**FISHERIES SCIENCE III**

**PROCESSING OF LOBSTERS**

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**PROCESSING OF LOBSTERS**

Minimize the Deterioration of Lobsters – Handling

it is generally known that under similar conditions, the quality of lobsters deteriorate more rapidly than fish and therefore care in maintaining the lobsters live prior to processing is strongly recommended;

• since lobster legs and other appendages can be easily broken and the damage can cause the risk of infection and weakening of the lobster, care should be taken to handle live lobsters at all times;

• tanks and wells for pounding live lobsters should be so placed and constructed as to ensure survival of the lobsters;

• live lobsters should be carefully packed in clean tanks, wells, crates, open-weave bag, or in boxes covered with wet sackin and held at as low a temperature as practicable, as required of

varying species;

• holding tanks are regarded as a better method of storage for long-term handling than well storage;

• the use of clean Hessian or jute bags, for transport, is preferred. Bags made of woven synthetic material should not be used;

• where bags open weave are used for transport, precautions should be taken to avoid suffocation of lobsters due to slime or mud;

• care also should be taken to maintain the necessary humidity in holding the lobsters live in bags for transport;

• species, which mutilate each other, should have the claws banded as soon as possible after catching;

• if it is not possible to keep lobsters alive until the time of processing, lobsters should be killed. Tails should be carefully separated and cleaned before freezing or cooling down to the temperature of melting ice, which should be done as rapidly as possible.

Processing Operations

This section provides two examples of products derived from lobsters. Special consideration was given to elaborate on products which involve heat treatment because of their potential impact on food safety (such as post processing handling). The products and their respective flow diagrams are as follows: Frozen Raw Lobster Tails. Chilled Cooked Whole Lobster/Chilled Cooked Lobster Meat

**Frozen Raw Lobster Tail**

**Live Lobster Reception (Processing Step 1)**

• live lobsters should be inspected upon receipt to ensure that they are alive, which can be demonstrated by active leg movement and the tail of lobsters being curled lightly underneath the body when the lobster is picked up. Dead lobsters have a high probability of decomposition due to a high autolysis rate and should not be processed

• weak lobsters should be processed immediately;

• since lobster legs and other appendages can be easily broken and the damage can cause to risk of infection and weakening of the lobsters, care in handling should be applied to live lobsters at all times. The necessary skills should be acquired by lobster handlers;

• lobsters should be rejected if they are known to contain harmful or extraneous substances and/or defects which will not be eliminated or reduced to an acceptable level by normal procedures of sorting or preparation. An appropriate assessment should be carried out to

determine the reason(s) for loss of control and the HACCP or DAP plan should be modified where necessary.

**flow chart for frozen raw lobster processing**



**Live Lobster Holding (Processing Step 2)**

• All live lobsters should be processed as soon as possible;

• Storage time should be monitored where appropriate and should be as short as practical;

• to minimise damage, black discoloration (melanosis) and mortality losses during captivity, especially for the moulting stage of lobsters, over-crowding should be avoided and this can be achieved by controlling the stocking density;

• for short-term storage, live lobsters should be held in suitable containers and in land-based tanks and wells that should be supplied with running sea water, or in dry crates;

• dead whole lobsters should not be processed and should be rejected and disposed in a proper manner. An appropriate assessment should be carried out to determine the reason(s) for loss of control and the DAP plan should be modified where necessary.

• If drugs are used, appropriate withdrawal times must be followed.

**Tailing (Processing Step 3)**

when lobsters are not landed alive, the tail and cephalothorax should be separated immediately after catching. This practice is strongly recommended as they are brought on board. Tails should be carefully separated and cleaned before freezing or cooling down to the temperature of melting ice, which should be done as rapidly as possible;

• tailing should be carried out as rapidly as possible.

**Washing (Processing Step 4)**

lobster tails should be washed in plenty of running potable water, or clean sea water, or water as outlined in 13.1.2, to remove all impurities.

**Application of Additives to Lobster Tails (Processing Step 5)**

• Mixing and application of appropriate additives should be carried out by trained operators;

• Regular checks of the additive levels should be carried out.

• Tails with black spots should be discarded.

• Non-approved additives should not be allowed in the processing facility.

• sulphites should be used in accordance with manufacturer’s instructions and Good Manufacturing Practice.

**De-veining/Trimming/Washing (Processing Step 6)**

• the intestine should be removed immediately and consideration should be given to use methods such as ejection by water pressure, vacuum, or physical removal by appropriate utensils (such as scissors, knives or extractors);

• skills should be acquired by lobster handlers with particular attention being given to the removal of membrane and blood from the front end of the tail where the meat is exposed;

• an adequate supply of clean water or potable water should be available for the washing of de-veined and trimmed lobster tails to ensure that no remnants of the gut or its contents remain;

• the de-veined or trimmed lobster tails should be washed and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility;

• the de-veining process should be carried out quickly to prevent product spoilage. Tails waiting for de-veining should be kept on ice or refrigerated at 4 °C or less.

**Grading/Weighing/Wrapping (Processing Step 7)**

• lobster tails should be graded into species, sizes and weights for the relevant market, to assure the economic integrity of the final product;

• calibrated balances should be provided for accurate grading;

• balances should be calibrated periodically with a standardized weight to ensure accuracy;

• packaging material should be clean, sound, durable, appropriate for its intended use and of food grade material;

• the wrapping and packaging operation should be conducted in a sanitary manner to avoid contamination of the product;

• care should be taken to ensure that the front end of tail where the meat is exposed is completely wrapped to protect against dehydration;

• weights of finished packages should be monitored at regular intervals to assure that they are the proper net weight.

**Chilling (Processing Step 8)**

• for lobster tails, chilling in refrigerated sea water is not recommended because excessive salt penetration into the muscle will take place rapidly. However, refrigerated clean water systems can be used for rapid pre-cooling before freezing or storage in ice;

• chilling should take place as rapidly as possible to prevent microbiological growth and deterioration.

**Freezing (Processing Step 9)**

• air blast, liquid nitrogen, or other freezing methods should be rapid to produce high quality tails and to ensure that the textural qualities of the product are retained.

**Glazing (Processing Step 10)**

• glaze water should be replaced regularly to ensure that a high bacterial load does not occur and to prevent build-up of foreign material;

• chilling of glaze water will result in a more uniform application of glaze that will better protect the product

**Final Packaging/Labelling (Processing Step 11)**

• packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;

• care should be taken to ensure that the front end of tail where the meat is exposed is completely wrapped to protect against dehydration;

• where sulphites were used in the process, care should be taken to ensure that this additive is properly declared on the label.

**Frozen Storage (Processing Step 12)**

• products should be properly packaged to protect against freezer burn and dehydration;

• glaze is recommended as a further measure to ensure against dehydration.

**Packaging and Label Reception (Processing Step 13)**

• packaging materials should be examined for signs of defects and contamination;

• labels should be examined for accuracy and to adherence to applicable regulations.

**Additives Reception (Processing Step 15)**

• Additive shipments should be examined to ensure that they are not contaminated and that the container integrity is sufficient;

• Additive shipments should be examined to ensure that they are the correct chemical and meet purchase specifications

**Additives, Packaging and Label Storage (Processing Steps 14 and 16)**

• food additives and packaging material should be protected from dust, dirt and other sources of contaminants;

• pests and insects should be excluded from the packaging storage area.

**Distribution and Transport (Process Step 17)**

**II Flow Chart for Processing of Cooked Lobsters**

**Chilled and Frozen Cooked Whole Lobster and Cooked Lobster Meat**

**Live Lobster Reception (Processing Step 1)**

**Live Lobster Holding (Processing Step 2)**

**Drowning or Pacifying (Processing Step 3)**

• some species (not *Homarus*) are prepared for cooking by drowning / suffocation in clean water with a low oxygen content or by immersing in chilled clean water;

• another possible process is an electric shock (pulse) in potable water, clean water or brine.

**Cooking (Processing Step 4)**

• a cooking schedule for boiling or steaming should be designed to take into consideration the appropriate parameters such as cooking time and temperature and size of the lobster;

• cooking should be carried out by appropriately trained personnel who have acquired the necessary skills to monitor and ensure that all lobsters are given the same time/temperature exposure and adequate heat penetration during the operation;

• each cooker should be equipped with a suitable thermometer to show the cooking operation temperature. Fitting of a recording thermometer is strongly recommended. A simple device to indicate time of cooking should be supplied;

• lobsters should be cooked according to size until the shell is uniformly orange-red in colour, and depending on the product, until the meat can be easily removed from the shell. Overcooking causes the meat to shrink excessively, lowers yield while undercooking makes it difficult to remove the meat from the shell.

**Cooling (Processing Step 5)**

• cooling times should be kept as short as possible and every effort should be made to avoid contamination of the product during this period;

• cooling should be done properly, immediately after cooking, to ensure uniform cooling of the batch and to avoid holding at temperatures which would encourage the growth of bacteria;

• cooling should be done using cold circulated air, running potable water or clean sea water;

• where lobsters are cooked on a continuous basis, cooling is also best done on a continuous basis;

• cooling water should be used only once;

• shell removal should be performed only when the product has adequately cooled;

• care should be taken prevent cross contamination of cooked lobsters does not occur;

• cooked lobsters should be handled as a ready-to-eat product that has its normal microflora destroyed which can allow pathogens to proliferate.

**Trimming (Processing Step 7)**

• an adequate supply of clean sea water, potable water or water should be available to remove adhering coagulate protein. Spray washing on a conveyor is sometimes sufficient but it may be necessary to brush by hand. These methods can be combined;

• all surfaces and brushes should be frequently cleaned during the operation in order to minimise the microbial contamination.

**Shucking, De-veining and Washing (Processing Step 6)**

• the shucking and de-veining of cooked lobsters should be done quickly and carefully, in order to provide an attractive product;

• care should be taken to prevent cross-contamination of cooked product with raw lobster or any questionable material;

• depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of

hazards, the shucked or de-veined cooked lobster should be washed and appropriately chilled in clean containers and stored in specially designated and appropriate areas within the

processing facility;

• lobster meat should be thoroughly washed on all surfaces in cold potable water, clean sea water

**Grading/Weighing/Wrapping (Processing Step 8)**

lobster should be graded into species, sizes and weights for the relevant market, to assure the economic integrity of the final product;

• lobster meats should be uniform in size;

• calibrated balances should be provided for accurate grading;

• balances should be calibrated periodically with a standardized weight to ensure accuracy;

• wrapping material should be food grade, clean, sound, durable and appropriate for its intended use.

**Chilling (Processing Step 9)**

• chilling should take place as rapidly as possible to prevent microbiological growth and deterioration;

• refrigerated clean water systems can be used for rapid precooling before freezing or storage in ice;

• chilling lobsters in refrigerated sea water is not recommended because excessive salt penetration into muscle will take place rapidly.

**Freezing (Processing Step 10)**

quick freezing methods such as air blast, liquid nitrogen, or other freezing methods should be done immediately to maintain high quality whole lobster and lobster meats of good textural quality.

**Glazing (Processing Step 11)**

Final Packaging/Labelling (Processing Step 12)

• packaging material should be food grade, clean, sound, durable and appropriate for its intended use;

• care should be taken to ensure that exposed lobster meats are completely wrapped to protect against dehydration

**Chilled Storage (Processing Step 13)**

• temperatures in chilled storage should be 4 °C or less;

• product should be properly protected to avoid contamination by condensates and splashing water.

**Frozen Storage (Processing Step 14)**

**Packaging/Label Reception (Processing Step 15)**

**Packaging/Label Storage (Processing Step 16)**

packaging material should be protected from dust, dirt and other sources of contaminants;

• packaging storage area should be free from pests and insects

**Distribution and Transport (Process Step 17)**