

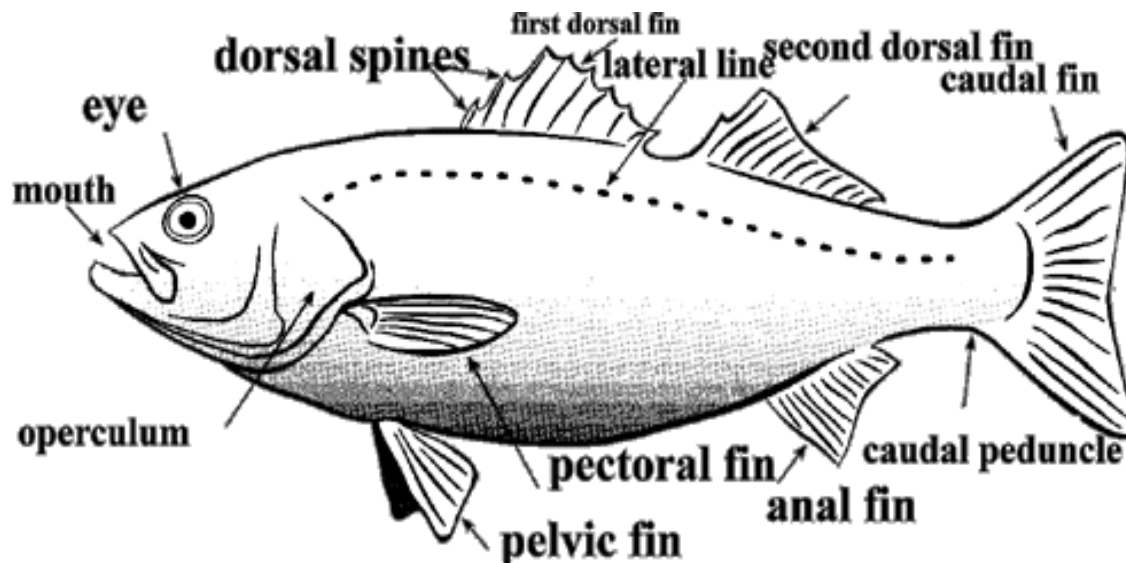
FISH

A fish is any aquatic vertebrate animal that is covered with scales and equipped with two sets of paired fins and several unpaired fins

Fish plays a significant role as part of a balanced healthy diet. Fish is a good source of many of the nutrients we need throughout life from infancy through to old age.

MAIN COMPONENTS OF FISH

- The body tissues include skin, flesh and bone.
- Skin consist of mainly of water ,about 80%,and about 16% protein.
- Bone contains much mineral matter, principally calcium phosphate, which amounts to about 14% of total bone material, the rest is mainly water,about75%,and protein ,about 9%.



- Chemical composition of a fish;
- 66-84% water
- 15-24% protein
- 0.1-0.22% fat
- 1-3% carbohydrates
- 0.8-2% minerals

Catching of the fish





FISH PROCESSING

- In the food industry , fish processing is the processing of fish and other seafoods delivered by fisheries, which are the supplier of the fish products industry.
- Fish processing may be subdivided into major categories;
 - fish handling
 - fish product manufacturing

A.FISH HANDLING

- Freezing
- Filleting of fresh fish for onward distribution to fresh fish retail and catering

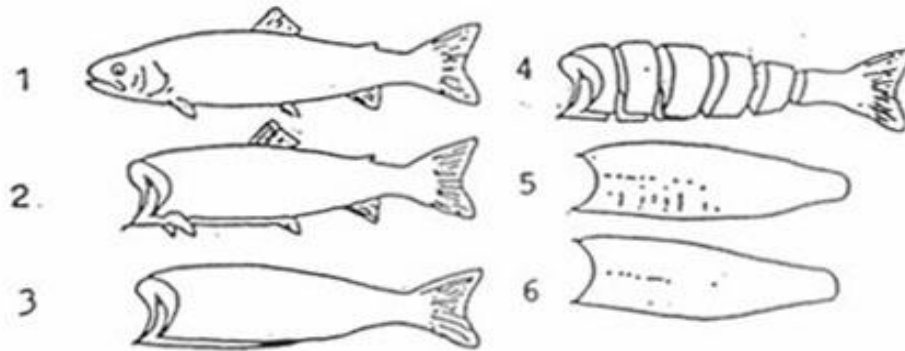


Figure 3.1 Major forms of preprocessed fish:

- 1 - whole fish,
- 2 - gutted fish without head,
- 3 - gutted fish without head and fins,
- 4 - sliced whole fish after deheading and evisceration,
- 5 - fillet with ribs, and
- 6 - fillet without ribs, with or without the skin.

B.FISH PRODUCT MANUFACTURING

- Chilled ,
- Frozen, and
- Canned products for the retail and catering trades

FISH HANDLING OPERATIONS

Sorting

Dressing

Cutting

Eviscerating

Skinning

Precooking

Spicing

Blanching

Filleting

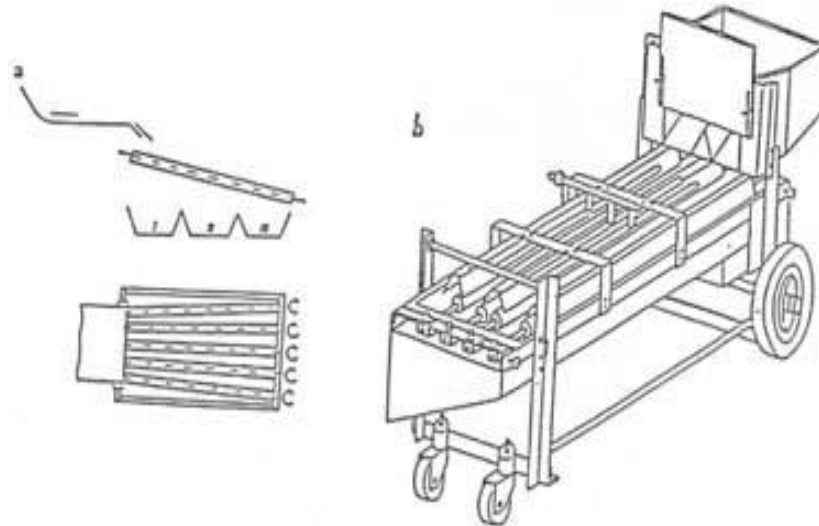
Salting

Stunning of fish

- Stunning is critical for final product quality because prolonged agony of fish causes production of undesired substances in the tissue.
- Red spots appear on the surface of the skin and in the muscle tissue near the backbone; these reduce quality.
- Stunning is best done with an electric current. First, the fish are placed in a tank of water and an electric current is then passed through the water to stun or kill the fish.

Grading

- Size grading is very important for fish processing (i.e., smoking, freezing, heat treatment, salting, etc.) as well as for marketing.



Grading machine with a fan shaped arrangement of rollers:
a - scheme, b - general view

Washing

- Washing is intended primarily to clean the fish and to remove accumulated bacteria.
- The effectiveness of the washing procedure depends, inter alia, on the kinetic energy of the water stream,
- ratio of fish volume to water volume and on the water quality.

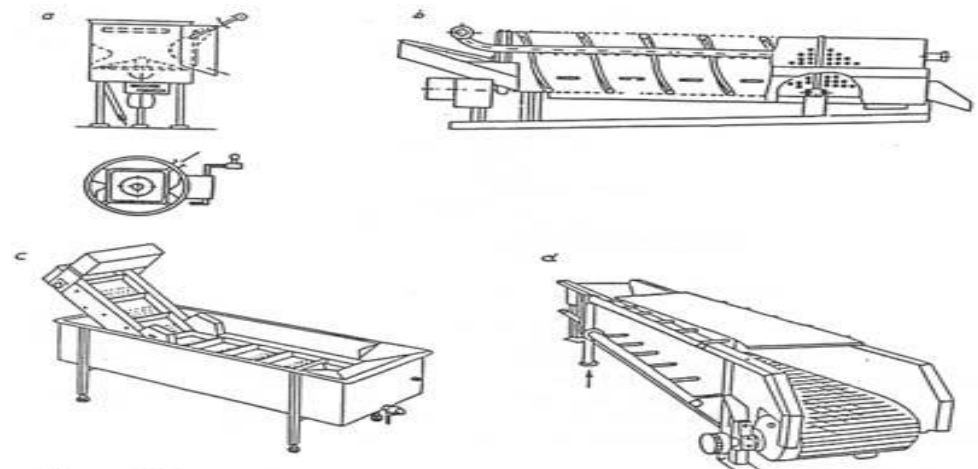


Figure 3.10

- a. Vertical-axis drum washer
- b. Horizontal-axis drum washer
- c. Combination washer-conveyor belt
- d. Conveyor with a water spraying system (belt made of metal mesh) used as a washer

Deheading

- The head constitutes 10-20% of the total fish weight and it is cut off as an inedible part. Although many mechanized deheading machines had been developed for processing marine fish, freshwater fish are usually deheaded manually

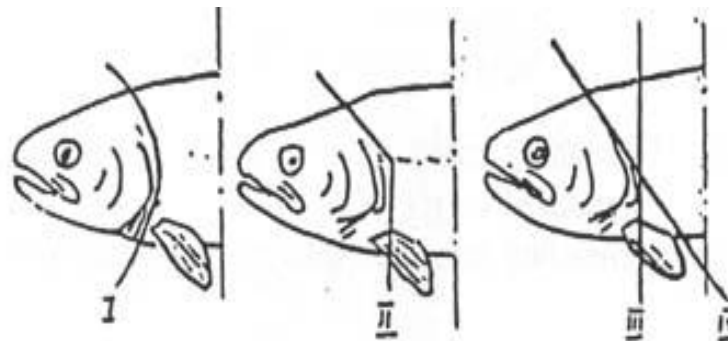


Figure 3.11 Cutting techniques used for deheading of freshwater fish:
I - round cut, II - contoured cut, III - straight cut, IV - slant cut

Gutting

- The purpose of gutting is to remove those fish body parts most likely to reduce product quality, as well as to remove gonads and sometimes the swim bladder.
- Evisceration of freshwater fish is labour-intensive and usually performed by hand.
- Gutting consists of cutting down the belly (fish may be deheaded or not), removal of internal organs, and, optionally, cleaning the body cavity of the peritoneum, kidney tissue and blood.



Figure 3.14 Gutting work station:

- a. cutting down belly with a safe cutting element,
- b. removal of guts with vacuum suction,
- c. washing and rinsing of body cavity with rotational brush

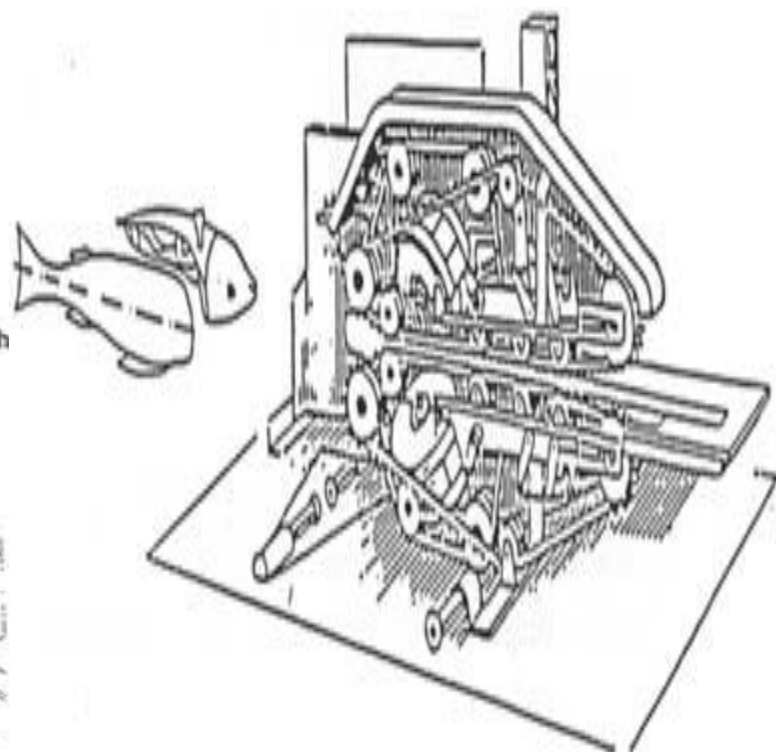


Figure 3.16 Deheading and gutting machine

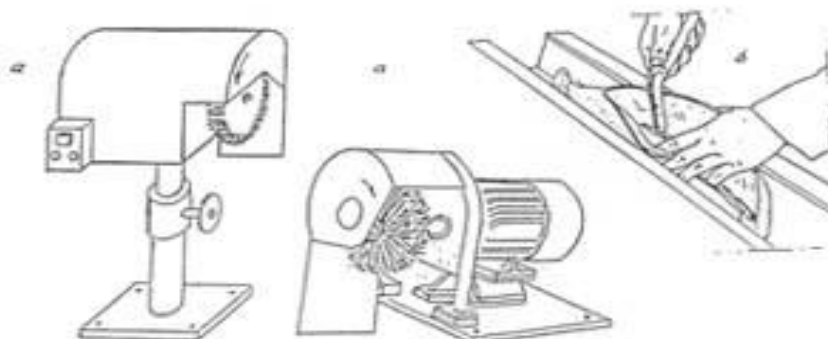


Figure 3.15 a. Rotating brushes used to clean body cavity and to remove kidney tissue (with and without adjustable height),
b. hand-held vacuum suction tool for kidney removal and cleaning of body cavity

FISH PRODUCTS

Fresh Fish

Canned Fish

Frozen Fish

Cured Fish

-salted and smoked fish

Dried Fish

Fish Fillets

Fish Roe

Pre-cooked Fish

Fish Oil

SMOKING



Smoking

- Although more frequently used for flavor than preservation , smoke is an antimicrobial and antioxidant. The smoke particles adhere to the surfaces of food , inhibiting bacterial growth and oxidant.

SALTING



salting

- Once properly salted ,the foods interior contains enough salt to exert osmotic pressures that prevent or retard the growth of many undesirable microbes.

DRYING





drying

- The drying of food is the world's oldest known preservation method , and dried fish has a storage life of several years.
- This method is cheap and effective in suitable climates.

FILLETING



filleting

- The fillet is made of fish that has been finely pulverized. It is made of the same surimi used to make fish balls .

CANNING



canning

- Canning is a method of preserving food in which the food is processed and sealed in an airtight container. The packaging prevents microorganisms from entering and proliferating inside.

CONTAMINATION AND PACKAGING METHODS

- Contamination depends on;
habitat; seawater, fresh water, pelagic or at the bottom
- Perishability or stability of the food product
 - chemical
 - biological
 - physical nature of the food product
- And also initial quality.

- Internal factors;
 - water activity
 - pH
 - redox potentials
 - nutritive substance

Storage conditions and environmental factors;

_oxygen, light, temperature, humidity, storage

DECOMPOSITION OF FISH

- A. Enzymatic Spoilage
 - lactic acid produced
 - pH decrease
 - muscle becomes rigid
 - muscle becomes pliable
- B. Oxidative Deteriation
 - rancid odors
 - colour changes
- C. Bacterial Spoilage
 - TMAO;TMA+formaldehyde

therefore,

- Preservation;
- -salted
- -smoked
- -heated
- -cooled
- -fermented
- -dried
- !!! Cooling or freezing provides a prolonged shelf-life

- Most spoilage of fish is due to bacterial breakdown.
- Chilling of fish immediately after harvest is

Preservation Method	Proteins	Lipids
Salted	No effect	Might rancid
Smoked	No effect	Might rancid
Airdried	Might deteriote	rancid
Fermented	Bitter taste	Get rancid

FISH MARKETING

Fish markets are marketplace used for the trade in and sale of fish and other seafoods.

They can be dedicated to wholesale trade between fisherman and fish merchants

OR

to the sale of seafood to individual consumers, or to both.

