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A REVIEW OF FISH PROCESSING INDUSTRIES IN KIRIBATI

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1. Introduction

The Republic of Kiribati is made up of the Line, Phoenix and the Kiribati Group. It has a land mass area of 700 sq. kilometers made up from 33 coral atolls scattering over 2000 nautical miles. By taking into account the 200 mile limit zone, Kiribati covers 1 million square miles of the equatorial Pacific Ocean. Thus Kiribati rely mainly on the sea resources for her revenue after the ceassation of phosphate in 1978. The main administration and commercial center is in South Tarawa of the Kiribati Group, where the Republic is faced with difficulties for inter island communications, thus affect development programmes which includes related fields in fisheries.

Fish processing can be referred to any activity done to change the state of fresh fish with the intention of preserving the flesh for a period of time. In Kiribati, the locals mainly pranchised the cooking of fish and drying over the fire, sun drying and the use of salt. Recently, with the start of export overseas, the fish is sold frozen, chilled or filleted with vacuum packing.

2. Local Fish Processing

2.1 Cooking and Sun Drying

Sometimes the fish is caught and dried straight under the sun, especially with very small fishes of 2-5 cm.

However, the common practice is having the fish being cooked first. It can be boiled, but the use of oven is better. The oven is conctructed from a dugout earth, charcoal placed inside and after

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the fire is lid - flat stones are put over the top to form a hot base. The charcoal are obtained from dry bandaners fruit or coconut husks. Old sacks and mats are placed over the fire to form a lid pinned down hard by the use of heavier stones.

The fire is left overnight, where the flesh should'nt burn if the amount of charcoal used is just right. Further, drying is made under the sun and wind. By this time the fish will be in pieces and completely separated from the bone. Drying for the next 2-3 days will completely harden the fish. This product then can be stoned in tinned containers for later use.

2.2. Salt and Sun Drying

The product from this method is called a saltfish. Fresh fish is gutted, head and midbone removed and then salt is applied over the surface. It is then left for 2-3 hours before they are hanged over drying racks under the sun with a lot of wind.

However, local saltfish quality is very poor due to insufficient care taken with regard to hygiene. Often the produce is infested with bugs or fry maggots from improper drying. A white saltfish displaying the heavily use of salt - thus not attractive in the market, is common. Cooked saltfish is experienced from drying over old tin roofs as they regenerate a lot of heat.

Because this is the cheapest way of local fish processing as well as the easiest with quite good local market, Fisheries Division is encouraging the use of brine as detailed out in Appendix 1. It is shown that only fresh ^{fish} must be salted. Also,

this method controls the use of salt which can be expensive if used unnecessarily. The product should not attract flies if the method is followed carefully.

The "Local Produce" is handily handling the market in Tarawa. In 1976-77, the local sale records was 23 tons/yr. average. It dropped recently due to some administrative problems, but by improving the market as well as the quality, the product can go high in its yearly sales. This will benefit the fishermen in the rural areas greatly.

3. Commercial Fish Processing

From the definition given in the introduction, freezing and chilling can be termed as fish processing. There are two government owned companies involved in these processings namely: The "Mautari Ltd." and "Marine Exports". Filleting and vacuum packing are mainly done by a privately owned company called the "Gilbert Is. Industries". The companies are based on S. Tarawa with the exception of Marine Exports where it is located on Kiritimati-Line Is.

3.1. Gilbert Is. Industries

The company is originally intended for lobster processing. However, fish is now included.

The market for filleted fish is mainly for the spankled emperor. These are provided by the "Marawa Fishing Company" by the use of gill nets. The nets after being set inside the lagoon were checked every 6 hours. The catch were immediately gutted and put on ice inside the eski already available on the boat. It is then transported to the processing center by the

se of a truck - some 15 miles off from the warf.

At the center the fish is filleted manually by 2 men and 1 woman equipped with a sharp thin knife. The fish is beheaded midbone and outer skin removed and the remaining flesh is washed thoroughly, vacuum packed and chilled inside the cold storage. The remaining fish waste is sold to the Agricultural Division for feeding trail purposes in Livestock. The "dressing up" of fish takes about 6 hours with the 1980 export rate of 200-600 kg/week. The rate is declining at the moment due to decrease in catch rate from the Tarawa lagoon. Steps are taken for the locals from nearby islands to provide the emperor species from their lagoons. However, there are difficulties in maintaining the good quality and in transport.

Processing trials are now carried out on yellowfin and wahoo where they are sent to the main markets in Honolulu and U.S.A.

3.2 Marine Exports - Kiritimati Is.

The company is owned by the Ministry of the Line and Phoenix Groups situated on Kiritimati in the Line Is. Under the Japanese aid the processing center is equipped with:

- 1.tonne/24 hour ice plant + 2 tonnes storage;
- 10 tonne cold storage and;
- 1/2 tonne/12 hours blast freezer

In addition, it used a 20 tonne capacity chill stone originally belong to the brine shrimp project. It is currently filled with 2 brine tanks of 1 tonne capacity each used to store milkfish overnight prior shipment.

The unit mainly export milkfish which comes from the Fisheries Division milkfish ponds on the island. They are .ected alive, using fine mesh nets to minimize injury to the fish - put straight to chilled water inside the eskies and then transported by truck to the processing center 30 miles off. The fish is then put in the brine tanks for the overnight storage. Prior shipment by air the fish is put in eskies filled with chilled water.

In 1980 the company exported 36 tonnes of fish - 70% of which is milkfish. The rest, comprised of reef fishes mainly mullet, is supplied locally by the use of gill nets inside the lagoon and on the reef flats. The main market is in Honolulu and USA with an export rate of 1 1/2 - 2 tons/week. Nauru is supplied with 1/2 ton/week. Because of the discontinued flight in Tarawa from Kiritimati to Nauru, the fish is chilled overnight using the Gilbert Is. Industries cold storage which is a 3 min. drive from the Tarawa airport.

A limited quantity of about 100 kg/week of parrotfish, trevally and snapper are filleted and marketed to Nauru. Successful trials are anticipated in the USA and Tahiti pending the arrival of a vacuum packing machine.

3.3 Te Mautari Ltd.

The company is a statutory body entirely owned by Government. It has 2-100 ton pole and line fishing vessels under the British and Japanese aid. Included in the Japanese aid is a shore cold storag facility comprised of:

50 tonne-cold storage;

10 tonne-cold storage;

3 tonne chill store;

1 tonne/12 hour air blast freezer;

3 tonne/24 hours flake ice plant + 3 tons storage.

The fishing boats mainly catch skipjack with the aid of live baits - either wild bait or cultivated and mainly gold spot herring and milkfish respectively. During the fishing activity, the fish are collected on the deck; with the aid of mechanical devices. The catch is then put straight into the cooling brine system as soon the school of fish stopped biting. The system freeze the fish quickly right to the midbone because it has a lower freezing point of -18°C than ice. After 4 hours inside the brine, the fish are put inside the ship's cold holds.

At the end of a fishing interval, the boats discharge their catch to the shore facility. At the moment the procedure involved is very time consuming and especially when maintaining the frozen condition of skipjack. The fish are put inside the small boats which deliver the load to the warf. On the boat there is an immediate exposure of the product to the sun although it is for only a short while.

The earlier arrangement at the warf, was having the fish thrown up the side and although the basement was covered with a piece of board or a tarpulin, some fish still got to the dirt.

This, however, has been remedied by the installation of a winching system on the warf. Now the fish is lifted out of the boat and into the truck; and then straight into the cold storages. In the meantime, Government is trying to improve the harbour facility in order to service the fishing boats better.

Last year 1981, the two boats total catch was 750 tons at 2.5 tons/vessel/day. At that time, the two boats were required also to transport their catch to the Marshalls. This resulted in the loss of fishing days; thus a greater catch record for the company, could have been recorded. This year, a chartered container boat is added to the Mautari's fleet.

The Mautari Ltd. is also involved with the direct purchasing and selling of fish (tuna plus reef and lagoon fishes) to the public. The fishermen especially with outboard motor boats, buy ice from the plant at 3¢/lb. and bring it to the fishing grounds with the aid of an eski. With the local canoe, because of the limited space and bouyancy, ice is impossible to take on board. In gill netting or handlining the fish is gutted and put in ice as soon as it is caught. In local pole and lining (using pearl lures) the boats dont usually bring ice because the fishing ground is quite far. A team of three can easily fill up one motor boat when encountering a favourable school. These boats are often very fast and as soon as they are full up they quickly rush back to the market with their catch still very fresh.

At the market, all local fish purchased are inspected and the spoilt fish are rejected. In May-August 1981, the company purchased 125 tons of fish, i.a., 30 tons/day average. On peak seasons the average catch per boat is 1000 lbs.

However, the market in South Towawa is only 5 tons/day and thus resulting in a fish stock build up. Because there's very limited outlet market for reef fishes this build up can only be solved by rejecting the unwanted species and thus a price strategy was invented depending on the demand. This greatly discourage local fishing but as things stands there's no other alternative. However, efforts are still underway to open outlet markets.

The public purchase their fish requirement direct from the center and two other outlet in the populated areas of South Tarawa. A recent survey revealed that the opening up of more centers on South Tarawa will increase the 5 ton/day market. Inside these centers, all the available fish species one displayed on ice. The inside of the buildings are washed constantly to ensure maximum hygiene.

Summary and Conclusions

Salt fishing is very easy and inexpensive, and thus it is widely practiced in the rural areas. However, the fishermen are not very serious with this market. The education in trying to understand how the fish get spoil, the hygienic requirement involved and an understanding on the market system, i.g., the product must be made attractive to the customer, would improve and change the attitude of people towards salt fish production.

At the first start of the National Fishing Company - the
Entari Ltd. in 1981, a lot of fish purchased from the Fishermen
are rejected because insufficient care was taken to maintain
the good quality of fresh fish. This brought about an awareness
on the use of ice. It means that if ice is not used properly, the
fishing effort will be wasted because the catch will be rejected
from the market.

On the outer islands there is need to organize the marketing
of fresh fish. The common practice, now is that, the fishermen
go around the villages selling his catch. This is often a tiring
job, with the fish getting spoil easily. Efforts are underway
at the moment to study the feasibility of installing an ice making
machines on each of the individual islands. This will greatly
encourage local fishing as on South Tarawa. It means that the
fishermen after a fishing expedition just weigh in the catch to
the ice plant center and thus gain money straight away. The
catch is then sold locally, with the highly prized species trans-
ported to Tarawa and thus utilizing the facilities in the Gilbert
Is. Industries for export.

In commercial ventures, processing is very limited. It only
involved three processing centers dealing mainly on chilling,
frozen and to a lesser extend-filleting and vacuum packing. To
maintain the quality of the product is very vital, because once
the export got poisoned somehow, all the fishing companies in the
country will colapse. The Fisheries Division of the Ministry of
Natural Resources Dvelopment is therefore, changed with the

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licensing and inspection of such commercial centers. This is done by the continual visit of the fisheries personnels to these centers and a constant check in the water quality used in the washing.

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Appendix 1

FISH SALTING AND DRYING

1. Scale fish, cut off Head and split down the back.
2. Break off backbone just in front of tail.
3. Make sure all guts are removed, the dark skin is OK for Tarawa.
4. Make sure the fillets are cut where the flesh is thickest.
5. Wash thoroughly in fresh water and leave to drain in a basket.
6. When all fish ready make enough % Brines % to cover them.
DO THIS BY:
 - a. Seeing how far a container is filled up with the fish.
 - b. Remove the fish, pour in about 1/2 this volume of fresh water.
 - c. Add salt (bought from the store) a handful at a time, stirring until dissolved.
 - d. When no more salt will dissolve the brine is of the correct strength. There should be a light covering of salt on the bottom of the container.
7. Lay the fish in the "Brine", making sure that the fish pieces are as straight as possible and that the Brine is well mixed around the fish and covers all the fish.
8. Leave for about 2-3 hours for thin fish with fillets the size of a man's hand, 4-6 hours for thicker and larger fish. Oily fish like mullet (te aua) will take up less salt than others. Much larger fish will need to be cut up into similar sizes to the above.
9. Remove fish from the brine, leave to drain for a few minutes in a basket.
10. Very important, wash the fish thoroughly so all the extra brine is removed. The fish is now ready for drying after draining off any liquid for a few minutes in a basket.
11. Start the drying about 7:30 to 8 o'clock in the morning. The fish will keep in good condition overnight if necessary after brining and washing.
12. Turn the fish every 1/2 hour - this is very important during the hottest part of the day.
13. Dry the fish for a least 3 sunny and breezy days - if in doubt, dry the fish for a couple more days, it will do no harm if they are turned regularly.
14. Do not place on an iron or aluminium plate in the sun, this is too hot and cooks the fish.
15. Store, when dry, in a container which allows air to flow through.