LECTURE 8

CHAPTER 14-15

MEAT, EGG, FISH AND POULTRY

MEAT, EGG, FISH AND POULTRY

- The amount of animal products consumed by a society is positively correlated with the affluence of the society and negatively correlated with its poverty.
- In agriculturally advanced societies, it is possible to convert feeds into meat at rates of about:

2 kg feed /kg chicken

4 kg feed /kg pork

8 kg of feed /kg beef

- These highly varying conversion ratios are mainly responsible for the wide variety of the respective prices.

MEAT and MEAT PRODUCTS

- Meat and meat products generally are understood to include the skeletal muscles of farm animals; also included are the glands and organs of these animals (tongue, liver, heart, kidneys, brain and so on are called "offals")
- In a broader sense, "meat" also includes the flesh of poultry and fish. But these are considered as a separate group from the "red meats".

Yield= $\frac{\text{Carcass * weight, kg}}{\text{Live weight, kg}}$

*Body after removal of hides, head and hooves

Typical yields:- of lamb: 53%; -of ram : 67%

Typical compositions of meats:

%	Beef	Poultry	Pork	Fish
Protein	18	21	12	20
Fat	21	13	45	11
H_2O	60	66	42	68

MEAT and MEAT PRODUCTS

- **Principal sources of meat are:**

Cattle – beef
Calves – veal
Pigs – ham, pork, bacon
Sheep – mutton
Young sheep – lamb

MEAT and MEAT PRODUCTS

Grading:

- "Meat Quality Grades" are based on subjective evaluations of four main factors:
  - ✓carcass maturity-more tender when young
  - ✓degree of fat marbling (deposition of fat within the lean muscle),
  - ✓muscle firmness,
  - ✓color

MEAT and MEAT PRODUCTS

Meat Inspection:

Animal diseases that can pass on the human body:

- ✓**Bovine Tuberculosis – sheep are immune to this disease**
- ✓**Brucellosis – infected teats, mastitis**
- ✓**Trichinosis – mostly seen in pork**
- ✓**Tapeworms (taenia)**
- ✓**Bacterial infections – *Salmonella, Staphylococcus, Clostridia***

MEAT and MEAT PRODUCTS

- Meat is very easily perishable due to its high H_2O content, which permits growth of microorganisms. Therefore, optimum care should be taken into hygiene and sanitation to avoid their presence in meats:

Ceiling, floors and walls should be washable

Contamination sources should be efficiently segregated (rats, insects, etc.)

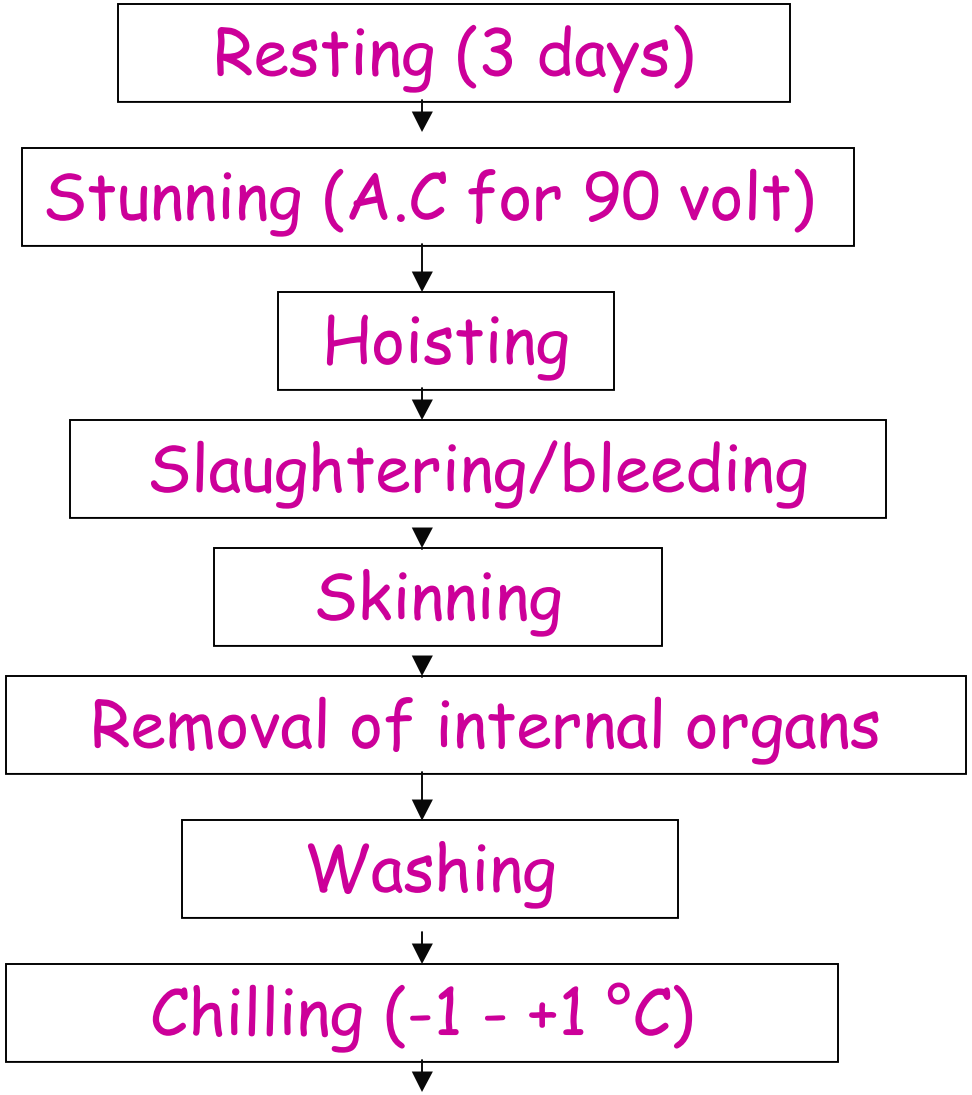
Utensils should be sterilizable (knives, dishes)

Hygiene of working people

Every country has a special legislation for government surveillance of cutting meat. Veterinary inspection is obligatory.

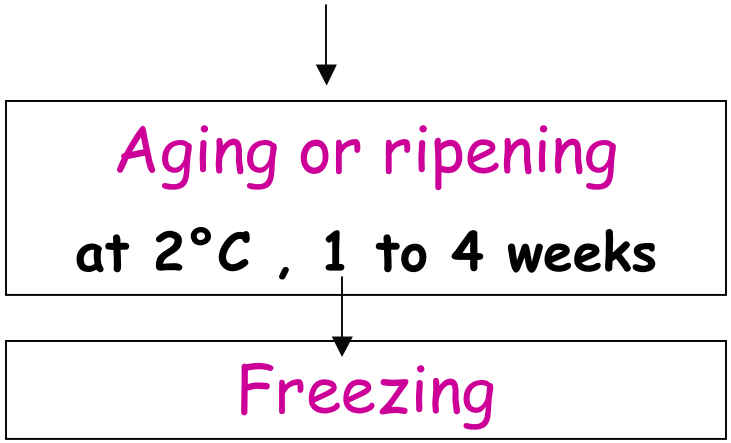
MEAT and MEAT PRODUCTS

SLAUGHTER-HOUSE OPERATIONS



MEAT and MEAT PRODUCTS

SLAUGHTER-HOUSE OPERATIONS



At 0° C, vacuum-packed meat in O_2 -impermeable films can be stored upto 3 weeks.

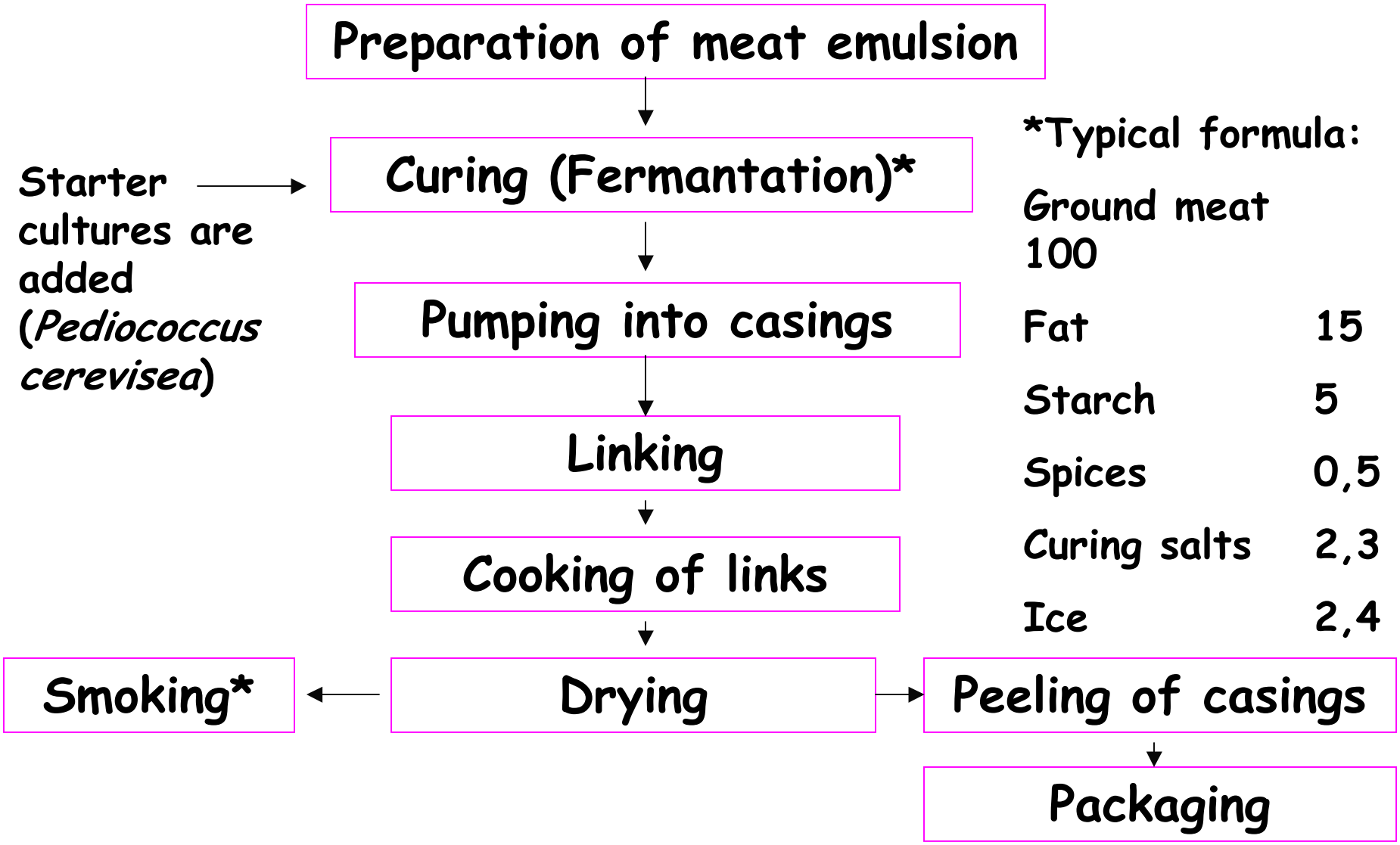
Slaughter is sometimes required to conform to a religious ritual (Kosher, Helal)

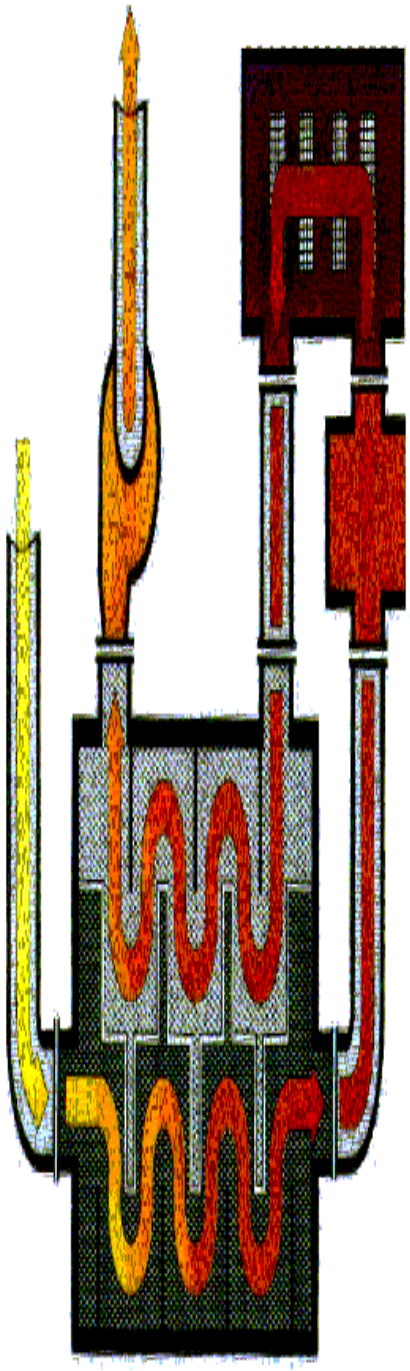
Curing of Meat:

Curing refers to modifications of the meat that affects preservation, flavor, color, and tenderness due to added curing ingredients.
Smoked and salted bacon, ham, sausages and frankfurters.
Purposes of curing:
- **To produce unique-flavored meat products**
- **To preserve the red color of meat after cooking.**

Principal ingredients used for curing:
Sodium chloride, sodium nitrate and/or sodium nitrite (also acts as antimicrobial inhibiting the growth of pathogenic microorganisms), sugar and spices.

SAUSAGE PRODUCTION





Smoking* Method:
Sawdust is fed to burner (yellow line) , burnt and smoke produced (red line) flows through a heat exchanger where it is heated to a temperature of 400° C. An electric heater downstream of the heat raises the temperature further to around 620° C.

Then the temperature is raised by chemical reaction to about 720° C in the catalyzer, which keeps the purification process going without any additional energy input.

The thermal energy produced during the purification process is not wasted but directed back to the heat exchanger and used for primary warming of the incoming untreated gas.

The recycling of energy thus restricts energy consumption to the preliminary heating stage.

POULTRY

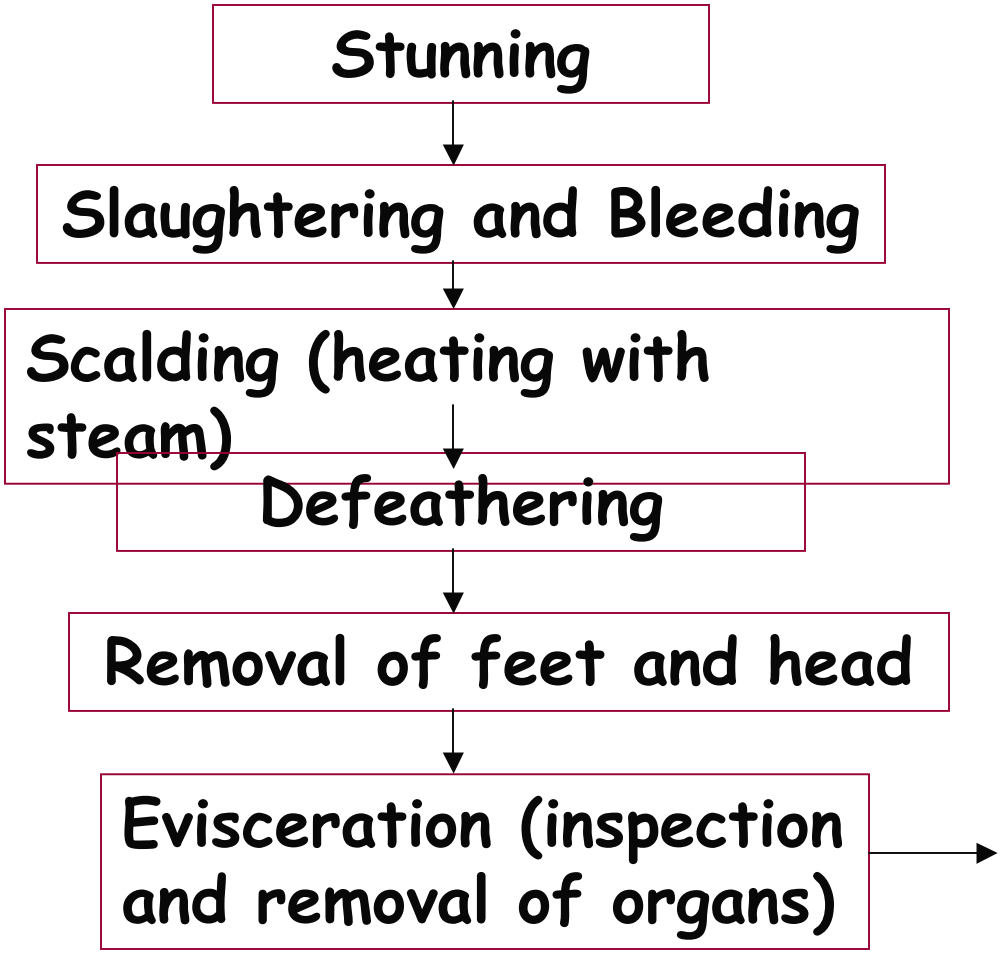
- **Principal types of poultry are:**
  - **Chickens**
  - **Turkey**
  - **Ducks,Geese**
  - **Quails**
- **"Poultry industry" has provided a large variety of products. These products are similar to products that might conventionally be made from red meats, poultry based frankfurters, hams, sausages, salami, pastrami, other lunchmeats.**

POULTRY

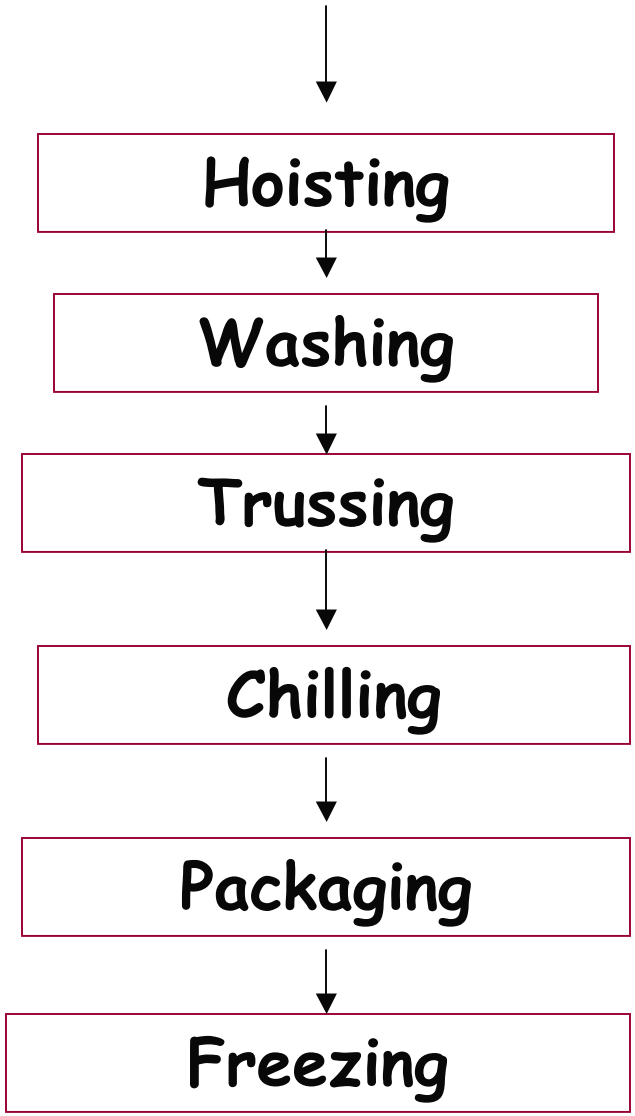
- **Chicken flesh contains more protein, less fat and less cholesterol than red meat.**
- **The proteinis of excellent quality and contains all of the essential amino acids needed by humans.**
- **The fat is more unsaturated than the fat of red meat.**
- **Like other animal tissue, poultry flesh is a good source of B vitamins and minerals.**
- **Because of its high protein:fat ratio chicken is a favored food of people vascular sclerotic tendencies.**

POULTRY

FROZEN CHICKEN PRODUCTION



FROZEN CHICKEN PRODUCTION



EGGS

- About 90% of eggs are consumed directly. The remainder, broken out of the shell, is frozen, dried or otherwise processed for use in the bakery, confectionery, noodle industries, although there are also minor non-food uses.

Egg shell is porous, allowing gases in and out;large air cell indicates long storage.

- Eggs contain about two parts white to one part yolk by weight. The whole mixed egg contains about:

65% water, 12% protein and 11% fat, and 1% ash.

EGGS

- A particular group of bacteria belonging to the genus *Salmonella* are pathogenic to humans and commonly found in the poultry digestive tract.
- It is difficult to keep *Salmonella* organisms out of egg products and *Salmonella*-infected eggs have caused numerous outbreaks of disease.
- Because of the prevalence of *Salmonella* infections, all commercial eggs broken out of the shell for manufacturing use should be pasteurized.

MARINE FOODS

Foods derived from salt water are considered "seafoods", whereas all foods derived from water environments, be they fresh or salt, are considered marine foods.

Fresh water fish – trout, salmon, carp, pench

Salt water fish – Pelagic (caught in the surface)

Demersal (caught in the bottom)

Pelagic fish has much more fat in their body. Feed on plants.

Demersal has fat in their liver. Feed on bopth plants and animals.

MARINE FOODS

Pelagic fish: mackerel(uskumru), anchouvies, mullets(red:barbunya;gray:kefal)

Demersal fish: cod(morina), haddock(mezgit), flounder(dil), halibut(pisi)

Crustaceans – shrimps(karides), lobster(istakoz), crab(yengec)

Good sources of water soluble vitamins, fat soluble vitamins (vit D and vit A), proteins, unsaturated fatty acids and iodine. Bones are excellent sources of calcium and phosphorus. They decrease the risk of cardiovascular diseases.

MARINE FOODS

Spoilage factors:

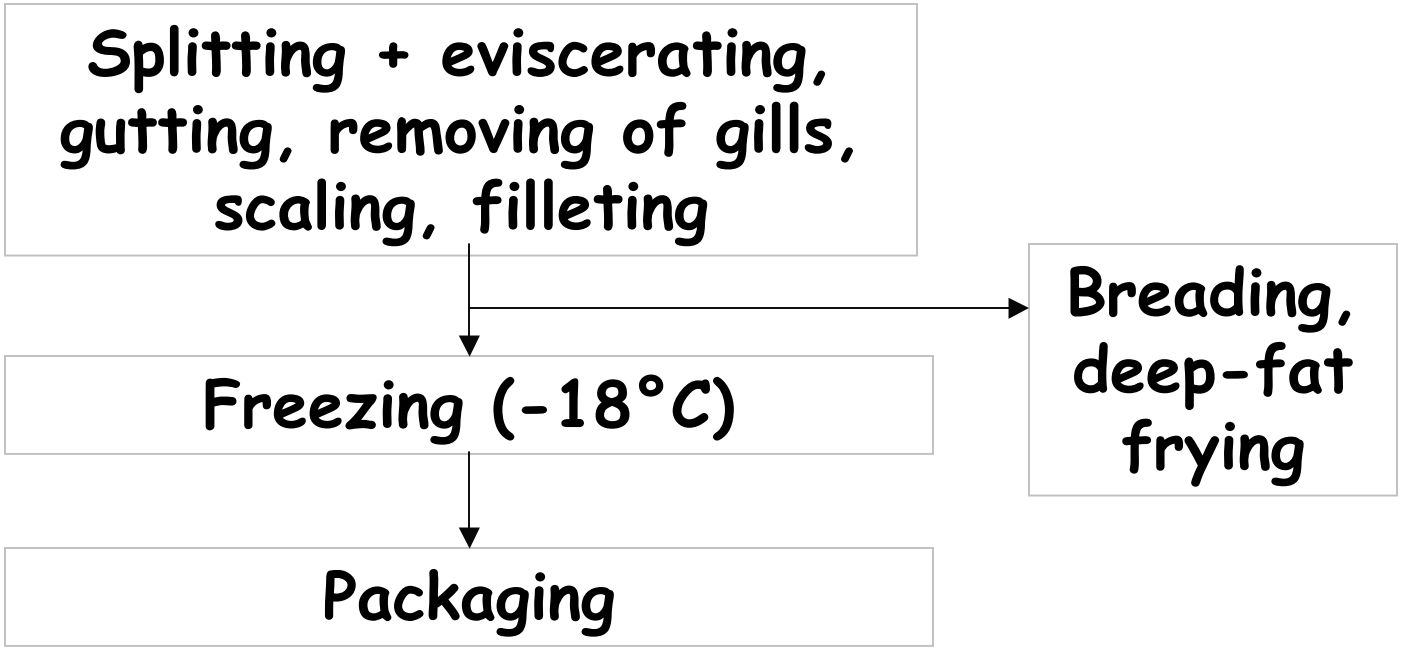
- **Microbiological factors: Although the flesh of healthy live fish is bacteriologically sterile, there are large numbers of many types of bacteria inm the surface slime and digestive tracts of living fish.**
- **Physiological factors: Fish struggle when caught and use up all of the glycogen in their muscles, so little glycogen is left to be converted to lactic acid after death.**

MARINE FOODS

- **Chemical factors: Associated with the fat of fish are phospholipids rich in trimethylamine . Trimethylamine split from phospholipids by bacteria and natural fish enzymes has a strong characteristic fishy odor.**
- **The fats of fish are highly unsaturated and become easily oxidized, resulting in additional oxidized and rancid oof-flavor and off-odors.**

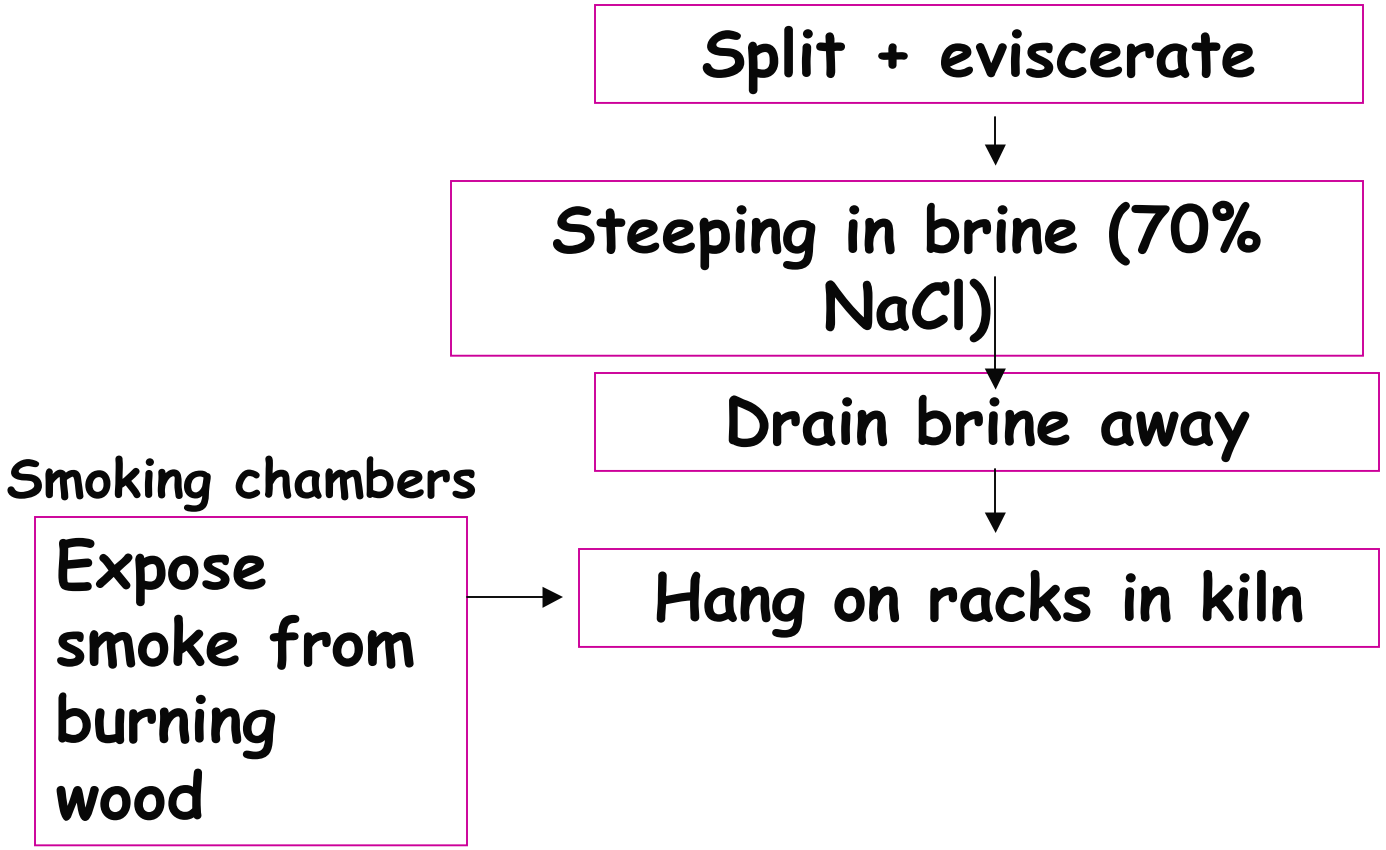
MARINE FOODS

FISH FILLETS



MARINE FOODS

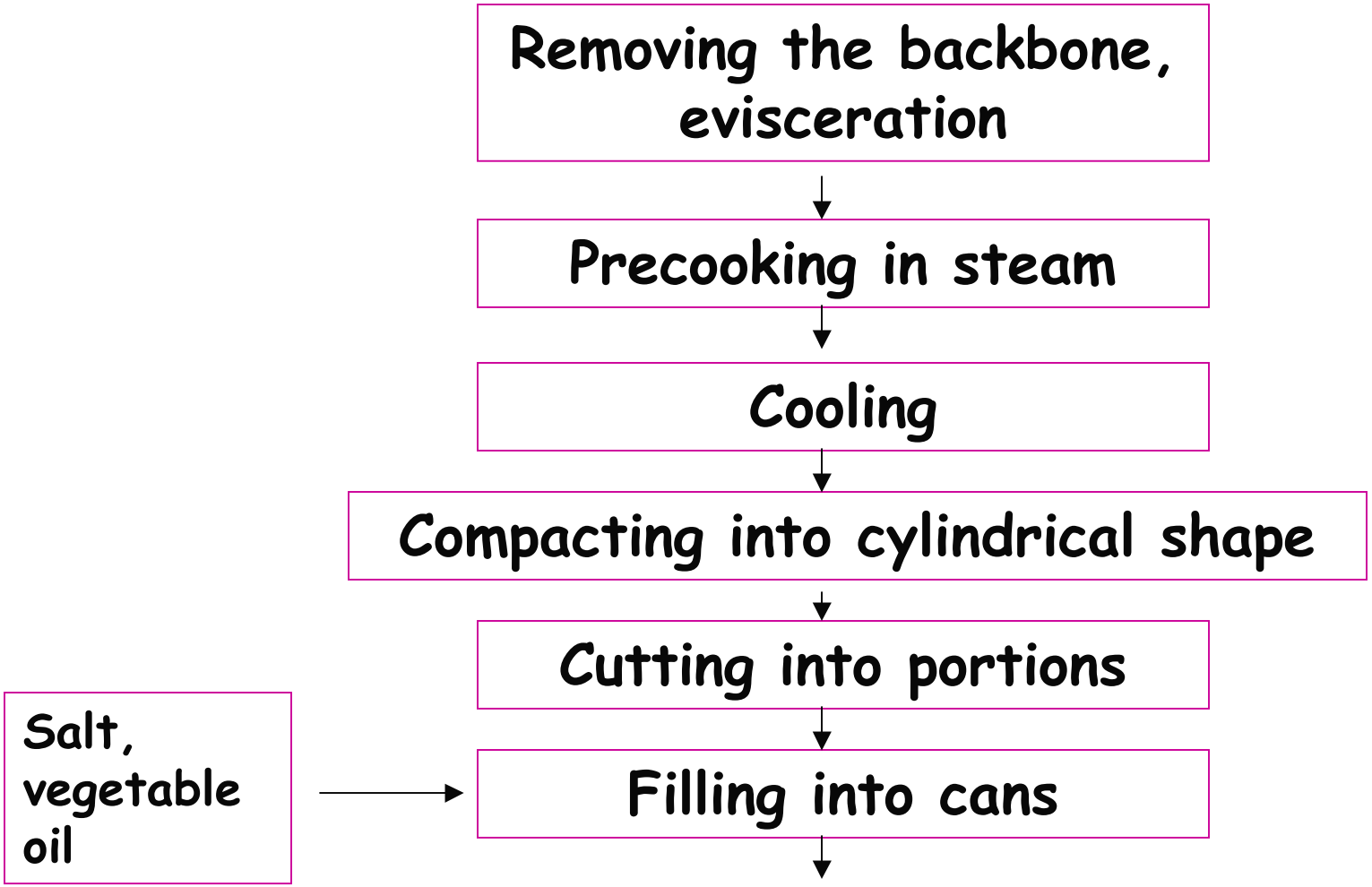
SMOKED FISH-SALTED FISH



Smoking and salting decreases the moisture content of a flesh fish.

MARINE FOODS

CANNED TUNA FISH



MARINE FOODS

CANNED TUNA FISH