SEAFOOD QUALITY AT THE SYDNEY FISH MARKET 1986

SEAFOOD QUALITY AT THE SYDNEY FISH MARKET 1986

CONTENTS

This report was produced by Mr. David Burford operating as Extension Officer and Quality Control Officer at the Sydney Fish Markets through 1985. The project was made possible with a grant from the Fishing Industry Research Trust Account and we wish to express our gratitude to the Fishing Industry Research Council for their support.

INTRODUCTION

As is necessary when one discusses quality, I am obliged to explain my definition of the term. In order to make my message clear it is necessary that I distinguish three "quality categories" in seafood. I believe that, because of its very nature, it is not possible or desirable to quantify the word "quality" with any degree of certainty. In the ensuing discussion I will draw on inexact qualitative terms such as flavour, aroma and visual impact, rather than the more conservative and popular methods used by the scientific community to assess and quantify the freshness of seafood. For my purposes I have divided the quality of the product up into, excellent seafood; good seafood and bad seafood.

Excellence is only to be found in a product that is either alive or so fresh that the extent of metabolic change within the product cannot be distinguished by a critical palate. My earliest experience with such seafood was to be found in the sweet, succulent, "buttery nutty" flavour of raw scallops, straight from the sea bed, a similar flavour can be found in live prawns.
Aroma from such product is usually minimal to non existant and the sweetness is usually accentuated by the salty flavour of the sea water adhering to the fish. This sweet fresh flavour is the key to successful exports of "Sashimi" quality fish to overseas markets.

My second classification in fishery products , "good seafood," can best be described as that which you are probably most familiar with. The product is fresh, wholesome, looks good, smells good and makes a good cooked product. The critical difference is that the sweet nutty flavour has been lost and amoniacle and fishy flavours have started to evolve. The product can still have excellent visual characteristics, however an experienced eye can note a dullness to the sparkle and gloss associated with excellent quality.
The length of time that product can be kept in the "good seafood" category depends on the species, feeding habits, initial handling by the fisherman and other factors, including the expectations of the ultimate consumer.

My third class in fishery product quality is "bad seafood". This is a general term under which I will group all seafood that has been: handled badly, cooked incorrectly, not iced, adulterated, allowed to exceed the end of safe shelf life, and of course, poisonous seafood.
Although much of my attention in this report is directed toward this third class of product quality, it should be remembered that the vast majority of our seafood falls into the first and second categories. In many cases, the market safeguards minimise consumer exposure to 'third class product', but it should not be forgotten that consumers do experience bad seafood occasionally and when they do, we lose customers.

When I commenced work as "Extension Officer" over twelve months ago, I began my training on the market floor liaising and conferring with the retailers. At this naive stage in my introduction to the N.S.W. Fishing Industry I was told and believed the old catch-cry that "Retailers rewarded good fish handling by the producer". After twelve months of activity in this area, I am forced to the conclusion that this statement is only true in a very general sense.

On many notable occasions I have observed retailers looking very pleased with themselves because they managed to procure product of exceptional quality for average or below average prices. It is this attitude, that is disillusioning many enthusiastic fishermen with regard to striving for excellence in the quality of their product.

There is one factor which will ensure the continued supply of high quality seafood products to the domestic market - "the profit motive".
Nowhere is this illustrated more clearly than in the application and enthusiasm shown by fishermen supplying the export and domestic Sashimi markets.

In Wollongong, Ulladulla, Coffs Harbour and the Clarence River Co-operatives, good prices are consistantly achieved for excellent quality (very fresh) product destined for markets in Japan, Hawaii and SanFrancisco.

These markets are accepting not only the heavily publicised Yellowfin and Bigeye Tuna's, but also high quality Garfish, Trevally, Redfish and Gurnard at prices way above the threshold that the domestic market is prepared to pay.

The attitude of many producers is that they would prefer a guaranteed $5-00 per kg for small yellowfin tuna in Hawaii, than risk the fluctuations of the Sydney Market, ranging between $2-00 per kg and $10-00 per kg. On numerous occasions producers have been so disappointed with the returns on their product through the Sydney market, that it becomes a matter of principal that they export product simply because of the lack of price support that they receive from local retailers. In other words, New South Wales fishermen can and will produce excellent quality seafood products if the purchaser is prepared to reward the extra effort. In Sydney, retailers require good quality Redfish, Gurnard, Trevally and Garfish and are prepared to pay about $1-00 - $2-00 per kg for the product. On the other hand, producers who can achieve excellence in the quality of the packaged - iced product can receive upwards of $10-00 - $12-00 per kg for the same species in Hawaii and Japan. For such a price difference the fisherman will go to whatever extra effort is required in the 'onboard handling', transferal and packaging of their fish.

Fishermen experimenting with the Sydney market and sending very high quality Kingfish and Snapper to the Sashimi bay have received only average prices, needless to say supplies dried up when the fishermen realised there was no reward for the extra effort.

In the light of these facts it becomes necessary to analyse what factors determine the wholesale price. The most obvious factor, accepted by all is "supply" and "demand". If there is no demand for excellence in seafood quality it will not be rewarded. Where must the demand come from? Ultimately it must come from seafood consumers. There is little point in a retailer in Sydney paying $9-00 per kg for very high quality garfish if consumers are only prepared to pay $6-00 for the product, 'regardless of its state of freshness'.

The message here is that as long as the local market is indiscriminate with regard to seafood quality the fishing industry will not go to a great deal of trouble to upgrade its product. Therefore, any real attempt to upgrade seafood in the New South Wales Industry must start with an upward pull in demand by consumers, possibly encouraged by a consumer campaign to convince the public of the importance of selecting fresh product at any 'cost'.

To some extent this is already occuring in the form of the burgeoning growth in the frequency of Japanese restaurants. Unfortunately, these tend to be supplied by only a handful of purchasers on the market floor and because of their low numbers, there is a decrease in competition for the product which tends to keep prices down. Another problem compounding this, is the lack of critical expertise amongst consumers even at Japanese restaurants. This allows the chefs of such places to serve product of inferior quality to what would be acceptable in Japan.

This is not intended to be an essay on the Sashimi scene in Sydney. However, it is worth noting that at the three Pacific markets with high demand for good quality produce, the demand is generated by the Japanese community there or by Japanese eating habbits that have 'rubbed off' on the local community.

As I have already mentioned the reward for quality on the Sydney market is unstable. Unfortunately, this is not the only "dissincentive" for local fishermen to supply exceptional quality. Their growing awareness of the willingness by foreign markets to pay exceptional prices for exceptional quality has led to a general expectation by producers that local retailers should reward them with the same generosity. Clearly this is an unattainable goal from an auction system with such a ready availability of local product.

One message that needs to be conveyed to producers is that they cannot expect Hawaiian or Japanese prices for Sashimi product, be it Tuna or Garfish marketed in Sydney.

A second important point for producers to bare in mind is that in general, the fluctuations arising because of the demand-supply factors, will outweigh any price variance between good quality product and exceptional quality product marketed in Sydney.

And lastly, disregarding the daily price fluctuation that a producer may experience for his product on the Sydney market, the benefits derived from having an excellent reputation on the market floor justifies providing consistently good quality product. If retailers have confidence in a particular producer, they will buy his product sight - unseen.

Notice the discarded coffee cup in this box of small Mulloway. It has become unacceptably commonplace to find such an abuse of health standards at the Sydney market by the retailers attending the daily auction. This wholesale abuse of hygiene standards manifests itself through activities such as; smoking on the market floor, standing on boxes of fish during the auction, spitting on and littering of the floor at the market and a 'grubby, lackluster' attitude to dress, none of which would be tolerated in the meat and dairy industries.

For a more detailed report on the state of hygiene and sanitation at the Sydney market, the reader should see the report, "Waste Disposal, Sanitation and Hygiene at the Sydney Market (1986), David Burford.

Fish marketing in New South Wales has a lot of 'growing up' to do. Logically we should have maintained standards and improved our production and processing lines in step with our very professional brothers in the Meat and Dairy industries. Unfortunately, we seem to have been left behind. There is no organised regulated system of quality control at retail outlets, rather it is left to market forces to effect improvements in standards. There is insufficient input by the Health Authorities at the co-operatives and the Sydney market establishment. And there is no system for regulating the hygiene standards of vessels and crews, the first step in this food handling chain.

In general, standards of sanitation and hygiene in this industry are low. The exception to this rule are the increasing number of co-operatives and others seeking D.P.I. approval for export certification. These include the Clarence River Co-operative's building at Illuka, the Coffs Harbour Co-operative, Wollongong and Ulladulla Co-operatives, Warratah Seafoods and Montague Ocean Products. The Newcastle Co-operative is also considering upgrading one of their establishments to export standards. Of special note are the standards maintained in both the Wallis Lake and Tuggera Co-operatives, which although they do not have D.P.I. export approval, still maintain excellent standards in plant and sanitation.

All other Co-operatives in New South Wales serve as little more than fish packing stations. They consist of primitive buildings, poor quality retail outlets and are staffed by poorly dressed attendants. One exception is the Richmond District Fishermens Co-operative, which although it does not maintain exceptional standards within the packing plant, does boast a high quality retail outlet.

It is interesting to note that two Co-operatives with limited plant and facilities manage to maintain the best of reputations for quality in seafood on the market floor. They are the Wooli Fishermens Co-operative and the Evans Head Fishermens Co-operative. Both of these Co-operatives have small memberships of around 30 fishermen, this may help to maintain high standards by enabling more personal contact within the Co-operative and thus, peer group pressure may contribute to their impressive record. The Coffs Harbour and Wallis Lake Co-operatives also have excellent reputations for the quality of their product, proving that the larger, less personal Co-operatives can also achieve the best in fish presentation standards.

Co-operatives should learn the efficient use of detergents and sanitisers. Most of the smaller establishments consider a hose-out to be sufficient to maintain their packing and filleting areas, and only utilise the sanitiser hyperchlorite once or perhaps twice a week, when these areas start to smell of fish.
In most Co-operatives the use of stainless steel is restricted to the troughs used in the filleting stand. Most other metal fixtures, racks, trolleys, stand etc are made of mild steel construction, which tends to rust and become impossible to maintail to a hygienic standard.

The Sydney Fish Market building at Pyrmont is a reliable indicator of the state of facilities and hygiene in the N.S.W. Fishing Industry. The development of the new Sydney Fish Market building should be of great interest to the fishermen of New South Wales who fund the project. It would be a lamentable disaster if it were to be developed along the same lines as the existing building, with poor drainage, inefficient waste disposal and antiquated filleting and processing facilities. A possible benefit would be obtained from input by the export inspection service in the Department of Primary Industry, who have a proven track record in the construction of high quality fish handling premises.

Certainly it seems logical to have at least one section of the new market complex suitable for the packaging of export products.

I have not had sufficient experience at all of the New South Wales Co-operatives to give a detailed description of their shortfalls. However, it is possible to give a general outline of the areas requiring immediate attention if the public immage is to be lifted.

The retail outlet in most Co-operatives is the local industry's interface with the public and should therefore be of the highest standard. The following rules should be observed when considering upgrading a Co-operative retail fish shop:-

1. Staff should be, at all times, cheerful, clean and well dressed, preferably in a uniform.

2. Fish should, wherever possible, be presented in a specially designed, "chilled" display cabinet, with plenty of ice around the product in order to keep the fish both cold and moist. Fish should not be displayed in F.M.A. grey plastic fish boxes as is often the case.

3. The retail outlet should be isolated from the main Co-operative packing and processing area, or at least partitioned off.

4. Walls and floors should wherever possible be made of pale coloured washable tiles, and on the floor these should be non-slip. They should be kept clean at all times, as should the glass of display cases and windows.

5. A regular cleaning and sanitation programme at the end of each day should be adopted.

6. Only good quality fish should be sold.

7. An attempt should be made to make the retail outlet "vermin proof" as in many cases, the Co-operative building is not.

MAGGOTS ON FLOOR OF F.M.A. AUCTION AREA.

Notice here the well developed mature maggots in a rubbish bin on the F.M.A. auction floor. (above), and in a pool of stagnant water underneath the aforesaid rubbish bin (below). This is a common occurence at the Sydney Fish Markets and is more significant problem after weekends. Filleting at the F.M.A. processing benches is allowed between the hours of 4-30am and 12-30pm on week days. This is clearly indicated on a sign at the rear of the processing room.

In reality, this processing area was used 24 hours a day, 7 days a week because there is no locking up of the markets. Rubbish removal over weekends is non existant, and during that time there is a considerable build up of waste fishery products which stagnates until it is collected Monday morning. Notice also in the bottom photograph the rusty galvanised iron fixtures. These are used exclusively in the Sydney Fish Markets and create considerable problems with regard to easy cleaning. Also consider the inside surface of the rubbish bin in the top photograph. These bins are regularly emptied but never cleaned. They should be made of stainless steel and steam cleaned regularly.

There have been notable occasions in the past where a blatent abuse of hygiene standards have led to very serious public health threats. Des Sibra, Head of the food branch at the N.S.W. Health Department related the story of the addition of such a large amount of Borax to a box of Octopus that the analysist had to re-calibrate his instrument 3 times to measure the high concentration present. Apparently, when the fishermen from the Illuka depot in the Clarence River Co-operative found that he did not have room for this box of Octopus in his ice box, chose to leave them on deck. After a days fishing, and finding that the octopus had assumed a rather nasty smell, he elected to "freshen up" his product by the addition of a small quantity of Borax to it. The Octopus was then delivered to the Illuka Co-operative where a member of staff, unaware of the previous addition, carried out the same adulteration. The offending box was then sent to the Maclean Co-Operative for consignment to Sydney, where a third helpful fish handler made yet another addition of Borax to the Octopus. Fortunately, this box of fish was not marketed to the public. If the addition of Borax to a box of Octopus is such a common occurrence that three people thought of it independently, with the one box, one wonders if this is not a serious problem in our industry. Borax, Sodium biborate, is a toxic substance not allowed as food additive under any circumstances.

The addition of Sodium Metabisuphite and other sulphiting agents to the seafood marketed in N.S.W. has been dealt with at some length in the report: "The addition of Sodium Metabisulphite to Prawns Marketed in Sydney" (1986) David Burford, and should be referred to here. The crucial problem appears to be that both retailers and fishermen have ready access to cheap sulphiting agents and are more than willing to be generous with them. This can lead to excessive levels of the preservative, which according to many reports, can trigger allergic reactions in sensative individuals.

The allergic reaction by an individual could reasonably be interpretted as a reaction to the prawn itself, which may be entirely innocent and unable to trigger a response without the preservative present.

COOKING CRUSTACEANS

"LOBSTER"

The cooking of crustaceans requires that the cook devotes much care and attention to detail. In most cases, the cook is also the fisherman and the cooking process is carried out on board, sometimes during the fishing opperation. While some consequences of poor handling (cooking) are immediately obvious such as 'lost legs' and 'dropped tail', others like Melanosis remain undetectable for a few days and only at the market does the full extent of the problem become evident.

Most lobster fishermen consider that they have the cooking process 'well in hand' and know exactly how to produce a high quality product. However, the considerable number of incorrectly handled fish reflects the prevailing ignorance in many cases. The most common errors observed are under-cooking and dropped tails.

Melanosis in lobster

Melanosis or black spot will occur in lobster as well as prawns. In the Sydney market, when black lobster are detected, they are seized as being sour and unwholesome product. The black discolouration as seen in the photograph occurs under the tail and in the first joints of the walking legs and indicates that the product was not cooked for a sufficient length of time.

Lobster over 4kg are relatively common in New South Wales and such large fish require thorough cooking to minimise the chances of this discolouration. The formula followed by most successful cooks is to cook the lobster for 20 minutes for the first kilogram and 10 minutes more for every additional kilogram, in vigorously boiling water with varying amounts of salt added. A common error in this procedure is to cook all lobster for the same length of time regardless of size or to minimise the extra time required for the larger fish. Thus it is a common sight to find very large lobster at the Sydney market with black discolouration beneath the tail.
A 4-5 kilo lobster may require an additional thirty minutes of boiling if thorough cooking is to be ensured. As already mentioned, fishermen will not see this ugly discolouration as it takes a few days before enzymic activity can bring about the colour change. This often fosters resentment on the part of fishermen who see no good reason why their large lobster were seized, while the smaller ones are sold without complication.

Lobster being chilled before cooking.

Lobster should be drowned or chilled to the point of unconsciousness for one or two hours before cooking. Some experienced fishermen believe that even this is too long and that only 30-45 minutes is required. Chilling lobster in ice is generally recognised as the most effective method of slowing down the animals metabolism so that it will not 'throw off its legs' as a result of the extreme shock of the cooking process. The same method is used in the cooking of blue swimmer crabs.

These lobster were chilled for over 24 hours and all were dead when they were cooked. Out of 75 lobster, 3 were discovered with dropped tails and of the remaining 72, a large number had significant 'dislocation' of the tail, while still having quite a firm feel about the tail - carapace junction. To ensure a tight fitting, firm, tail-carapace junction (desirable according to fish retailers) the fish should be chilled for the minimum length of time still ensuring unconsciousness to prevent casting off of the lobster legs.

I believe it would be a worthwhile study to discover the effectiveness of 1, 2 and 3 hour chilling times for lobster before cooking and also to ascertain the relative effectiveness of chilling verses fresh water drowning for these animals, to ensure the most desirable end product. Lack of time, funds and effective equipment prevented me from performing these experiments. Perhaps they could be carried out in the laboratories of the seafood technology unit in the division of Fishery Research in Tasmania.

These lobster illustrate the typical response to being boiled without prior chilling or drowning. They have cast off their legs at the first joint. Hopefully, if the lobster is sufficiently chilled before cooking, in its unconscious state it will not be aware of what is happening and as a result, will not endure any undue suffering or throw off its legs as it dies in the cooker.

When a lobster is 'cooked alive' and throws of its legs it loses considerable weight and some flavour, and also loses a lot of its traditional visual presentation value. When the lobster throws off its legs, it loses not only the weight of the appendages it casts off, but also a considerable amount of fluid from inside the carapace. Thus, the product has a reduced weight and a reduced price per unit kilogram.

These three lobster were part of a consignment of 3 boxes from the Coffs Harbour region and were cooked by an inexperienced fisherman. "Kitten Potting" or the capture of very young crayfish close to the shore can be carried out using only small craft, thus this fishing activity is often carried out by younger, less-experienced members of the fishing community, susceptible to making these classic mistakes in the cooking process. Fortunately, the occurence is rare and because of the 'hip pocket nerve', the fishermen usually only makes the mistake once.

Unfortunately, because most fishermen are well aware of this problem there is a tendency to <u>over-kill</u> and the fishermen will often chill their lobster for extended periods (up to 24 hours) as a safeguard. This often leads to the classic dislocated tail-carapace junction seen in the following photograph. If the lobster are left for an extended time after death at room temperature the tail-carapace junction may also become very 'sloppy', indicating 'mushy flesh' in the crayfish. This is commonly referred to as 'dropped tail' syndrome.

Lobster with external evidence of drop tail

Here we see the typical external evidence of dropped-tail. The tail carapace junction is dislocated and very 'sloppy'.

This photograph shows the consistency and texture of lobster meat in a dropped tail specimen. This particular lobster had been kept at room temperature for 10 hours before it was cooked. It was one of 3 mortalities in a box of 20 live lobster sent to the F.M.A. for sale. It may be possible that this lobster died because of some factor also contributing to the mushy flesh (as in milky kingfish?)

Dropped tail is the most common reason for seizing lobster on the Sydney fish market floor. Whether this phenomenon is related to seasonal variation, diet or some paracitic infection in the individual is unknown. Certainly much evidence suggests that allowing many hours or even days to elapse before the dead specimen is cooked is the major cause of this syndrome. Interestingly, blue swimmer crabs suffer from a complaint which leaves their meat in a similar state of unacceptable texture, 'mushy crabs'. It would make an instructive study to discover whether this common complaint in crabs is in any way related to the one found in crayfish, or if indeed it is related to the cooking procedure.

PRAWNS

One of the most satisfying aspects about studying errors in the crustacean cooking procedure is that the physical manifestation of the error on the product is often highly visible, and easily photographed.

School prawns with Melanosis

These school prawns, displaying characteristic 'black spot' are a good example. Once again the discolouration arises because the product is undercooked. These small school prawns require at least 2½ to 3 minutes cooking in vigorously boiling water, to ensure sufficient time to kill off all bacteria and denature all enzymes. Prawns such as these are often caught in vast quantities, up to a thousand kilograms a night. At such times the fishermen find it difficult to pay the necessary attention to the cooking process. "He simply doesn't have time". The sensible solution would be to stop fishing once a manageable quantity of product has been landed. Unfortunately, the reality of the situation is that the fisherman will continue to put the net down for as long as the fish are available because such quantity will more than likely not be available in the forseeable future.

King Prawns with Melanosis

Once again, the tell-tail signs of an undercooked prawn are evident. In the case of these large king prawns, the cooking time should be in the order of 3-3½ minutes, with extra large prawns needing in excess of 4 minutes in vigorously boiling water. Because this prawn was not subjected to sufficient time in the cooker, the activity of one enzyme in the prawn (Tyrosinase) has continued after the death of the prawn, and generated the black Melanin pigment from the amino acid phenylalanine. This problem is particularly prevalent in long-stored green prawns and is controlled using sulphite preservatives.

A typical prawn trawl catch consists of many other species and may include squid, octopus, cuttlefish, whiting and bugs. One species often encountered in large quantities is cuttlefish and this animal can release liberal volumes of black ink across the rest of the sorting table. This ink may adhere to the fine sensory hairs along the edge of the tail, on the pleopods and also around the eyes of prawns in the catch. When these are cooked and boxed, the black ink on these prawns can mimic Melanosis and cause considerable concern to a potential buyer. An experienced eye can determine that the black colouration, rather than being associated with the dermis layer, is found around the fine sensory hairs on the body.

Transverse section through undercooked prawns

This photograph clearly shows the distinction between the pearl-white colour of cooked prawn meat, around the outside of the tail section, and the almost translucent undercooked meat in the centre of the tail. The most obvious difference between cooked and undercooked prawns, before black spot becomes evident, is that the organs in the carapace are still intact. In a correctly cooked prawn they become a light prawn paste.

Fishermen usually determine whether their prawns are cooked by watching to see if they float to the surface of the cooker during cooking. Once the prawn is cooked, the meat of the prawn separates from the hard shell and gasses and water vapour fill these gaps making the prawns positively bouyant. An experienced fisherman will then remove one or two prawns, hold them up to the light and bend them straight to check for this separation of shell from meat. The prawns, if cooked, are then removed from the cooker and placed in a 'running sea water cooling bath' to quickly cool them down.

A prawn cooling bath usually located on deck, and consisting of a 30 gallon tank into which is flowing clean sea water from the deck hose, which spills out an overflow hole, can be the site of various forms of contamination of the prawns. Firstly it should not be forgotten that even the cleanest ocean sea water contains micro organisms and therefore these washing tanks are the site for re-contamination of the cooked product with bacteria.

Secondly, in a situation where bilge water is being pumped overboard, and the deck hose water cooling the prawns is contaminated with this bilge water, it is likely that the prawns will be contaminated with oil or diesel from the bilge. Diesel contamination is a very common problem with consignments of prawns. Even very small volumes of diesel are sufficient to affect the smell and taste of the prawns. The problem occures with both king prawns and school prawns and may even arise in finfish. The fishermen should be alerted to these possible dangers.

'Sweaty' prawns, as the name implies, smell of human sweat and usually occur in times of high yield. The combination of insufficient time in the cooling bath, inefficient cooling whilst in the bath and lack of icing of the product after removal from the bath, means the prawns spend the first crucial hours of storage life at optimum working temperature for bacteria. 'Sweaty' prawns have significant bacterial contamination and a very short shelf life. Such prawns are usually seized by the inspector at the market.

Finally, the third common error made during the cooling procedure occurs when a fisherman leaves his prawns in the cooling bath for the duration of the night's fishing. (nine or ten hours). The temperature of the sea water used to cool the product is usually between 18 and 20^{o}C, and at this temperature bacterial attack on the product proceeds quite efficiently. A better product would be obtained if the cooked prawns were cooled to 0^{o}C on ice as soon as possible. This would require about 6kg of ice to be scattered among a 24kg box of prawns after they had been cooled to 20^{o}C in the cooling bath.
However fishermen maintain that they do much physical damage to their prawns back at the co-operative when this ice is removed, to enable weighing of the prawns.
This may be true, the fact remains that the product remains unchilled until it arrives and is weighed in at the co-operative, perhaps 15 hours later.

Spanner crabs without ice

It is very common to find cooked crustaceans on the market floor without sufficient ice for cooling. Spanner crabs are a good example. After cooking for 7-8 minutes, the product is cooled in a water bath and boxed and iced. However, spanner crabs quite often reach the Sydney fish markets without any ice and with an internal temperature between 12-15^{o}C.
Because these fish are caught by fishermen in small boats the product is usually cooked by the fisherman back at the Co-operative and the sooner the crabs are out of the cooling bath and into boxes the sooner the fisherman can go home.

For this reason, cooling in the bath is often rushed, which means the ice used in the fish box is often used up in achieving heat removal from a very warm product. Consequently there is no ice left when the product reaches the market.
This will occur when cooling any hot product after the cooking process and fishermen and Co-operatives should remember to use more ice in these cases.

PACKING AND ICING OF FISH

The packing and icing of seafood products for the Sydney market can have a dramatic effect on their value.

The care that a fisherman shows in the packing of his product can convey a message of careful handling to a potential buyer and the presence of plenty of good clean ice tells the buyer that the product is being kept cold and well preserved. In New South Wales, buyers have become accustomed to seing a good covering of ice on the product being marketed. On those rare occasions when no ice is evident they display their dissatisfaction by paying poor prices.

Poor icing, or no ice, is usually only a problem in product coming from the Co-operatives south of Sydney. These regions often handle large volumes of lower value species which may provide the fisherman with the incentive not to take proper care of his product. Obviously this is not an excuse for the lamentable attitude as the lack of ice will only contribute to down grading of their product. This attitude becomes more pronounced in times of heavy supply as fishermen come to expect ever decreasing returns for their fish. From late June to September, it is not uncommon to find hundreds of boxes of Gemfish. or Warehou without ice at the market. Often this fish is left unsold and placed in the cold room for the next days sale where, needless to say, it still fails to achieve a bid.

Gemfish with planty of ice in the box. The temperature indicated by the thermometer is around 3°C and these fish are being well preserved.

Gemfish without ice. The temperature indicated by the dial thermometer is around 12°C and these fish are spoiling rapidly . This photograph was taken in late July and was one of 160 boxes of Gemfish without ice on this day.

The attitude of fishermen from the southern Co-operatives is clearly illustrated in their attitude to a couple of the fish species that they share in common with fishermen from the north coast.
Snapper and flathead are good examples. Product being supplied from Coffs Harbour, Wallis Lake, Wooli or other northern ports is always carefully packed, dorsal surface uppermost, evenly graded and layered with ice between the layers. The same is true for sand and river flathead.
On the other hand, snapper caught by the trawlers from the south coast is wrecklessly thrown into boxes, if any ice is present it is only ever on the top layer.
This is also true for the tiger flathead that they catch. It is never packed as carefully as those flathead coming from the north coast. Trawler fishermen will tell you that they do not have time to handle a large catch with 'kid gloves'. This may be true, but even when fish are scarce and the crew has plenty of time between shots to pack the fish, there is no attempt made to do so.
Usually the catch is bulked at sea on an extended voyage, and re-boxing occurs back at port. If at this time the fisherman choose not to pack their catch carefully, then that is their problem, but it is simply not true to say that they do not have time.
What sort of business is it that does not have time to increase profits?

These tiger flathead were supplied by fishermen from one of the trawlers on the south coast. Notice the wreckless way the fish are thrown into the box, and the lack of ice on the product.

These sand flathead were supplied by the Wallis Lake Co-operative. All have been carefully packed and iced in the box. The fish are also gutted, as are all river flathead from this co-op.
The particular box also had a decreased weight of fish in it which may help achieve a slightly higher price.

Icing is a time honoured method of preserving fish. It lowers the temperature of the animal and reduces the activity of both the fish's own enzymes and the digestive enzymes released by bacteria, as well as reducing the reproductive rate of the bacteria. To be effective, the fish must be in contact with the ice. Many fishermen fill a box with fish and then ice only on the top of the box, "topping". The correct method of icing is to place a layer of ice on the bottom and then alternating layers of ice and fish. With this method, the fish must be boxed twice, once to weigh up the 25kg of fish and then gradually tipped into a second box, with metered amounts of ice. This is the method used in most northern co-operatives. In the southern co-operatives, this seldom happens. When packing fish at the Eden Fishermen's Co-operative, I observed the co-operative staff unpacking correctly iced boxes of fish delivered by fishermen, re-weighing, and then re-boxing the fish with top icing.

This disregard for the fishermans original care and attention seems like 'such a shame'. Obviously, if the fishermen could correctly weigh a box at sea, this problem would be overcome. In many cases, fishermen are at the mercy of the standards of their co-operatives packing staff.

When a fisherman is considering icing his product, he must consider the quality of the ice he uses as well as the quantity.

On this occasion, the supplier was one of the trawlers from the Ulladulla region and on this day much of the ice from this Co-operative was of similar quality. Ice from the Lakes Entrance Co-operative, another big supplier, is often similarly effected. The black slime seen on the surface of these fish arises as the ice in the box melts. Dirty ice carries much suspended sediment and this is left behind along with cold resistant bacteria to contaminate the product it is intended to preserve.

The Ulladulla Co-operative has installed a water purifying filter to remove the sediment from ice used to pack their Sashimi Tuna for export. Some of this clean ice is also used on the domestic product, but often, as can be seen the local produce is chilled with ice loaded with sediment. This sediment is often associated with domestic water supplies and becomes a greater problem after heavy rain when water supplies become cloudy with mud.

Many fishermen believe that because ice blocks last longer than flaked ice that they should be using ice blocks on their product. They believe that if the blocks last longer they must be a better cooler. It is difficult to convince them that unless the ice is melting, 'it probably isn't doing the job'.

There are many advantages and disadvantages to the various forms of ice. Ice blocks such as those supplied by Bells Ice have the advantage of being visually appealing when liberally distribured around the fish and a buyer can see through the ice block into the product. One of the disadvantages of these blocks is that they tend to dent the surface of large Sashimi Tuna that are lying on top of the ice, thus affecting their value. In this case, flaked ice is considered superior to ice blocks as it forms a comfortable bed for the tuna to rest in. When prawn packing is considered, the fishermen should remember that it is easier to distribute ice blocks throughout a box of prawns than it is to distribute flaked ice. With ice blocks, the ice can be simply shaken into the middle of the box.

At present, the average cost of ice is about $0-08¢ a kilogram or $3-00 a box. At the Co-operatives that subsidise this commodity it can be as little as $0-50¢ a box, or less than $0-02¢ a kilogram.

Considering that less than 10 kilograms is required for each box of fish, the cost to fishermen for correct icing is minimal, less than $0-80¢ a box at the most expensive outlet.

There simply is no reasonable economic arguement against the liberal use of ice for preserving fishery products.

This John Dory was part of a consignment of fish supplied by one of the otter trawlers operating out of Sydney. The fish shows the classic symptoms of storage without ice preservation. Disintegration of the membrane between the rays of the fins, cloudy eyes, and breakdown of the dermal layer. Associated with this are the less easily photographed symptoms which include an obnoxious smell, breakdown of the internal organs, brown 'foul smelling' gills, and exudate from the vent.

Mr. Noel Smith, the Market Inspector with the Department of Agriculture, has compiled an extensive record of suppliers to the Sydney Fish Market that provided product without ice during the spring of 1985. Regular offenders included:-
the Wollongong Fishermen's Co-operative, the Ulladulla Fishermen's Co-operative, the Nelson Bay Fishermen's Co-operative and others including many of the larger trawlers from Sydney and the south coast. Often the species for which icing is neglected are of very low 'expected value'. Mullet, flathead, gurnard and warehou. In some cases, good fish in the medium price range are also left un-iced these include such species as gemfish, morwing, and spanner crabs. There are even instances of some suppliers neglecting to properly ice high value species such as John Dory, Snapper and Prawns, usually on very hot days when they under estimate the quantity required to overcome the ambiant temperatures.

Some Co-operative members have requested that the N.S.W. Fish Marketing Authority investigate the feasibility of placing canvas tarpaulins over the rows of fish on the market floor to reduce the 'ice melting' that occures on hot days. This approach seems like a sensible solution to the problem and would obviously require extra effort on behalf of the Authority. Unfortunately, the Authority has dismissed the idea as requiring too much of their staff members time. Answers to the problems of good fish handling will always require extra time and effort. Only when the various 'links' in the fish handling chain acknowledge the importance of this extra effort, will the desired result come about. When the fish retailers demand excellence in fish quality and fish handling, the suppliers and agents will begin to deliver a superior product.

The Morwong caught in fish traps at 50 fathoms are being stored temporarily in an ice slurry on board the vessel. The fish were transferred to boxed-iced storage upon returning to port (6 hours) and consigned to the Market. This method of handling the catch from a trap or hand lining fishery produces excellent results.

This snapper is being stored in an ice box on deck with plenty of ice around the fish. As snapper catches decline the product becomes increasingly valuable to the fishermen.

The correct handling of valuable species such as snapper directly affects their appearance and the price that the retailer is prepared to pay. A fish that remains well chilled for the duration of its storage life will remain in premium condition. Poorly handled fish will become pale and adopt characteristic fishy odours.

PACKAGING

Whether a supplier is sending fish to the Sydney market or exporting to one of the lucrative overseas markets, the packaging for the product must be sturdy, water risistent and a good thermal insulator.
One factor which in Australia, has been hitherto overlooked, is that the shape of the package should be made to fit the fish, rather than vice-versa.
Retailers and fishermen share the common concern that much physical damage is done to the product if it is forced to conform to the shape of an unsuitable box.
The problem is compounded by the fact that such packaging is usually accompanied by a total lack of ice.

These Harpoka cod, typically illustrate the style of packaging of large fish at the Sydney market. Some other common species which are similiarly unsuited to the standard fish box include; Tuna, Castor Oil fish, Broad Bill Swordfish Mulloway and Spotted and Spanish Mackeral. Fishermen throughout New South Wales have shown considerable interest in the implementation of a longer fish box.

Packaging for seafood products is usually constructed in one of three possible materials. High density polyethylene is the material most commonly used in standard 'fish boxes' as supplied by the New South Wales Fish Marketing Authority. This material is light (about 3kg to a box) strong and durable, and with the aid of pigments, can be made resistant to the oxidising effect catalysed by U.V. light. It has the added advantage of being relatively cheap, approximately $13-00 a box, and easily cut, shaped and re-welded into longer boxes if necessary. The F.M.A. has its boxes manufactured by Nally Ltd, in St. Peters, N.S.W. using the 'injection-moulding' method.

Polystyrene, another common packaging material used in the seafood industry is gaining acceptance in New South Wales. Two manufacturers are producing these boxes in Sydney, Hanamex and Custom Foam, and boxes can be manufactured to meet specific requirements of density and size. Boxes are produced by allowing polystyrene to expand inside a mold and then removing the product once the material has solidified. Molds for polystyrene molding are considerably cheaper than those for injection molded polyethylene. ($5,000-00 as opposed to many hundreds of thousands). And, the weight of plastic in a polystyrene box is significantly less than that in a high density polyethylene box. Polystyrene boxes are therefore cheap in comparison to H.D. Polyethylene. The drawback with this method of packaging is that a polystyrene box has a limited life expectancy, perhaps only one trip.

The third major packaging material is cardboard. Cardboard can be strengthened (double thickness) and waterproofed (waxed) to make it more suitable for the seafood industry. Cardboard finds wide application in the packaging of frozen seafood usually in the form of waxed cardboard, which may be either flat board or a corrigated cardboard sandwich. Sashimi Tuna bound for Japan in air freight containers are packaged in a re-inforced, waterproofed cardboard coffin which may cost between $10-00 and $30-00, and comes in a variety of sizes to suit the fish.

Packaging wet fish in cardboard boxes brings with it, its own special problems. The box must be protected from moisture, which even in a waterproofed box, will cause gradual disintegration of the cardboard. Plastic bags to enclose both ice and fish are used to avoid this problem, and the system appears to work well for the export market. Similar boxes used to consign fish to the Sydney market have not proved successful. The boxes are either damaged by the large quantities of drip water in the truck delivering them to the market or are rendered useless when opened on the wet Market floor. Thus, the retailer has no container in which to transport his fish to the retail outlet.

A preliminary investigation into the use of polystyrene boxes for this transport has yielded encouraging results. The cost of a polystyrene container can apparently be kept below $7-00 and no extra packaging plastic bags are required. Packaging is quicker and easier, although a greater quantity of ice should be added to the box to enhance presentation.

The boxes are 'totally water resistant' and can withstand the normally wet environment of fish Co-operatives, retail outlets and the Sydney fish market, possibly even remaining suitable for a second trip. These boxes also have excellent insulating properties and thus help maintain the cold storage temperature.

One major flaw in the long polystyrene boxes implemented in the past was that they tended to 'break in the centre' when carrying large fish and ice. It is hoped that this design flaw can be overcome by either increasing the density of the styrene and/or re-designing the internal corners of the box to an arc of 100cm radius rather than a perpendicular junction of the two side walls, with the floor of the box.
The internal arc in the box is designed to provide strength by increasing the quantity of polystyrene in this crucial area.

A second possible design problem arises when one considers the variety of sizes of fish likely to require a longer box. It is not feasible to make one box to suit all large fish. A box of about 120cm in length is being considered as this is suitable for almost all of the larger fish except Tuna over 50kg and very large Broad Bill Swordfish. Most Tuna in excess of 35kg in weight will require varying amounts of their tails are 'docked off' so that they fit comfortably into the box. This is considered acceptable when packaging Tuna for Japan and should also help the buyer when assessing the colour quality of the meat.

In an effort to provide a suitable packaging container for large Tuna in the short term, boxes of twice the normal length were constructed by cutting one end out of two boxes, and welding the two together. In order to re-inforce this weld a 150mm piece of H.D. Polyethylene was welded into the lip around the top edge of the box across the junction. Fifteen of these boxes were originally constructed for use in the Fish Marketing Authority 'Sashimi Bay' and immediately the retailers requested that more boxes be constructed for their use. Twenty more such boxes have been constructed and made available at cost price to retailers.

Specially constructed long boxes.

Large Tuna thrown in the normal fish box.

As already mentioned, constructing a mold for a longer H.D. Polyethylene injection molded fish box is a costly process and not likely to be implemented. The Nally Company have already presented a large 'rotationaly molded' box for assessment. This box would not be as strong as the box currently in use in the fishing industry and would be considerably more expensive. It does have the advantage of being large enough for fish up to 100kg and may be suitable for holding such fish at the market. It does not seem likely that this box would be suitable for implementation in the returnable fishbox system currently in use. Structural weakness and initial cost make it a doubtful proposition. Nally are still searching for a suitable long box already in use elsewhere in the world.

Fish presented in various forms of packaging on the Sashimi table. Note export packaging boxes at the back of the table and specially constructed long boxes in the foreground. Also note the very large fish for which no suitable box is available.

In the near future, the increasing use of molded polystyrene foam to construct a variety of boxes suitable for the consignment of seafood product to the market, appears inevitable . Already the Japanese market has adopted this strategy and the New Zealand product arriving in Australia is also packed in polystyrene boxes with a plastic liner. In recognition of this trend, the Clarence River Co-operative has commenced trial shipments of its product to the Sydney market in specially constructed, polystyrene boxes with clear plastic lids. They are placing a reduced quantity in each box of prawns in the hope of lifting prices, and are constructing a variety of shapes and sizes of these boxes to suit different species of fish.

An increasing number of interstate fishermen are consigning their product to the large New South Wales market. Often this seafood is air freighted fresh for maximum value. Blue swimmer crabs are being air freighted from Broughton in South Australia and Spanner crabs from the Queensland Gold Coast are also transported by air.
With this method of transport a light waterproof packaging material is essential and polystyrene with a plastic liner serves this purpose.

One factor often overlooked when considering packaging material is the problem of waste disposal. As is already evident at the Sydney Market, wind-borne polystyrene scraps cause a considerable litter problem when it is carelessly disposed of, unlike paper it is not biodegradable. Polystyrene waste products from the Sydney fish market can be found blowing all over Pyrmont, with increased use of this product, the waste disposal problem will become more significant.

CONSIGNING LIVE SEAFOOD TO MARKET

At present there are about seven shellfish species consigned to the Sydney market alive. They include Prawns, Mudcrabs, Lobster, Pippies and Cockles, Turban Shells and Yabbies. The major problem confronting a supplier of this product is keeping it alive.

Efforts to provide increasingly high quality seafood to consumers are continually being up-graded. The freshest product available is 'live seafood' and this is considered the ultimate in high quality. In many of the high quality restaurants and retail outlets the showpiece of the establishment is the Lobster tank where consumers can select their meal from the many animals on display. The great advantage derived from eating freshly killed seafood is the sure knowledge that the product is bacteriologically safe? Although this assumption may not necessarily be true for Oysters and other esturine species possibly inhabiting poluted waters, for open ocean species where the food portion comes mainly from the animals skeletal muscle, the bacteriological safety of this product can be reasonably guaranteed.

Of course, those restaurants serving the product raw, gain the added advantage of being able to provide that truly unique flavour derived from Sashimi quality seafood.

An often overlooked advantage of keeping seafood products in the live state is the potential increase in the shelf life of the product. Animals such as Lobster, Mudcrabs and Prawns have a limited shelf life, perhaps only one week. The possibility of keeping them for periods of up to a month in a live holding tank enables the seller of the product to reduce the loss normally associated with dead seafood that reaches the end of its shelf life.

Of the seven species that arrive at the Sydney market alive, only Mudcrabs, Yabbies and Lobster are 'kept alive' through the marketing chain to consumers. The others are not necessarily retailed as a live product because there is not a high public demand for them in this state. One of the species for which a change in attitude may be of some benefit is Prawns.

Green prawns in Sydney are generally purchased by the retailer as a packaged frozen product. Large green King Prawns may be purchased in 10kg or 20kg boxes from the Northern and Western Australian Prawn Processors for about $12-00 per kg. Most of this product has been treated with the sulphiting preservative, Sodium Metabisulphite to reduce the formation of Black Spot in the product. These blocks of frozen Prawns are usually thawed out in a water bath as they are required and large retailers can turn over many boxes a day. The smaller retailers can take many days to sell a single box of Prawns and in this time, Black Spot usually develops in the product creating a presentation nightmare, and reducing their salability in these retail outlets even more.

An alternative method of preserving the shelf life in Green Prawns is that adopted by the Japanese to keep them alive. The Japanese utilise 'course dry sawdust' to keep prawns alive for up to 24 hours out of water, thus enabling transport to and from markets. The process requires a 3 or 4 day period of starvation prior to transport and thus is more effective on aquacultured Prawns where the post harvest diet can be controled. The dry sawdust' is used to separate individuals and allow oxygen to permiate the box, keeping those at all levels alive. Temperatures must be kept low, but not as cold as cold storage temperatures.

This process is used successfully with many penaid species and may find application with some modification on Sydney Harbour and Botany Bay Prawns. These Prawns are delivered to the Market within hours of capture and are usually alive up until ice is applied at the point of sale. Much work would need to be done to determine survival rates of Prawns from 'trawl fisheries' and the market requirement for such an expensive high quality product. Certainly the numerous Japanese restaurants in Sydney may provide some demand for live prawns, and survival in aquariums should not pose any difficult problems.

One species consigned to the Sydney market in small, but significant quantities is the pippy. These pippies are dead as can be seen from the numerous open shells which will not close when handled. There are two alternative reasons that pippies and other live seafood arrive at the market dead. They may either become too hot and die of heat exhaustion or they may be chilled below a tolerable temperature and freeze. These pippies were almost frozen because of the efficiency of the transports refrigeration. This is a significant problem for those consigning live seafood with the Co-op truck. Most of the produce being delivered should be chilled to around $0^{o}C$ and there is not a separate zone for storing live product. Within reasonable limits of temperature and duration live organisms can tolerate low storage temperatures. To my knowledge, no studies have been carried out to determine the 'limits' for the species relavent to the Sydney market. These would include Mudcrabs, Yabbies, Lobster and Pippies.

In the short term fishermen have been advised to consign pippies in polystyrene foam boxes without ice. Far and away the most significant preportion of live seafood provided to Sydney consumers is made up of Mudcrabs and Lobster. Mudcrabs are the most resilient of the two species and can survive wide variation in temperature and water availability. Lobster on the other hand usually inhabit the more constant environment of deeper water away from the intertidal zone and are not as resistant to fluctuations in the environment.

Local suppliers of Lobster, who deliver their product to the market personally, soon after capture, have high survival of the fish. As the point of capture becomes further removed from the market, the survival rate declines because the length of time the Lobsters are 'stressed' out of water is increased. Fishermen often place wet seaweed, (Ecklonia), wet newspaper or wet hessian bags over a box of live Lobster to raise humidity and lower the temperature of the box. These methods have varying success. The most successful method appears to be the mingling of wet kelp (Ecklonia) in and around the box of Lobster. Wet hessian is also relatively successful, but fishermen should beware the former use of the hessian bag. 'Pickled Grains' used as stored seed grain, contain a variety of insecticides which can kill the Lobster. Wet newspaper is often screwed into balls by the Lobster and some of the animals will start feeding on it which one prominent retailer claims kills the Lobster.

The N.S.W. Fish Marketing Authority is the central depot for much of the seafood retailed in New South Wales. Mudcrabs from north and south Queensland and from the Northern Territory are often air freighted to the Pyrmont markets where they may be sold on the same day, if they arrive before the sale ends or held over for one or two days, depending on the size of the market.

The mortality of Mudcrabs held at the market for more than one day can be significant, up to 40%, as happened in September 1985. At present there is no facility for the safe storage of live seafood. Both Mudcrabs and Lobster could have their storage life extended and their existence made more tolerable if a live holding room were installed. These animals are subject to heat exhaustion and dehydration with the current marketing facilities.

A live holding room need only be small (9' x 9' approx.) and could be designed to maintain temperatures between 15 - 18^{o}C with very high humidity using a mistor. The advantages of improving the F.M.A.'s capacity to store live seafood could include a much larger through-put as suppliers gained confidence that their losses from mortality could be reduced. I believe the F.M.A. should make it a priority to investigate the feasibility of this scheme.

ACTION AREAS

FEEDBACK TO CO-OPS

A major activity undertaken by the Extension Officer has been the establishment of feedback communication lines to fishermen. For many years fishermen have been consigning their product to the market and hoping for the best. In those instances where their product was either 'short in weight' or seized because it was judged 'sour and unwholesome' the producer may have been left completely 'in the dark' regarding the specific reason for the anomaly. Some fishermen and Co-ops had established a repertee with the Market Inspector and could gain details of seizure cases. Some others believed the marketing system corrupt and did not investigate instances of seizure through fear of reprisals on future shipments. Many fishermen know so little about the marketing system that they believe the Fish Marketing Authority is responsible for daily seizures and know little about the involvement of the Department of Agriculture Inspectors.

Old and stale Silver Warehou on the market floor. These fish typically illustrate the condition of some product arriving at the market. They may have been held for up to a week on the vessel, held over by the Co-op for various reasons, or perhaps even stored for a significant period without ice. In some instances, the fishermen may not have been aware of the extent of spoilage when the fish were sent off to market. If seizure now takes place in Sydney the suppliers will not know why.

More often, the seafood causing most concern when it is seized is from the crustacean family. I have already mentioned the development of black spot and those smells associated with sweaty prawns. These problems may only take 24 hours to become apparent, and suppliers may be totally unaware of the reasons.

Short in weight's can and will occur in boxes of cooked prawns and lobster as drip water is released from the product through storage. Black Spot on the product can cevelop overnight in an incorrectly cooked crustacean, and prawns that are not kept cold can develop sweaty odours rapidly.

However, it is not uncommon when investigating instances of poor quality product to find that the fisherman's Co-operative has held the product over for a number of days in an effort to sell it at the local retail outlet. When the fish starts to show signs of age, the Co-operative attempts a quick sale at the Sydney market.

On numerous occasions when contacting suppliers regarding a recent seizure it was discovered that the supplier was aware of the dubious freshness of his product. On some occasions the Co-operative may be aware of this dubious freshness, but the fisherman is not.

The Co-operative Manager may be holding product over for one or two days in an attempt to play the market, that is, hoping for a day of short supply. Sometimes this tactic backfires on a Co-operative, and their product simply loses value as it ages, possibly to the point of seizure. In some instances the fishermen may be asked to pay for this gamble.

In an attempt to establish reliable feedback communication to suppliers, we are pursuing two principal avenues. Telexes and telephone calls are regularly used to inform Co-operative Managers of the identity of suppliers whose product has been seized. Also, considerable travelling has been undertaken to numerous coastal locations to familiarise fishermen with the system and convey the message concerning the importance of product freshness.

One long-standing problem that Co-operatives have had to contend with is their inability to identify the supplier when 1 or 2 boxes from a large number are seized. The result is that all fishermen supplying the product have to carry the burden of one suppliers poor handling. Conversly the poor seafood handler still receives a return from the Co-operative even when his product may be sour

and unwholesome. This situation has arisen because Co-operative produce is 'pooled' before being supplied to market, and although some Co-ops were still providing boxes with identification, this was not known to the staff of the Authority, and has effectively removed the financial incentive to supply good quality product.

In an attempt to remedy the situation, the Extension service has regularly supplied Co-operatives with the identification of offending suppliers. Some of the relevent telexes are included for inspection. These telexes not only provide identification, but also serve as a constant reminder of the 'good quality' message and are often pinned up on Co-op notice boards.

Through the course of 1985, the Fish Marketing Authority conducted numerous seminars at various locations along the N.S.W. coast. Although the northern Co-operatives were serviced quite thoroughly much work still remains to be done at the troublesome south coast Co-ops.

Initially, thirteen seminars were conducted at nine locations along the north coast, 179 fishermen attended and the general reaction was favourable with Balina, South West Rocks, The Clarence River, Newcastle, Tuncurry and Crowdy Head requesting further seminars at their Annual General Meetings. At these meetings the extra fishermen contacted numbered many hundreds and much enthusiasm was shown for the concept of an extension service. The most enthusiastic response to the seminars shown by fishermen was at the least populous ports with Evans Head and Wooli achieving almost 100% response. The most disappointing response was found at the Clarence River Co-op where only 3 fishermen attended the seminar. However, almost 70 fishermen attended their Annual General Meeting some months later and showed a good deal of enthusiasm for the seminars.

N.S.W. Fish Marketing Authority

Cnr. Gipps and Jones Streets
Pyrmont N.S.W. 2009

Telegrams: "Fishmark" Sydney

Telex: 26956

Our reference: DB:ms

Your reference:

Telephone: 660 1611

Mr. Alec Vallance,
Manager,
Richmond District Fishermen's
co-Operative Ltd,
P.O. BOX 499,
BALLINA. N.S.W. 2478.

17th February, 1986

Dear Alec,

Re: QUALITY OF RICHMOND DISTRICT KING PRAWNS

After consultation with the Fish Merchants Association I decided to contact your Co-operative regarding the King Prawn quality.

Three boxes in particular were found to be of very poor quality:- there was a large number of broken prawns in these boxes and all prawns were found to have a rough, "gritty" texture on the shell, rather than a smooth, "glassy" texture normally associated with fresh prawns.

The three boxes concerned were marked CL, MK and CP and all had the letter "M" in a red circle.

Please accept this criticism in the manner in which it is intended, that is, for the benefit of the industry and contact me if you wish to discuss it further.

Yours sincerely,

David Burford.

20TH FEBRUARY, 1986

ATT: DAVID BURFORD

THANK YOU FOR YOUR LETTER 17TH FEB., 1986 RE QUALITY OF PRAWNS.

THIS NOTICE HAS BEEN POSTED ON OUR NOTICE BOARD FOR ALL TO SEE.

COULD YOU PLEASE ADVISE THE DAY OF THE SALE THESE WERE SOLD.

REGARDS,

GEORGE ROBINSON,
MANAER.

P.S. ALEX VALLANCE RETIRED 31/1/86

FMA AA26956
BALCOP AA66260

The Manager,
South Coast Aboriginal Co-Operative,
P.O. BOX 41,
HUSKISSON. N.S.W 2040.

DB:ms

17th March, 1986

Dear Sir,

Today, the fish merchants at the Sydney Fish Market Floor displayed their dissatisfaction at seeing your large shipment of Bully Mullet presented in poor condition without ice.

If you continue to supply fish in this condition, your Co-op will gain a very bad reputation with the buyers on the Market Floor.

Even Mullet, a low value species will achieve better prices if it is in good condition.

I trust you will inform your fishermen and whoever is responsible for packing the fish of the necessity of quality presentation.

Regards,

David Burford,
Extension Officer.

Mr. P. Delaney,
Wallis Lake Fishermen's
Co-Operative Ltd,
Ray Street,
TUNCURRY. N.S.W. 2428.

DB:ms

12th February, 1986

Dear Mr. Delaney,

It has come to my attention that most of your Yellowtail Kingfish supplied to the Sydney Fish Markets are being supplied with the gut in.

The retailers association has asked me to advise you that they would prefer these fish to be supplied with the gut and gill removed.

I trust you will inform the fishermen supplying you with these fish of these requirements.

Yours sincerely,

D. J. Burford

David Burford,
Extension Officer.

Mr. D. Goodger,
Bermagui Fishermen's
Co-operative Ltd,
BERMAGUI SOUTH. N.S.W. 2547.

DB:ms

6th March, 1986.

Dear Sir,

I regret to inform you that 10 boxes of Arrow Squid had to be placed on re-sale this morning. All boxes were marked with the fish identification of "H.L.".

These Squid could have been in excellent condition if they had been iced thoroughly. Placing 25kg of Squid into a box, then filling the rest of the box with ice is not correct icing.

The fish should have been layered in the boxes with a layer of ice, then a layer of fish and a layer of ice etc.
Not only does this affect your Co-operatives reputation, but it will decrease financial returns to the fisherman if he continues to supply fish in this manner.

Please inform the fisherman of the situation.

Yours sincerely,

David Burford

David Burford,
Extension Officer.

GA
66260
BALCOP AA66260
FMA AA26956

24-2-865

ATT GEORGE ROBINSON

RE QUALITY OF PRAWNS AND MULLOWAY

ONE BOX OF POOR QUALITY PRAWNS, SOFT AND BROKEN MARKED 'G.B.' AND TWO BOXES OF MULLOWAY MARKED 'J.M.' THE BUYER OF THE MULLOWAY FELT AS THOUGH THEY HAD BEEN MISREPRESENTED.

ONE LARGE FISH IN THE BOX WAS SUSPECTED OF BEING OLDER THEN THE OTHERS. PLEASE ADVISE FISHERMEN OF THESE COMPLAINTS.

REGARDS,
DAVID BURFORD

*
BALCOP AA66260
FMA AA26956

GA
28387
NUFISH AA28387
FMA AA26956

26-3-86

ATTN THE MANAGER

PLEASE INFORM FISHERMAN I.D. NO. 23482 THAT HIS PRAWNS ARE SEIZED BECAUSE OF DIESEL CONTAMINATION THIS MORNING. (1 BOX SMALL-MEDIUM KING PRAWNS). IT ONLY REQUIRES A SMALL AMOUNT OF DIESEL TO CONTAMINATE THE PRODUCT WITH AN OVERPOWERING SMELL AND TASTE.

FISHERMEN SHOULD BE AWARE OF DIESEL SPILLS FROM COOKERS AND THE QUALITY OF THE WATER COMING THROUGH THEIR DECK HOSE.

REGARDS,
DAVID BURFORD - EXTENSION OFFICER

*
NUFISH AA28387
FMA AA26956

The seminars were punctuated and terminated with questions and criticisms from the fishermen who seemed genuinely concerned about product quality. Most of the photographs in this report were included in the seminar to ensure that it was both relevant and up to date. Emphasis was placed on convincing fishermen that the fishing opperation was in fact an exercise in food handling and that the product should be treaded with this in mind. Some discussion of bacterial load and the consequences of poor icing was included as well as various graphs and tables relating lost shelf life to hours of un-iced storage. The information leaflet currently being printed is a useful guide to some of these topics and will hopefully prove helpful to future seminars.

The seminars and time spent at the local Co-operatives were useful as a guide to the Extension Officer to identify areas of necessary action. Fishermen were not hesitant in coming forward with suggestions of ways to improve product quality. Some of these included.

1. That the Authority should provide larger fish boxes, for the consignment of longer fish such as Tuna, Jewfish and Harpooka

2. That the Authority should, via liaison with the buyers, establish a code of practice for individual species that would explain the required cleaning, gutting and gilling procedures for each important species.

3. That the Authority should, via liaison with the buyers establish an acceptable size grading for large, medium and small in important species.

4. That the Authority should pay greater attention to cleanliness of the F.M.A. grounds as this is the only contact a large number of members of the public have with the fishing industry.

5. That the Authority should not allow the sale of poor quality ex-frozen produce as this allows the less quality conscious retailers to provide the public with an undesirable product that discourages the consumption of seafood in the long term.

6. That the Authority should play a more active part in relaying information on product condition on arrival at the market back to the supplier.

Many of these suggestions have already been acted upon and the system is receiving the benefits of this. It is essential that the Extension Officer remain highly mobile in the persuance of his duty as only through visiting regions and discussing particular problems with fishermen on site, can a true appreciation of the situation be gained.

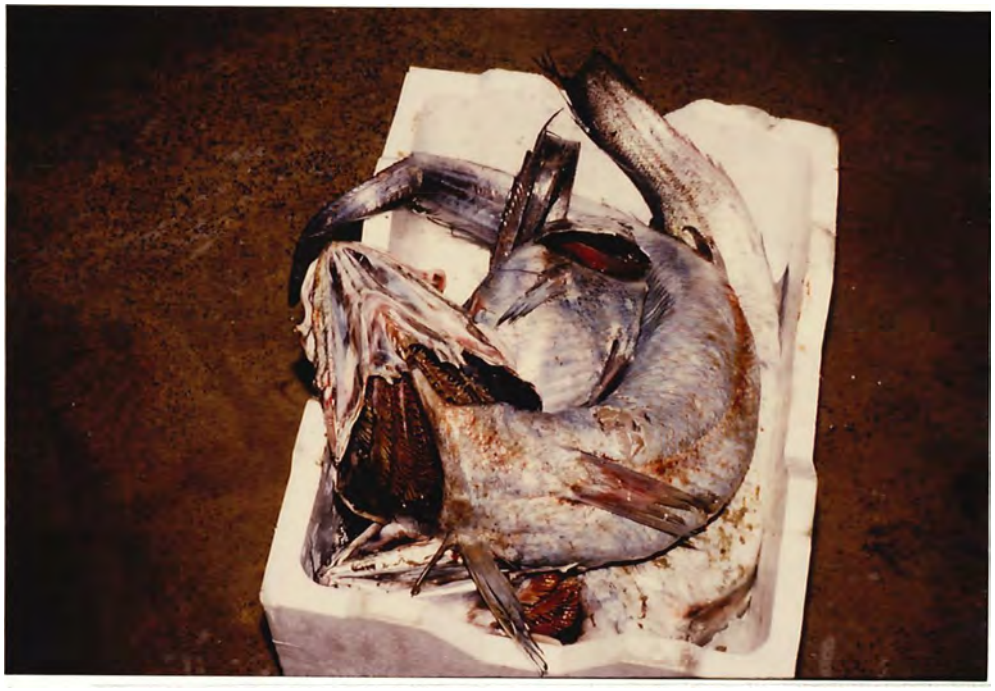
THE SYDNEY FISH MARKET (A DUMPING GROUND)

The Pyrmont Fish Centre is often referred to by retailers as a 'dumping ground'. As has already been mentioned, Co-operatives will sometimes send product to market in the knowledge that it is not fit for their local retail outlet. The prevailing attitude being that it may be of some use to someone.

This Mulloway was consigned to the Market by the Laurieton Co-operative. The mid-section of the fish has been removed by a large shark. Fish such as these are usually seized by the inspector because they are considered 'mutilated produce'.

When consigning product with such obvious flaws, the Co-operatives run the risk of developing a 'bad reputation as a supplier'. Retailers perceive such deliveries as an indication of the suppliers attitude to the Sydney market and react as though they have been insulted.

In cases such as this the Co-operative or fisherman would be well advised to utilise the product locally if they consider their 'market floor' reputation to be of importance. The high likelihood that the product will be seized by the fishery inspector is another good reason not to send the fish to Sydney.



This Blue Grenadier supplied to the markets early in 1985 is a typical example of poor quality product. The gills are a dirty brown colour, the fin membranes and skin have begun to disintergrate and the fish is thrown 'willy nilly' into a polystyrene vegetable box without ice. Obviously the supplier has little or no respect for the product and is not concerned about the preservation of the eating quality of the fish.

The unfortunate sequel to this story is that quite often, produce in this condition is purchased by the less quality conscious retailer, as happened to this box of Grenadier. Logically we must assume that it is then marketed to the Sydney public as fillets or in some other partially processed form.

In other words, unless the product is seized before sale and it must be in very poor condition for this to happen, there is a high likelihood that the Sydney consumer will be asked to consume it.

The public is largely ignorant in the selection of good quality seafood and if we are to preserve a good name as an industry, we must impose strict quality control measures on ourselves.

Silver Warehou are trawled from deep water by otter trawlers in southern New South Wales and Victoria. When the product is in season, catches of several ton are not uncommon. It is also not uncommon to find several tonne on the market floor without ice and with evidence that the fish has never been iced. Often supply is so heavy that there is no market for the quantity being delivered to market. Fishermen realise this but continue to catch the fish. Their knowledge that prices will be low or non-existant does not prevent them from going fishing, however, it does disuade the propper use of ice on the product.

In effect, the suppliers are dumping product on the market in poor condition in the hope that it will be sold at any cost. This attitude often helps develop a poor reputation for the product being supplied.

The retailers and consumers begin to expect this level of quality and the fish may develop a reputation for poor taste. Silver Warehou develop a very 'strong flavour' after a few days poor storage. No doubt this has some effect on their salability.

Fishermen are not the only suppliers to dump product on the market floor. Fish wholesalers selling their product under various pseudonyms are well known as suppliers of poor quality product. On numerous occasions I have observed the sale of very poorly preserved frozen product supplied by P. Manettas & Co. The retailers refer to this phenomenon as "Manettas cleaning out his freezers'. It usually occurs at times of short supply of fresh product to the market and results in an injection of numerous boxes of very poor fish to the public.

The snapper shown above are not a product of P. Manettas & Co. In fact, they are infinitely superior to the product he supplies. On one occasion (20-3-86) 20 boxes of headed and gutted Orange Roughy (ex ice) were delivered to the market by P. Manettas truck. The product was sold under the name 'Select Seafoods' and Manettas made the highest bid of $3-72 buying only one box. It should be remembered that the skin of Orange Roughy will cause severe diahorrea if it is eaten.

FISH MARKETING AUTHORITY SALE SHEET

BATCH No. | BAY No 1-6 S.F.M. 4 | ROW No. 0 8 | SHEET No. 1 | PLASTIC = P NON PLASTIC = N P | EX ICE | CONSIGNMENT DATE | SALE DATE 20 03 86

	CRATE NUMBER BAY	ROW	POSITION	SENDER	SENDER CODE	SPECIES	SPECIES CODE	QUAL	KGS	PRICE	BUYER	BUYER CODE	UNITS FROZ MISC
1	4	0 8	0 0 1	SELECT SEAFOODS	3 7 4	O/PER Orange	0 0 0		2 5 0	3.72	MATT	0129	
2	4	0 8	0 0 2	SELECT SEAFOODS	3 7 4	O/PER Roughies	0 0 0		2 5 0	3.52	IMPORT	5652	
3	4	0 8	0 0 3	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		"	"	
4	4	0 8	0 0 4	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		"	"	
5	4	0 8	0 0 5	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0	3.32	MAN.	0129	
6	4	0 8	0 0 6	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0	3.22	FIJI	0460	
7	4	0 8	0 0 7	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		"	1	
8	4	0 8	0 0 8	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		BHX	0305	
9	4	0 8	0 0 9	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0	3.42	BHX	1	
10	4	0 8	0 1 0	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		JUNCTION	0112	
11	4	0 8	0 1 1	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0	3.32	"	"	
12	4	0 8	0 1 2	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		"	"	
13	4	0 8	0 1 3	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		"	"	
14	4	0 8	0 1 4	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		"	"	
15	4	0 8	0 1 5	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0	3.12	BHX	0305	
16	4	0 8	0 1 6	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		BHX	1	
17	4	0 8	0 1 7	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0	3.14	Neutral	0538	
18	4	0 8	0 1 8	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		2	1	
19	4	0 8	0 1 9	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		PIY	5834	
20	4	0 8	0 2 0	SELECT SEAFOODS	3 7 4	O/PER	0 0 0		2 5 0		2	1	

With this in mind, and knowing full well that Sydney retailers are not familiar with this product, and are likely to underestimate the importance of skinning the fish, I recommended it be withdrawn from sale; it was not.
Because of my curiosity regarding this shipment of fish had been aroused, I requested the identity of the supplier from the F.M.A. computer. Select Seafoods was listed as the supplier, with no name or address. The cheque for this delivery was collected by a member of the F.M.A. staff three days later who collects many of the suppliers cheques and gives them to suppliers on the market floor.

In my opinion, the problem with this system is that suppliers of poor quality, illegal or dangerous product can keep their identity secret.

Frozen product sold on the market floor is often the result of very primitive fish preservation techniques. The snapper shown on the previous page are a good example. No attempt has been made to protect the fish from either oxidation or freezer burn. The product is not dipped glazed to protect if from freezer burn, and it is not packeged in sealed plastic wrap to reduce rancidity through oxidation in a freezer.

Headed and gutted frozen Leatherjackets arrive at the markets from time to time in grey plastic bins. Obviously this is the receptical in which they have been frozen and no special freezer preserving techniques have been pursued.

This product often bears the classic signs of freezer burn across the exposed surface of the carcass.

Poorly preserved frozen crustaceans like these frozen Endeavour Prawns can cause some concern amongst retailers. The product is often quite fresh, but on some occasions, sweaty Prawns can result very soon after thawing and a buyer may have no come-back on the supplier. Unlike fish which has 'notable changes' to its appearance when it is stored for long periods prior to freezing, there may be little or no change in the visual characteristics of a Prawn which has been overstored before entering the I.Q.F. tanks. What changes there are may be difficult to detect in the frozen product. Typical of the symptoms masked by the freezing process are the slimy feel and the sweaty smell of the prawns. A good procedure to follow when buying such fish is to warm 2 or 3 prawns in the palm of your hand for a couple of minutes and then assess the product.

The great disadvantage of allowing poor quality product to enter the consumer market is that it can generate hostile attitudes to seafood by dissatisfied consumers.

PRODUCT HANDLING AND QUALITY CONTROL

Throughout the marketing chain, the attitude of the numerous fish handlers varies. Usually those whose incomes directly depend on the quality of the product have a superior attitude to fish handling in general. It is often Co-operative staff or F.M.A. staff that are made responsible for critical aspects of the product preservation and presentation and here lies one major contributory factor to poor quality product.

These large fish species arrived at the F.M.A. in a bed of ice secured in the Co-operative transportation vehicle. On arrival at the F.M.A. they may be left lying around on the floor for extended periods with no provision for cooling. When they are eventually placed in the auction bay, they are not iced and they are placed in boxes which are entirely inappropriate for such large species.

Some efforts to remedy this situation are being made. Large boxes have been made available for Tuna in the Sashimi bay, but many other species are not gaining the benefits of this initiative.
It has been made a condition of sale within the Sashimi bay that fish supplied to it must be iced. This may be done by the fisherman if he delivers his own fish to market, or by market staff if the product has not been attended to on arrival.

A major impediment to good product quality is the suppliers disinclination to allow re-icing of their product on the market floor. All of the Co-operatives south of Sydney and many of those from the north coast have instructed the F.M.A. not to re-ice their product if it is found to be short of ice. This attitude has developed as a result of the rather zealous application of ice that occured during the period when re-icing was allowed. Fishermen consigning product to Sydney claim that re-icing was occuring on product when it was not necessary and also that they were being billed for ice that was not being applied.
'Bells Ice', the company charged with the responsibility of icing un-iced product on the market floor claim that fishermen were under-icing their product in the sure knowledge that it would be looked after at the market.

Whatever the true situation, it has resulted in a loss of faith between the two parties and re-icing seldom occurs these days.

The most significant contribution to the packaging and icing of suppliers product is usually made by staff at the fishermens Co-operative. On many occasions I have witnessed the lack of faith that fishermen have in Co-operative staff carrying out this job effectively.

This has been supported by my own observations of poor packing and icing at the Co-operative, as I found at Eden.
At two of the Co-operatives where packing presentation and icing of finfish is considered excellent, that is Wooli and Wallis Lake, the fishermen pack all the product themselves.

There is only one Co-operative where Co-operative staff are responsible for packaging the product and the results are excellent, and that is Coffs Harbour Fishermens Co-operative.

Probably some of the worst examples of fish handling technique come from the retail section of the trade. Retailers often pay high prices for Sashimi Tuna at the Sydney market, and one would assume that they would then take great care of this product. It is a regular occurence to find the person responsible for collecting the fish and delivering it to the retailer, handling these fish roughly, thus bruising the valuable outer layer of meat in a Sashimi Tuna. Some examples of rough handling include; dropping the fish, careless use of trolleys when transporting fish and placing the fish one on top of the other for storage with no ice.

'Wheelers' or those responsible for removing fish from the auction bay and delivering them to the retail outlet or truck often place boxes of uncooked product on top of cooked prawns or lobster. This is a classic fish handling mistake recognised by most members of the industry. Wheelers, F.M.A. staff and Co-operative staff undergo no formal training in these areas and could be forgiven for making this sort of mistake. By placing a box of uncooked product on top of a box of prawns, the wheeler is enabling re-contamination of the cooked product to occur. This

could enhance spoilage activity or contribute undesirable flavours. Where the uncooked product is a box of Octopus, Squid or Cuttlefish, contamination with black ink can also occur.

Retailers and fishermen are by no means uniformly good fish handlers. A small retailer may act as his own 'wheeler'. In these cases it is not uncommon to see the retailer making all those mistakes attributed to wheelers employed by the retailer. My experience of proceedings in the transport and storage of product at retail outlets is limited, but some events suggest that similar mistakes are made throughout. Heavy handed addition of sulphiting agents to prawns and the use of old stale fish in preparing cooked product suggests to me that quality control at retail outlets is limited.

Input by Health Authorities in the past has been minimal, in fact, when I brough Mr. Brett Campbell, a food inspector from the N.S.W. Department of Health to some of the retail outlets at Pyrmont, they exclaimed 'We never had a Health Inspector before!' and were alarmed that I had directed him to their shops. In the past, a large part of the quality control at shops has been self imposed with various outlets achieving various standards.

Many aspects of quality control at the central market fall under the jurisdiction of the Council Health Inspector. His attendance at the market in Sydney is at best, sporadic and at worse, useless. He is charged with maintaining standards of hygiene at the market and these are low to non existant. He is charged with preventing smoking and littering on the market floor. These are institutionalised. For the induction period for the new Extension Officer, Mr. Ken Harada, we could not find the Health Inspector in attendance on any day.

Fishermen are also well known for the errors they make in product handling. The main body of this report covers these problems thoroughly, so I do not propose to elaborate on this.
The simplest and most effective change that could occur in the industry would be to instil 'pride in product' into those suppliers where this is absent. This is illustrated not so much by simple errors in product handling, but by the lack of care and attention shown to some fish.

These Redfish, like many other species from trawl fisheries, regularly suffer from heavy oversupply. Often the fish are covered in muddy gut contents squeezed out of the fishes vent by rough handling as with these fish. The fish have probably been stepped-on and crushed and no effort has been made by the crew to wash the catch.

Gut contents can carry with it a variety of food poisoning bacteria normally only present in the box at very low levels. By smearing it throughout the box, not bothering to ice the product and possibly breaking the dermal layer with rough treatment, spoilage conditions are made highly favourable and the shelf life and bacteriological safety of the product is reduced.

DUTY STATEMENT FOR EXTENSION OFFICER

Extension Officer is primarily responsible for improving seafood quality and maintaining standards. To carry out this job efficiently the Officer must have:

1) Independence

2) Ability to withdraw product from sale

3) Maximum exposure to market floor operation

4) Authority to "direct staff members" in matters concerning quality control

5) Authority to downgrade product.

In persuing his duty the Extension Officer must ensure that he is capable of performing the following tasks.

1) To ensure the "Sashimi Bay" is running efficiently and that all fish are presented in the best possible light. In carrying out this task the Officer need not do the manual work of "shifting fish" but should have the Authority to direct fish handlers in the operation of the bay.

2) To ensure efficient communication lines open to co-operatives and fishermen informing them of product quality and market requirements. Telex and letters should be regularly sent to suppliers as a feed back of information.

   Country trips to Co-operatives are an essential part of the job and help to familiarise suppliers with market attitudes and initiatives. All Co-operatives should be visited for at least a couple of days each year.

3) That he is available to advise the public on technical matters regarding fishery biology, product storage, product spoilage, microbiological and biochemical aspects of seafood preservation. Market conditions, species performance, and other technical matters that lie outside the experitse of the Market Development staff.

4) That he is competent and available to advise fishermen on matters concerning product storage and onboard handling.

5) That he is competent and available to advise retailers and processors on matters concerning presentation, product preservation, species identification, grading of Tuna, etc..

6) That he is competent photographer and can collect and catalogue photographs of product at various stages in the handling chain, to be shown to fishermen at a later date.

7) That he is a reasonable communicator and can successfully relate information at seminars and co-operative general meetings.

8) The Extension Officer is also responsible for establishing an information service for fishermen, fish merchants and processors as part of this service relevant information should be collected from recognised experts in various fields and catalogues for future reference.