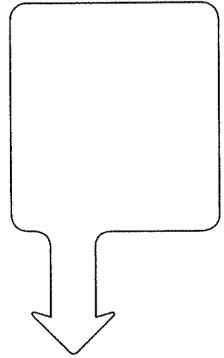
Quantity	\$ Cdn.	\$ U.S.
	Price per 1,000	
5M - 24M	\$2.90	\$2.35
25M - 49M	\$2.80	\$2.25
50M - 99M	\$2.70	\$2.15
100M - 249M	\$2.60	\$2.05
250M+	\$2.50	\$1.95

Please request a price quotation for seafood tags supplied already attached to "T" end plastic fasteners.

**Consecutive/Lot Numbering...**  
 Only certain tag shapes can be lot or consecutively numbered.  
**Lot Numbering** - Add \$10.00/1,000 (Cdn.); \$8.00/1,000 (U.S.) to the price of the tags.  
**Consecutive Numbering** - Add \$19.00/1,000 (Cdn.); \$15.00/1,000 (U.S.) to the price of the tags.

**Page 3...**

**I.T.A. AUTOMATIC TAGGING SYSTEM**



Complete tagging gun kit. Includes applicator, regulators, suspension pulley, hose and instructions.  
**\$1,495.00 (Cdn.) \$1,150.00 (U.S.)**  
 Minimum quantity of tags - 25,000  
 Film/Plate charge: \$275.00 (Cdn.) \$215.00 (U.S.) per colour, per side  
 Tags: \$10.75/1,000 (Cdn.) \$8.40/1,000 (U.S.) on quantities of 25,000 to 250,000.  
 For quantities over 250,000 - please ask for a quotation.

**Page 3...**

**QUALITY CONTROL DATING SYSTEM** - Please request a quotation.

### Page 4...

## SEAFOOD IDENTIFICATION/PROMOTIONAL TAGS

See page 1 of price list.

### COLOUR IDENTIFICATION TAGS

The total number of tags you require may be made up of between 1 to 12 colours, providing the minimum of any one colour is 1,000. Lot, Date or Consecutive numbering is done on one side only. Pricing is per 1,000 tags.

TOTAL TAG Quantity	COLOURED Blank		COLOURED Lot or Dated		COLOURED Consecutively Numbered	
	\$Cdn.	\$U.S.	\$Cdn.	\$U.S.	\$Cdn.	\$U.S.
5,000	\$51.40	\$40.60	\$61.40	\$48.60	\$70.40	\$55.60
10,000	\$48.95	\$38.70	\$58.95	\$46.70	\$67.95	\$53.70
25,000	\$46.60	\$36.80	\$56.60	\$44.80	\$65.60	\$51.80
50,000	\$44.40	\$35.10	\$54.40	\$43.10	\$63.40	\$50.10
100,000	\$42.30	\$33.45	\$52.30	\$41.45	\$61.30	\$48.45

For quantities over 100,000 - please ask for a quotation.

### Page 5...

## AQUACULTURE TAGS & ACCESSORIES

RC-518A-075

Net/Pen Tags. Red, Blue or Black

PRICES - EACH	1 TO 99		100-999		1,000-4,999	
	\$Cdn.	\$U.S.	\$Cdn.	\$U.S.	\$Cdn.	\$U.S.
Consecutive or constant number on both sides	\$0.95	\$0.75	\$0.90	\$0.70	\$0.85	\$0.65
Consecutive number on one side with 2/3 lines of engraved lettering or screened logo on other side	\$1.20	\$0.95	\$1.15	\$0.90	\$1.10	\$0.85

Screen charge, if applicable \$90.00 (Cdn.) \$70.00 (U.S.)

For any other combinations or for quantities over 5,000 - please ask for a quotation.

### Page 5...

## LIVE FISH TAGS (ALUMINUM) & SEALING PLIERS:

	Quantity	\$ Cdn.	\$ U.S.
#1 Size: 11/16" - Consecutively Numbered	100	\$15.85	\$12.20
	500	\$33.55	\$25.85
	1,000	\$53.70	\$41.35
	K10C: Plier for #1 Size Tags Each		\$24.95
#2 Size: 7/8" - Consecutively Numbered	100	\$17.45	\$13.45
	500	\$36.90	\$28.40
	1,000	\$59.10	\$45.50
	K20P: Plier for #2 Size Tags Each		\$24.95
#3 Size: 1-1/8" - Consecutively Numbered	100	\$14.30	\$11.00
	500	\$52.40	\$40.35
	1,000	\$87.30	\$67.25
	K-3-KN: Plier for #3 Size Tags Each		\$29.50



**PRICE LIST — SEAFOOD & AQUACULTURE TAGS**  
MARCH, 1998

**Page 5...**

**AQUACULTURE TAGS & ACCESSORIES**

	Quantity	\$ Cdn.	\$ U.S.
<b>XKT-844-075 7" Plastic Cinch-Up Seal</b> Printed & Numbered (200 per bag)  Colours Available: Red, White, Light Blue, Dark Blue, Yellow, Orange, Green, Brown or Black	Price per 1,000		
	1,000	\$177.00	\$138.20
	2,500	\$122.50	\$95.55
	5,000	\$103.85	\$81.00
	10,000	\$88.80	\$69.25
	25,000	\$77.95	\$60.80
<b>XKT-609-075 Plastic Dual Lock Seal</b> Consecutively Numbered & Custom Stamped  Colours Available: Red, White, Light Blue, Dark Blue, Yellow, Orange, Green, Brown, Black or Grey	Price per 1,000		
	1,000	\$196.55	\$153.30
	2,500	\$146.65	\$114.40
	5,000	\$113.55	\$88.60
	10,000	\$98.30	\$76.70
	25,000	\$78.25	\$61.05
<b>Plastic Cable Ties</b>  XK-8376-075 5-1/2" ..... XK-8387-075 7-1/2" .....	Price per 1,000		
		\$Cdn.	\$U.S.
		\$3.65	\$2.90
	\$6.50	\$5.15	
<b>Versa Small Nylon Tag</b> KT-3009-075 Consecutively Numbered  Lettering Only or Lot Numbering (Maximum of 5)  Colours Available: White, Yellow, Red, Green, Blue or Pink	Quantity	\$ Cdn.	\$ U.S.
	1 - 500	\$0.20 ea	\$0.16 ea
	501 - 1,000	\$0.19 ea	\$0.15 ea
	1,000 +	\$0.16 ea	\$0.12 ea
	1 - 500	\$0.17 ea	\$0.13 ea
	501 - 1,000	\$0.16 ea	\$0.12 ea
1,000 +	\$0.15 ea	\$0.11 ea	
<b>General I.D. Tags</b> Yellow or White only Numbered and/or Stamped KK-1080-075 Large Plastic Tag KK-1090-075 Small Plastic Tag	Price per 1,000		
	1,000-9,000	\$67.80	\$52.90
	10,000 +	\$64.70	\$50.50
	1,000-9,000	\$64.70	\$50.50
	10,000 +	\$61.70	\$48.15
<b>Plastic Padlock Seal</b> Red only XRT-2960-075	Price per 1,000		
	1,000	\$97.95	\$77.40
	5,000	\$88.15	\$69.65
	10,000	\$83.25	\$65.80
<b>Polyurethane Tag</b> Yellow, Orange, White, Green or Blue RT-3204F-075 Consecutively Numbered	1-99	\$0.50 ea	\$0.40 ea
	100 - 499	\$0.40 ea	\$0.32 ea
	500 - 999	\$0.35 ea	\$0.28 ea
	1,000 +	\$0.30 ea	\$0.24 ea

**Page 6...**

**KETCHUM POINT OF PURCHASE PRICE/PROMOTIONAL TAGS.**  
(Inside Back Cover)

Please ask for a copy of this catalogue.

**Appendix 2: Contact Details for Tag Manufacturers/Suppliers***Ketchum seafood and aquaculture tags****Ketchum Manufacturing Inc***

396 Berkley Av Ottawa Ontario  
Canada K2A 2G6  
Tel: 613 7223451  
Fax: 613 7225612  
Email: [ketchum@sympatico.ca](mailto:ketchum@sympatico.ca)  
Website: <http://www.ketchum.on.ca>

*Abalone tags, toggle tags and streamer tags****Hallprint Pty Ltd***

South Australia  
Tel: 08 82610312  
Fax: 08 82663816

*Shellfish and other tags***Floy Tag & Manufacturing Inc**

4616 Union Bay Place NE  
Seattle WA 98105 USA  
Tel: 206 524 2700  
Fax: 206 524 8260  
Email: [floytag@halcyon.com](mailto:floytag@halcyon.com)  
Website: <http://www.halcyon.com/floytag>

*Visible Implant Alphanumeric Tag****Northwest Marine Technology Inc***

PO Box 427 Shaw Island, Washington 98286  
USA  
Tel: 1360 468 3375  
Fax: 1360 468 3844  
Email: [office@nmt-inc.com](mailto:office@nmt-inc.com)  
Website: <http://www.nmt-inc.com>

Further information Dr JJ Solomon  
See article in Fish Farmer November/December 1998

*Bee tags*

Chr. Graze KG  
Strumpfelbacher Strabe 21  
7056 Weinstadt 2  
Endersbach  
Germany

Further information can be obtained from Will Borgeson in California  
Email: [wdborgeson@ucdavis.edu](mailto:wdborgeson@ucdavis.edu)

*Ink Jet Printing*

***Image Coding Technology Pty Ltd***

4/10 Northumberland Rd

Auburn NSW 2144

Michael Lowe

Tel: 02 9748 6076

Fax: 02 9748 0189

**Appendix 3: Adhesive Labels Tested**

*Adhesive labels/materials use in final tests:*

***Raflatac***

Product 3KRH0101  
Adhesive RH-1  
Backing Paper White Glassine 65  
Raflatac Oceania Pty Ltd  
Smithfield NSW

***3 M***

Material10071/EYT9/KV75  
3M  
Penrith NSW

***Meto***

Super weatherproof label affixed with a manually operated (or mechanised) handgun device.  
Meto Australia Pty Ltd  
Meadowbank NSW

***Jac Australia TR-resist.***

Quality 15264  
Adhesive F1  
Backing KV75 dls  
Jac Australia Pty Ltd  
Silverwater NSW

*Other notable labels tested in earlier trials:*

***Jacpaper Castgloss wine perm.***

Quality 30080  
Adhesive WLK 202  
Backing KV75.

***Jacpaper Opalux extra perm.***

Quality 8280  
Adhesive SPX  
Backing KV75.

Jacpaper label for Martins seafood.

3M Scotchmark 7109 label stock

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## Appendix 4: Selected Verbatim Comments from Interviews

### *Oyster Producers*

#### Producer a

*'Don't know how we could do it, a nightmare, really impossible feat.'*

*'Really the processors responsibility'*

#### Producer b

*'I can see it would be good, but we would only get the benefits if the processor leaves it on and doesn't mix the oysters.'*

*'It would be a good spin off for the processors too if they are real genuine about a HACCP plan and traceability of their product.'*

*'The processor is the weak link now and will be later too.'*

#### Producer c

*'I recognise it's needed but economics is the bug bear, the sheer numbers of oysters is the problem, the cost of tags and labour.'*

*'Cant see any real benefits for the individual grower in the promotion side of things.'*

*'The processors are really the high risk end of the business; they should be putting in more controls and attention to the product they have coming in and going out.'*

#### Producer d

*'The intent is good but being able to achieve it is another story.'*

*'Are there any real benefits in promotion of oysters; the quality of the oysters themselves is the key thing not the packing or labelling?'*

#### Producer e

*'I think it would be good, we could easily differentiate between Pacifics and Sydney rocks. Cost is the reason why we couldn't do it; we have looked at it but we are in enough (financial) trouble now the worst we've been in 30 years.'*

*'People are crying its so bad, with the costs of purification and testing and the shift to cheap bistro oysters.'*

#### Producer f

*'If it can be achieved it would be a good idea, it would allow us to protect our brand reputation.'*

*'Cost is a problem there is a depression in the industry right now and there is*

*growing pressure to sell small oysters for buffets.'*

Producer g

*'Great thing if it can be done, if its practical.'*

*'It would be useful for consumers we could tell them not to eat brand X if it was dangerous.'*

### **Oyster Processors**

Processor a

*'I don't know why you would need it, we have a good system where we can look up where oysters came from if there was any trouble.'*

*'If the customers in a restaurant pick the oyster up to read a label on its bottom it might fall out of the shell and spill liquid over the customer, it might end up staining a lady's dress and I don't think she'd like that.'*

Processor b

*'I don't see the need for this. I can't see any benefits in it for the farmers.'*

*'I can't see any problems with it either.'*

*'How would they do it?'*

*'I suppose it might help with safety problems with oysters, but we don't mix oysters, we keep different lots separate and we can trace all our opened oysters to the farm.'*

*'Perhaps it might be good for the restaurants, they can label their oysters on the menu too, tell customers where the oysters are from each day.'*

Processor c

*'We label all of our oysters on the carton or the bottles, and we can tell where they came from, from our records of opening each day.'*

*'We know where all our oysters come from, I cant see any need for this sort of thing.'*

*'How much will it cost? We couldn't do it; its hard enough to get the staff to open oysters today without having to get them to label them too. We're flat out just getting the oysters opened at peak times like Xmas.'*

Processor d

*'It might work, but how would they do it? We couldn't afford to do it.'*

*'We can identify all of our oysters every day and can trace them back to a*

*particular farm, every day's production at the shop; we keep good records.'*

Processor e

*'Impossible to do, they would have to be very robust to survive the tumble in the concrete mixing machine we use.'*

*'The farmers could not afford to do it, they are paying for new purification tanks and things for their QA systems.'*

*'We have a system where we keep track of each carton with a batch number that tells us which farms they came from [but we cannot know exactly which single farm of up to three on the particular day].'*

*'If the farmers did it would they all do it, would they be reliable?'*

*'I cant see any problems for us but I cant see any benefits for us either.'*

Processor f

*'It can't be done!'*

*'How will they tag these things, labels won't survive the washing and tumbling.'*

*'I can't see any problems with the idea if the farmers can do it. I can't see how we benefit either.'*

**Seafood Merchants**

Merchant a

*'Sounds like a great idea, it means we could pull out any oysters that are a problem; we might be able to promote particular oysters.'*

Merchant b

*'I don't know about that.'*

*'It would be costly if it could be done.'*

*'People [customers] might bring back some oysters simply because they did not look as good as others in a batch of a dozen.'*

*'Or maybe they will bring some back if they don't like the smell of them and sometimes people who are not familiar with the smell of oysters might bring them back even if they are OK.'*

*'I suppose its OK.'*

Merchant c

*'I think it's a good idea for the health safety reasons, it will make recall of oysters easier.'*

*'I don't see any problems with labelling, as more and more people get better educated about all of this and they will see how this will be beneficial.'*

*'It will be good if we can get all of the people in different parts of the seafood industry date marking seafood. It's a mess at the moment and traceback is impossible.'*

### **Seafood merchant -Oyster processor**

*'How can they do it? Nothing will hang onto a wet oyster'*

*'I suppose it will have benefits in helping to trace anything that's not good, but I don't think it will make much difference in marketing.'*

*'The tagging of salmon has not changed the way people buy the fish; they do not come in and ask for any particular brand or farm fish.'*

*'Its a very good idea. Especially for our HACCP plan, the biggest problem for us at the moment with our QA program is the identification of oysters particularly when we give one customer oysters from two farms in the one case of ten dozen.'*

*'There is no problem that I can think of. From the promotional idea I suppose the companies that promote will be the more recognised brand and will have a greater demand.'*

*'How much will it cost though, we can't afford any increase in price so we have to be careful it doesn't push prices up.'*

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- No. 1 Andrew, N.L., Graham, K.J., Hodgson, K.E. and Gordon, G.N.G., 1998. Changes after 20 years in relative abundance and size composition of commercial fishes caught during fishery independent surveys on SEF trawl grounds. Final Report to Fisheries Research and Development Corporation. Project no. 96/139.
- No. 2 Virgona, J.L., Deguara, K.L., Sullings, D.J., Halliday, I. and Kelly, K., 1998. Assessment of the stocks of sea mullet in New South Wales and Queensland waters. Final Report to Fisheries Research and Development Corporation. Project no. 94/024.
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- No. 7 Allan, G.L., 1998. Fish meal replacement in aquaculture feeds: subprogram administration. Final Report to Fisheries Research and Development Corporation. Project no. 93/120.
- No. 8 Heasman, M.P., O'Connor, W.A., O'Connor, S.J., 1998. Enhancement and farming of scallops in NSW using hatchery produced seedstock. Final Report to Fisheries Research and Development Corporation. Project no. 94/083.
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