HAM PREPARATION

This is method of preserving meat. There are various methods of preserving meat such as: **drying, freezing, chilling and salting**. Meats are preserved to extend their usefulness as food to a later date. Ham preparation is a method of preserving meat by means of salting and drying. There are different methods of curing hams based on the method of application of the salt.

Traditionally, meat curing was a process designed to preserve meat in the absence of refrigeration. The main feature was the addition of salt that was rubbed into the surface of the meat and then laid down in a bed of salt for several months. This method has been largely replaced by tank curing.
Brine is injected into the meat under pressure, then it is immersed in brine. There are basically three stages involved:

(a) injecting freshly-made salt solution of NaCl, $NaNO_3$ or KNO_3 and $NaNO_2$;
(b) immersion of meat in a similar solution called "cover" brine;
(c) draining and maturation during which the curing salts permeate and equilibrate all parts and allow the colour and flavour to develop.

Injection of the brine under pressure facilitates the curing of the meat and shortens the time necessary for immersion in the tank. Injection of the brine is aimed to give an increase of 8-10% in weight.

A large number of small injections is preferable to a small number of large injections to achieve rapid distribution of salts and reduction of losses during maturation.

The concentration of salts in the brine can vary but should be of the order of:

24-27.5% (w/v) at 4.4°C for NaCl
0.1-0.25% (w/v) at 4.4°C for KNO_3 or $NaNO_3$
0.025-0.1% (w/v) at 4.4°C for $NaNO_2$

In order to chill your meat quickly, you can (i) use a heat sink in a freezer; (ii) place your meat in a ploy freezer bag; (iii) place an euctectic solution in cans. The euctectic solution may be made up either of salt and water or ammonium nitrate and water; or (iv) put a brine solution in a container and immerse the bag with the meat and the cans with the euctectic solution in the brine and leave in the freezer.

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The type of euctectic solution you use depends upon the lowest temperature at which your freezer will go down to. If it can go down to -6°F (-21°C), use salt; if it can go down to 2°F (-17°C) use ammonium nitrate.

NaCl – 23% Water – 77%
Ammonium nitrate – 42%; Water 58%

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Beef and Veal

What is Beef ?

Beef is the meat obtained from dairy and beef cattle and buffalo. How should it be distinguished from meats in general?

What is Veal?

This is the meat obtained from the calves of beef and dairy cattle which have been fed on milk alone. The meat is usually very pale and very softly-textured. It is not the meat from calves which have been fed concentrate diets.

Sources of Beef

Beef obtained from dairy cattle is a by-product of the Dairy Industry through culls from the dairy herd, culled replacements and bulls not destined for breeding.

Description and Chemical Composition

Pearson amd Tauber (1984): Chapter 2

The composition of meat cannot be described simply in terms of the different components and their percentages, since meat includes the entire carcass along with the muscles, fatty tissues, bones, tendons, edible organs and glands.

Table 2.1 Pearson amd Tauber (1984): Chapter 2

Table 2.2 Pearson amd Tauber (1984): Chapter 2

Table 2.3 Pearson amd Tauber (1984): Chapter 2

Ageing of Beef (Conditioning)

Chapter 5 Laurie (1985) pp 82-91

In the absence of microbial spoilage, the holding of unprocessed meats above the freezing point is known as **conditioning** or **ageing;** and this has long been associated with an increase in tenderness and flavor. The meat can be held

for 10-13 days at $0^{o}C$;

for 4-5 days at $10^{o}C$;

for 30 to 40 hours at $20^{o}C$;

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or 10-11 hours at 30°C.

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Quality of Beef

This would be discussed in the classroom.

Cuts of Beef

There exists three main systems of describing cuts of beef: American; British and French

Check the following website for the **French Cuts of Beef:**

http://www.mhr-viandes.com/en/docu/d0000395.htm

This is why when ordering beef of cuts of beef it is important to know which system of cut classification is being used by the suppliers.

IMPORTANT NOTE:

See Appendix #1: Factors Affecting the Tenderness of a Cut of Beef

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Composition of Cattle and other Meat Animals

This refers to the Skeletial, Muscular and Organ makeup of Cattle. ***See Appendix #2 to Appendix #5***

Grading of Animals

See Table 13-6 The market grades and quality grades of cattle [Source: Ensminger (1983)]

Grading of Beef

Utilization of Beef

Marketing of Beef

Students are expected to View the videos available at the Audio Visuals unit on the 3rd Floor of the Main Library wherein is contained information on the above.

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MODULE 3: UNIT #2

Mutton

Description and Chemical Composition
Structure of Mutton
Quality
Cuts of Mutton
Composition of Sheep
Grading of Sheep
    See Table 13-7:The market classes and quality grades of Sheep
    [Source: Ensminger (1983)]
Grading of Mutton
Utilization of Mutton
Marketing of Mutton

Students are expected to View the videos available at the Audio Visuals unit on the 3rd Floor of the Main Library which contains information on the above.

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Chevron

What is Chevron?

Description and Chemical Composition
Structure of Chevron
Quality
Cuts of Chevron
Composition of Goats
Grading of Goats
Grading of Chevron
Utilization of Chevron
Marketing of Chevron

Although there are no videos on Goat Slaughter the ones on Sheep would be relevant to goats. Students are expected to View the videos available at the Audio Visuals unit on the 3rd Floor of the Main Library which contains information on the above.

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MODULE 3: UNIT #3

Poultry Meats Chicken Broilers

Description and Chemical Composition
- Chapter 4: Mountney (1983)
Structure of Broiler Meat
Quality
- Chapter 4: Mountney (1983)
Cuts of Broiler
Composition of Broilers
- Chapter 5: Mountney (1983)
Slaughter Processing and Grading of Broilers
Utilization of Broilers
- Chapter 11: Mountney (1983)
Marketing of Broilers

Students are expected to View the videos available at the Audio Visuals unit on the 3rd Floor of the Main Library which contains information on the above.

Spent Layers and Turkeys

Students are expected to View the videos available at the Audio Visuals unit on the 3rd Floor of the Main Library which contains information on the above.

Ducks [would not be covered in this course]

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Meats of Game Animals and Game Birds

Types of Game Animals

Non Birds

Chapter 12: Payne (1990)

Game Birds

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MODULE 3: UNIT #4

Pork

Montagne (1983) p. 711

Sources and Chemical Composition of Pork

Grading of Pigs

See Table 13-8 The market classes and quality grades of Hogs

[Source: Ensminger (1983)]

Grading of Pork

Cuts of Pork

Montagne (1983)

American, British and French Cuts

Composition of Pigs

Utilization and Marketing of Pork

Students are expected to View the videos available at the Audio Visuals unit on the 3rd Floor of the Main Library which contains information on the above.

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MODULE 3: UNIT #5

Rabbit and Rabbit Meat

[See Department of Agricultural Extension Fact sheets on Rabbits in Garcia's Box in Special Reserve]

MODULE 3: UNIT #6

Wild Game [Would not be covered in this course]

MODULE 4: UNIT #1

Eggs

Types, Structure and Composition of Eggs

Chapter 18: Mountney (1983)

Egg Quality

Chapter 18: Mountney (1983)

Collection, Preparation, Grading and Packaging of Eggs

Storage of Eggs

Utilization and Marketing of Eggs

Students are expected to View the videos available at the Audio Visuals unit on the 3rd Floor of the Main Library which contains information on the above.

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MODULE 5: UNIT #1

Feathers

[This is a Case Presentation Problem]

MODULE 6: UNIT #1

Fish

Types of Fish
- Salt Water
- Fresh Water

Form and Chemical Composition of Fish

Fish Products

Harvesting and Processing of Fish Products

Utilization and Marketing of Fish and Fish Products

FISH AND FISHERY PRODUCTS

By: Charles Nurse Technical Instructor, CFTDI, November 1996

The term 'fish' includes those animals which are harvested for food from the aquatic environment and they therefore include both the finfish and shellfish animals (i.e. crustacean, molluscan echinoderms, etc.).

Animal Production

The world fish catch amounts to approximately 98 million tonnes (1992) of which 82.5 million tones are harvested from the marine environment and 15.5 million tones from the fresh water environment. The species harvested consists of demersal species which live and feed on the bottom, and pelagic which live and feed close to the surface. Approximately 30% of the world's annual landings consist of pelagics of relatively small size, these have a high lipid content and so are subject to rapid deterioration. Pelagic species, especially the small species are also largely affected by environmental factors and this contributes to considerable variation in the annual supply.

Utilization and Marketing

Discards and post harvest losses in the annual supply are very high. It has been estimated that between 18 and 35% (Alverson *et al*., 1984) is lost annually through discards and post harvest losses. Chief among which are

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the discards emanating out of the selective fishery such as that for shrimp where it is not unusual to find in this fishery a fish by-catch: shrimp ratio of 5:1.

Seventy-two percent of the world's catch is used for human food, while the reminder is converted to fishmeal for use as animal feed. Approximately 31% of the amount which is utilized for human consumption is consumed fresh; another 30% is frozen (either for consumption at a later date for conversion into fishery products); 16% is converted into cured products (Dried salted smoked or semi-preserves) and 18% converted into canned fishery products. Therefore approximately 31% of the annual catch is consumed within 2-3 weeks of capture.

Fresh Fish

The fresh fish may be marketed whole or in a variety of forms such as whole, gutted (drawn fish), dressed or processed and marketed as filet steaks or portions. The marketing system may be simple where the period in distribution may be a day or two passing through one or two intermediaries and sold unprocessed; or a very complex system which may involve many days before it reaches the consumer and involving several intermediaries and processing.

Frozen Fish

The thirty-five percent of or which is frozen may be sold in a variety of market forms such as whole drawn (fish in the round) or processed into a variety of fishery products. These fishery products may vary from primary products such as fillets, stakes and in the case of shrimp, peeled or unpeeled shrimps or may be products of a secondary nature involving breading and batters to produce fingers and nuggets or fabricated foods. Primary frozen products may be produced aboard vessel in factory ships or ashore in land based plants. The secondary products are usually produced in land based facilities.

The land based facilities for the production of frozen fish may be very simple consisting of processing tables, freezers and packaging equipment to complex systems involving flesh recovery systems, mixers, blenders, fryers, etc. and requiring the necessary quality assurance and cold storage systems that would permit the marketing of the product through a complex marketing system.

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Salted Fishery Products

These may consist of wide variety of salted products produced either from finfish or shellfish be it crustacean or molluscan and containing various moisture contents which would inform their storage requirements, shelf-life and marketing arrangements.

Salted fish is a cured product in which the fish muscle has been preserved using salt (sodium chloride) as the major preservative. Salted fish made from finfish species may be presented in a variety of forms, varying from fish which has been split from head to tail where the entrails have been removed to fillets which may be presented with or without skin. The salt content within the muscle may also vary with market requirements and as in the case of moisture content, may be informed by the type of fish.

Generally salted fish is prepared from white flesh fish of a low fat content, but red flesh fish may also be utilized when these are utilized they require a combination of processes in order to enhance the shelf life. The largest volume of trade in salted finfish is among the various species belonging to the Gadidae family (Cod). Shrimp is the major shellfish which is salted, and this is mainly the small paenid and metapaenid shrimp. The process involves boiling the whole shrimp in a 10% brine or brining followed by drying.

Dried Fish

Dried fish is mainly produced and consumed in Africa, some parts of Asia and in Northern Europe. The annual trade in this commodity is small compared with salted fish but is still significant. The process involves drying the whole fish (usually small species) or split fish in the open air, as a result of this practice considerable losses are experienced before drying is completed. Losses also occur during storage as a result of fragmentation and insect infestation.

Smoked Fishery Products

These may be of two types, viz hot smoked where cooking of the flesh occurs, or cold smoked where there is no cooking but considerable drying and/or flavouring of the flesh occurs during smoking. Smoked fish is usually prepared from fatty fish, the flesh of which are usually dark in colour. The presence of anti-oxidants in the smoke therefore serves to enhance the shelf life of the product. The fish may be salt cured prior to smoking or salt may be used as a flavouring agent. In hot smoked products salt serves to flavour the product, while cold smoked fishery products are usually salt cured prior to smoking.

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Marinades

Marinades are semi preserves which are cured in a mixture of acid and salt; herbs and other ingredients are also added. This adds flavor to the product.

Medium fat white flesh fish are usually used to prepare marinades which may be of three types viz. cold marinades, cooked marinades and fried marinades. In addition to the use of finfish species, crustaceans such as shrimp and molluscan shellfish such as chip-chip can also be used in the preparation of marinades.

Cold Marinades- are produced by curing eh flesh in the mixture of salt, acid and other ingredients. The product is consumed without cooking.
Cooked Marinades-are prepared by simmering the fish and then pouring a hot solution (approx. 88°C) of the marinade mixture over the partially cooked fish. This serves to denature the enzymes and as well to kill any spoilage bacteria.
Fried Marinades- in this process the fish are fried or boiled before being packed in an acetic acid and salt solution.

Fermented Products

A range of fermented products such as fish or shrimp, paste, sauces, etc. can be prepared using either fish or shrimp. There are three categories, viz:

- products in which the fish retain the original form;
- products in which the original fish is reduced to a paste;
- fish sauces where the flesh is reduced to a liquid.

Generally, species such as herring, andories and mackerel, are used when shrimp is used. It is usually converted into a paste-like substance. Fermented products are however mainly produced in Asian countries, and to a lesser extent the Mediterranean countries.

Boiled Fish Products

Boiling fish in water is a short-term method of preservation. This is a practice common in Southeast Asia. The shelf life is extremely short; approximately only a few days.

The action of boiling in water dentures the protein and reduces spoilage due to the action of enzymes present in the flesh but because the technique is very artisanal the danger of bacterial re-contamination is great. There may be several variations of the basic method of preparation depending upon the

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raw material used and particular consumer preference, for example salt may or may not be used in the process.

Canned Fishery Products

Canning is a method of preserving fish so as to permit extensive shelf life under minimal storage conditions. Canned fish products are prepared from the muscle of such fish as herring, sardine, tuna, salmon as well as such shellfish as squid, crab, shrimp and oyster.

It is important that the material to be canned is of the highest quality and large volumes of material are available in order to support cannery. For example, a normal cannery would be expected to produce in excess of 5000 cans of fish per hour and may employ about 50 workers in this activity. The cans may be round, oblong or oval of various capacities and in a similar manner be packed in a variety of styles and sauces.

Reading Activity

Nurse, V. (1992): The Technology of Salted Fish; *In* Food Technology in Agro-Industry, Technical Assistance and Training Programme, Part II, IADB, ADB and IICA, Trinidad and Tobago.

References

Alverson, D.C. et al., (1994). A Global Assessment of Fishery By-catch and Discards., FAO. Fish Technical Paper (339):233.

C. Lucas, I.J. (1982). Fish Handling, Preservation & Processing in the Tropics, Pt. 2. Tropical Development and Research

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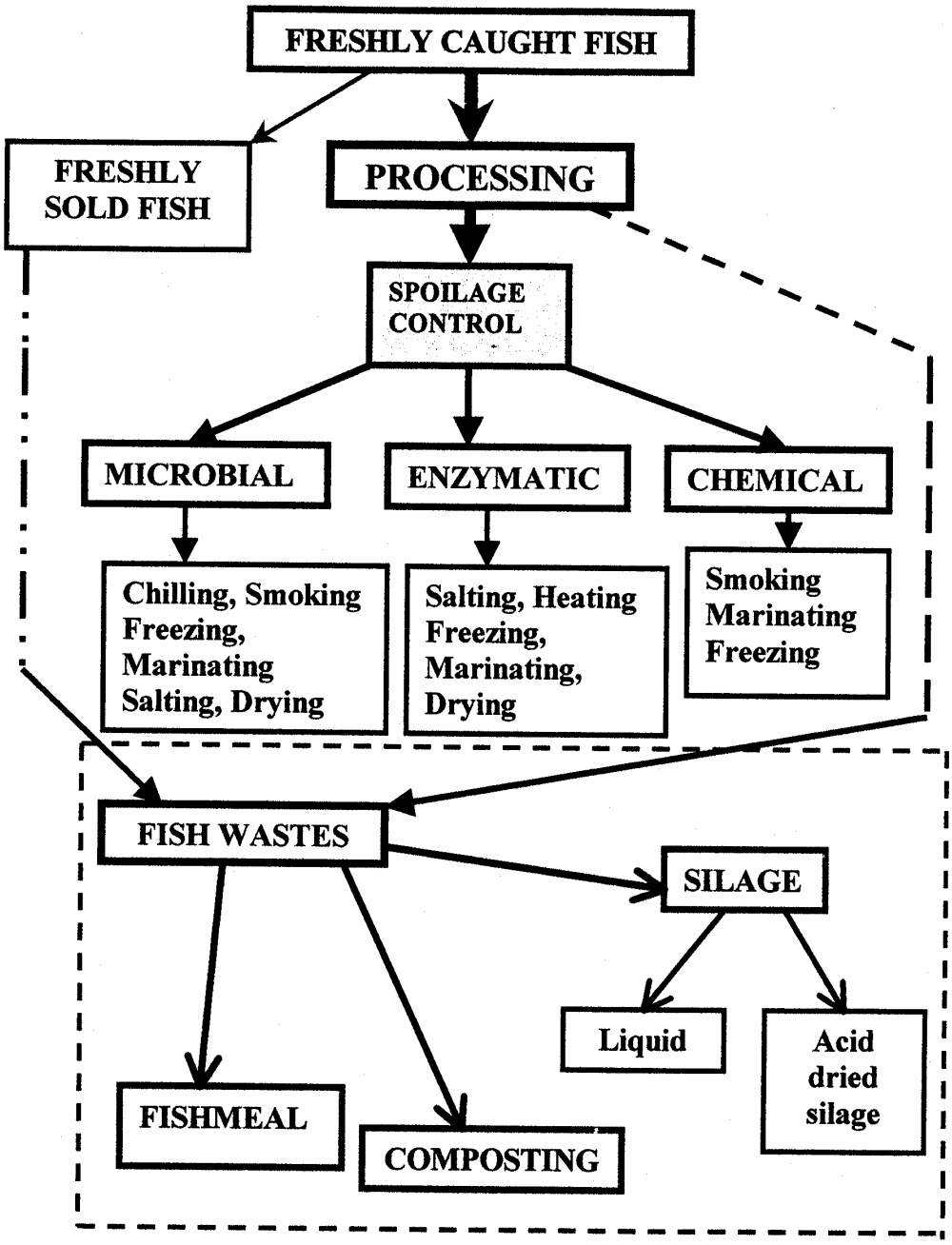
FLOW CHART SHOWING FISH UTILIZATION



Source: Students of AL26A, School of Agriculture, Year 2000-2001

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