



Principles of Food Science

Foods and Nutrition 2232

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Office Hours (Ursuline Hall Rm 107)

Thursday 11:00 – 1:00

or by appointment



Lecture 15

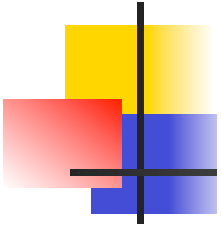
- Poultry – Chapter 26 – Questions 1, 3, 6
- Fish – Chapter 27 – Questions 1-4, 7



Poultry

- Describes all domesticated birds intended for human consumption
 - Chickens
 - Turkeys
 - Ducks
 - Geese
 - Guinea fowl
 - Squab
 - Pigeons





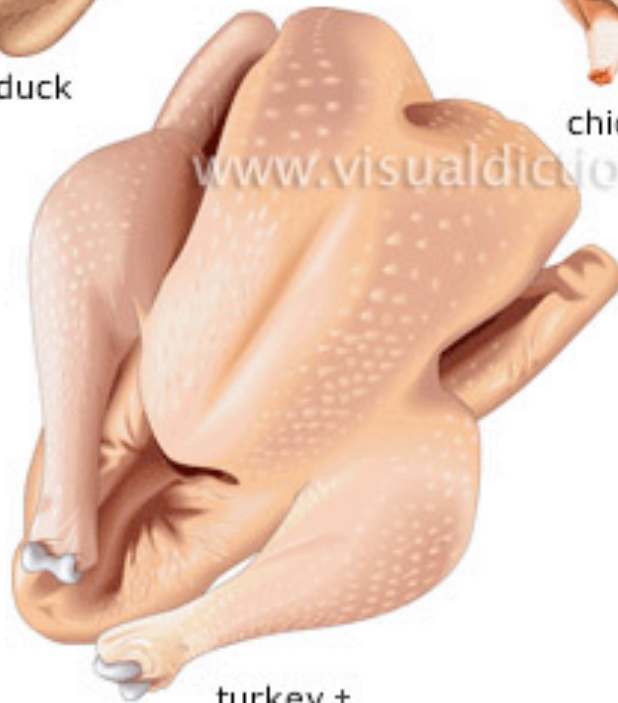
+ duck



chicken



capon



turkey +



+ goose

www.visualdictionaryonline.com



Ratites



-
- Birds with flat breastbone and small or rudimentary wings
 - Ostrich
 - Emu
 - Rhea
 - Production increasing globally
 - Raised for their
 - Red coloured meat
 - Hide
 - Feathers
 - Oils



Class



- Young Birds
 - Chicken
 - Broiler, fryer, roaster, capon, rock cornish game hen, young chicken
 - Turkey
 - Fryer-roaster, young hen, young tom, young turkey
 - Duck
 - Duckling, young duckling, broiler duckling, fryer duckling, roaster duckling
 - Goose and Guinea
 - Young goose or guinea
 - Pigeon
 - squab



Class




-
- Mature Birds
 - Chicken
 - hen, fowl, stewing chicken, mature chicken
 - Turkey
 - Yearling turkey, mature turkey, old turkey
 - Duck, Goose and Guinea
 - Mature or old duck, goose or guinea
 - Pigeon
 - Pigeon



Nutrition

- Protein
- Niacin, B6, B12
- Iron, zinc, phosphorous
- Fat, saturated fat, cholesterol





Fat Content of Chicken

**Chicken, light and
dark meat,
roasted, 3 oz.**

Without skin

With skin

Fat total (grams)

6

12

Saturated fatty
acids (grams)

2

3

Cholesterol
(milligrams)

75

74

Calories

160

200



Canadian Poultry Operations 2006



Canadian Poultry Operations⁴


	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.B.	N.S.	P.E.I.	Nfld.
Total chicken farms	311	196	64	95	834	405	11	67	9	7
Total turkey farms	59	35	9	22	116	48	2	8	3	1
Total egg production farms	627	138	53	127	599	158	29	49	15	16
Other poultry	55	25	5	12	93	68	1	1	1	0

⁴ Source: 1-12 Statistics Canada; <http://www.statcan.ca/english/freepub/95-629-XIE/1/1.2.htm>






Processing

- Slaughtered
- Bled 
- Scalded / Feathers removed
- Eviscerated
- Washed with chlorinated water
- Chilled



Processing

- May be dipped in a TSP solution 
 - TSP alone or in combination with NaCl
 - Delay microbial growth
 - Extend shelf life
 - May be sprayed

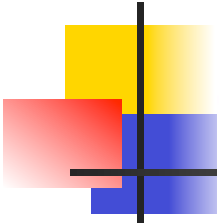


CHAPTER 4 - ANNEX L

Human Safety Guidelines for the Use of

Microbial Control Agents in Meat and Poultry Abattoirs

	Threshold Limit Value (TLV) – Time Weighted Average (TWA)¹ (8hr)	Threshold Limit Value (TLV) – Short Term Exposure Level (STEL)² (15 min.)	Critical Effect(s)
Trisodium Phosphate (TSP) (Na ₃ PO ₄)	1 mg/m ³ as phosphoric acid	3 mg/m ³ as phosphoric acid	Irritation eyes, mouth
Chlorine Dioxide (ClO ₂)	0.1 ppm	0.3 ppm	Irritation eyes, mouth; Bronchitis
Chlorine (Cl ₂)	0.5 ppm	1.0 ppm	Irritation eyes, mouth
Ozone	0.05 ppm - heavy work ³ 0.08 ppm – moderate work 0.10 ppm - light work	None	Pulmonary function; Irritation; headache





Inspection - Canada

- CFIA inspectors across Canada inspect poultry processing plants and cold storage facilities
- Federal and provincial regulations require poultry intended for local human consumption be slaughtered in facilities inspected by provincial or federal authorities
- Poultry shipped between provinces or destined for export must be slaughtered in a federally inspected plant






Inspection - US

- Mandatory inspection
- Processing plant inspection
 - Premises
 - Facilities
 - Equipment
 - Procedures
- All poultry inspected
 - Wholesomeness
 - Properly labelled
 - Not adulterated





Labelling - Canada

- Labelling requirements for meat products
- Processors, retailers and packagers must conform to specific regulations 
- A carcass or part of a carcass that has been approved and stamped with the meat inspection legend is considered fully labelled

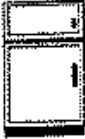

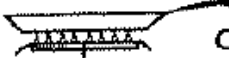



Labelling - US

- USDA requires that safe handling and cooking instructions be put on all packaged of raw poultry

Safe Handling Instructions

This product was inspected for your safety. Some animal products may contain bacteria that could cause illness if the product is mishandled or cooked improperly. For your protection, follow these safe handling instructions.

	Keep refrigerated or frozen. Thaw in refrigerator or microwave.
	Keep raw (meats or poultry) separate from other foods. Wash working surfaces (including cutting boards), utensils, and hands after touching raw (meat or poultry).
	Cook thoroughly.
	Refrigerate leftovers within 2 hours.





Grading - Canada

- Three grades
 - Canada A
 - Canada Utility
 - Canada C






Grade A - Canada

- Not more than wing tips and tail removed
 - Chicken, capon, Rock Cornish hen, mature chicken, old rooster, young turkey, mature turkey
- Carcass not deformed
- Carcass moderately plump breasted on both sides
- Breast, thighs and back show evidence of fat cover (not turkey)
- No prominent discolourations
- Skin on breast not greatly torn (minimum allowable size given for weight)
- No broken or dislocated bones
- No more than 3cm exposed flesh at posterior end of keel bone


Grading - US

- Voluntary
- Applied to chicken, turkey, duck, goose, guinea and pigeon
 - US Grade A 
 - Highest grade
 - US Grade B
 - US Grade C

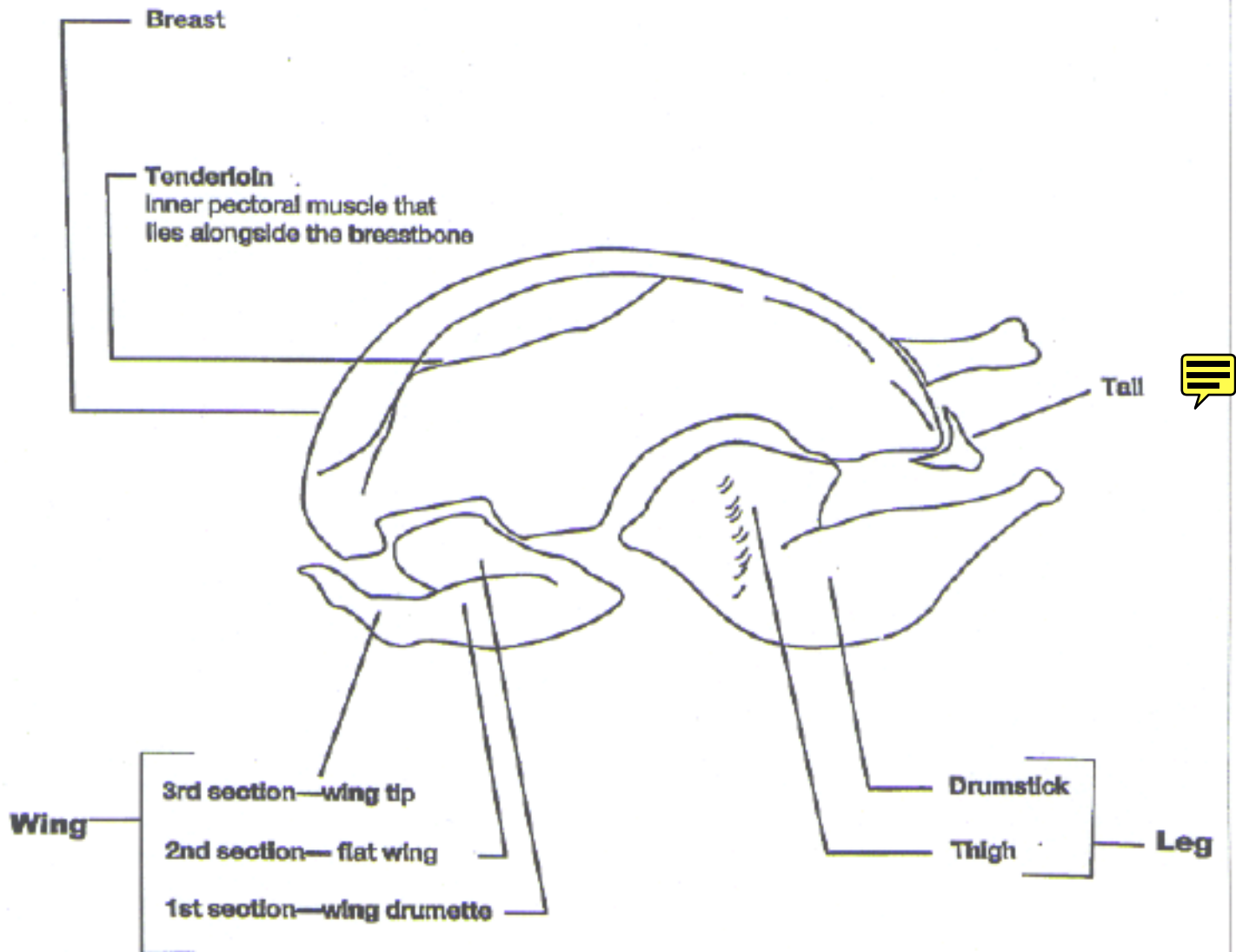
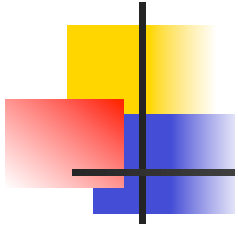




Grade A - US

- Fully fleshy and meaty
- Good conformation – a normal shape
- Free of disjointed or broken bones
- Well developed and well distributed layer of fat in the skin
- Free of pinfeathers, exposed flesh and discolouration
- No missing parts (in whole carcasses)
- Boneless products free of bone, cartilage, tendons and bruises
- Frozen poultry not dehydrated and no excess moisture in package 

Retail Cuts



USDA 1995



Dark Bones



-
- Darkened meat around the bones occurs in young poultry
 - Not calcified enough to prevent bone marrow from seeping into the meat
 - Pigment darkens during cooking
 - No health risk



Storage and Handling

- Store at **refrigerator temperature** (4°C or lower) or freeze
- Storage time usually just a **few days** unless frozen
- **Sanitize** all surfaces that the raw poultry comes in contact with during preparation



Cooking

- Acceptable endpoint internal temperature for pieces 74° C (165° F)
- Acceptable endpoint internal temperature for whole poultry 85° C (185° F)
- Acceptable endpoint internal temperature for ground poultry 74° C (165° F)
- Dry heat methods for young tender birds
- Moist heat methods for older, less tender birds



Super Bugs in Chicken



- <http://www.cbc.ca/marketplace/2011/superbugsinthesupermarket/>



Fish and Seafood - Composition



- Composition similar to that of lean meat
- Good sources of high quality protein
- Many fish lower in fat and cholesterol than beef
 - Shrimp higher in cholesterol
- Fat is highly unsaturated
 - Includes omega-3 PUFA's in fish oil
 - Fat in many fish contain 8-12% EPA (30-45% omega-3 PUFA's)
- Some carbohydrate in form of glycogen



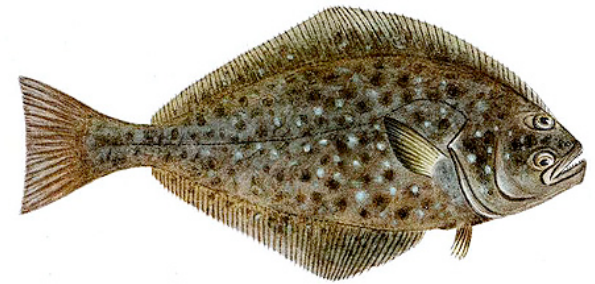


Nutritive Value

- Important sources of **minerals**
- Marine fish a dependable source of **iodine**
- Fat fish contain more **Vitamin A** than lean
- Canned salmon fair source of Vitamin A and good source of **riboflavin** and **niacin**

Classification

- Two major categories of sea
 - **Vertebrate** fish with fins
 - **Flat** fish
 - **Round** fish
 - **Shellfish** or **invertebrates**
 - **Mollusks**
 - Univalves (abalone)
 - Bivalves (clams, oysters, muscles)
 - Cephalopods (squid and octopus)
 - **Crustaceans**

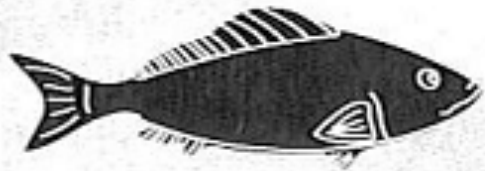


HALIBUT *Hippoglossus hippoglossus* LINNAEUS

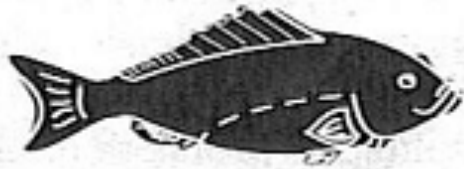


Market Forms of Fish

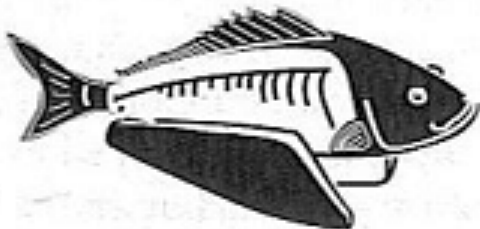
Whole or round fish.



Drawn fish.



Single fillet.



Dressed or pan-dressed fish.



Steaks.



Sticks.



Butterfly fillet.





Fish and Seafood

- Only major food source still hunted
- Variety of methods used
 - Line fishing (hand lines and long lines)
 - Troll lines
 - Nets
 - Gill nets
 - Otter trawls
 - Purse seines
 - Pots
 - Dredges, tongs, rakes or forks

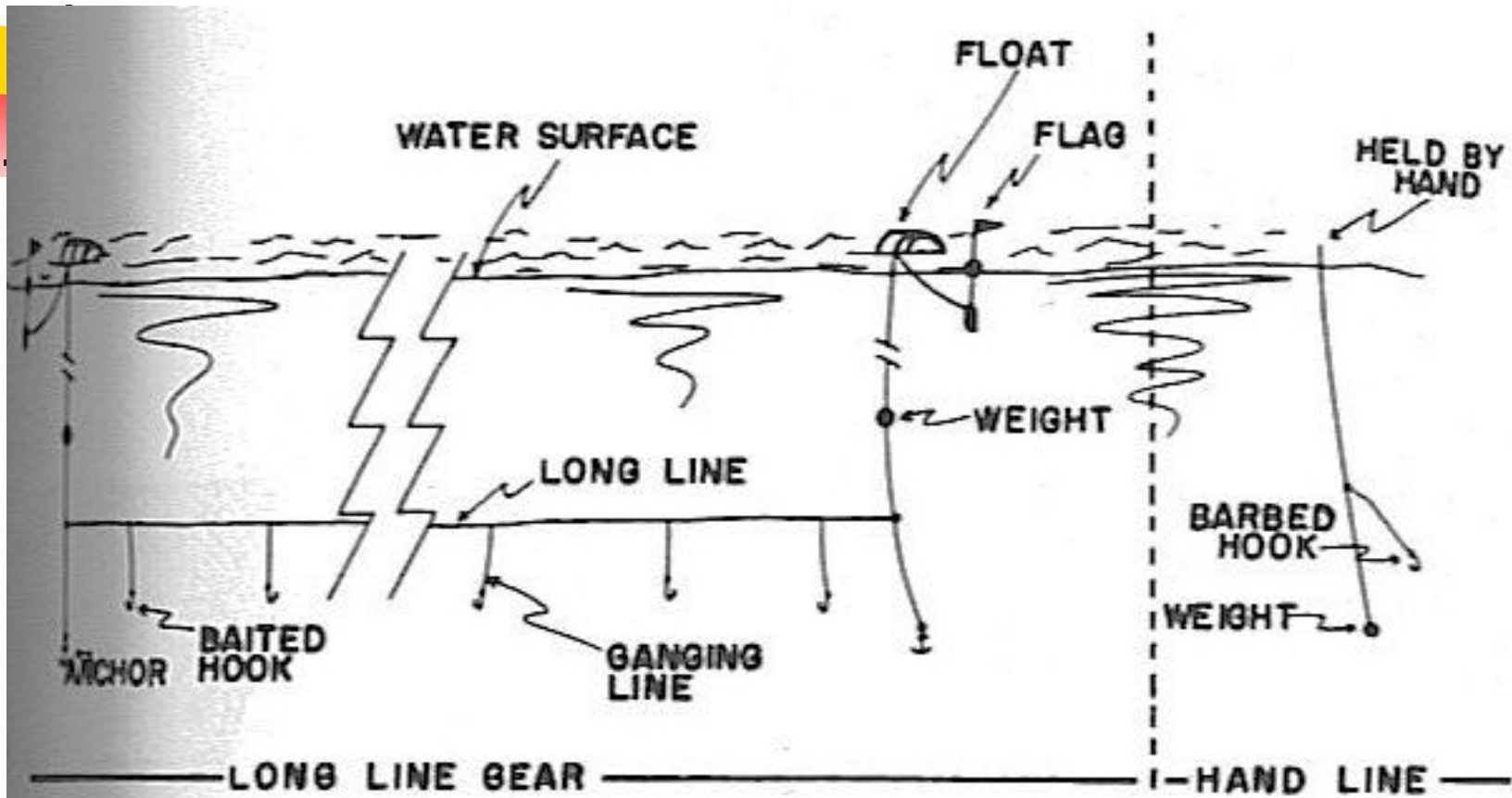


Figure 17.1. Line fishing.

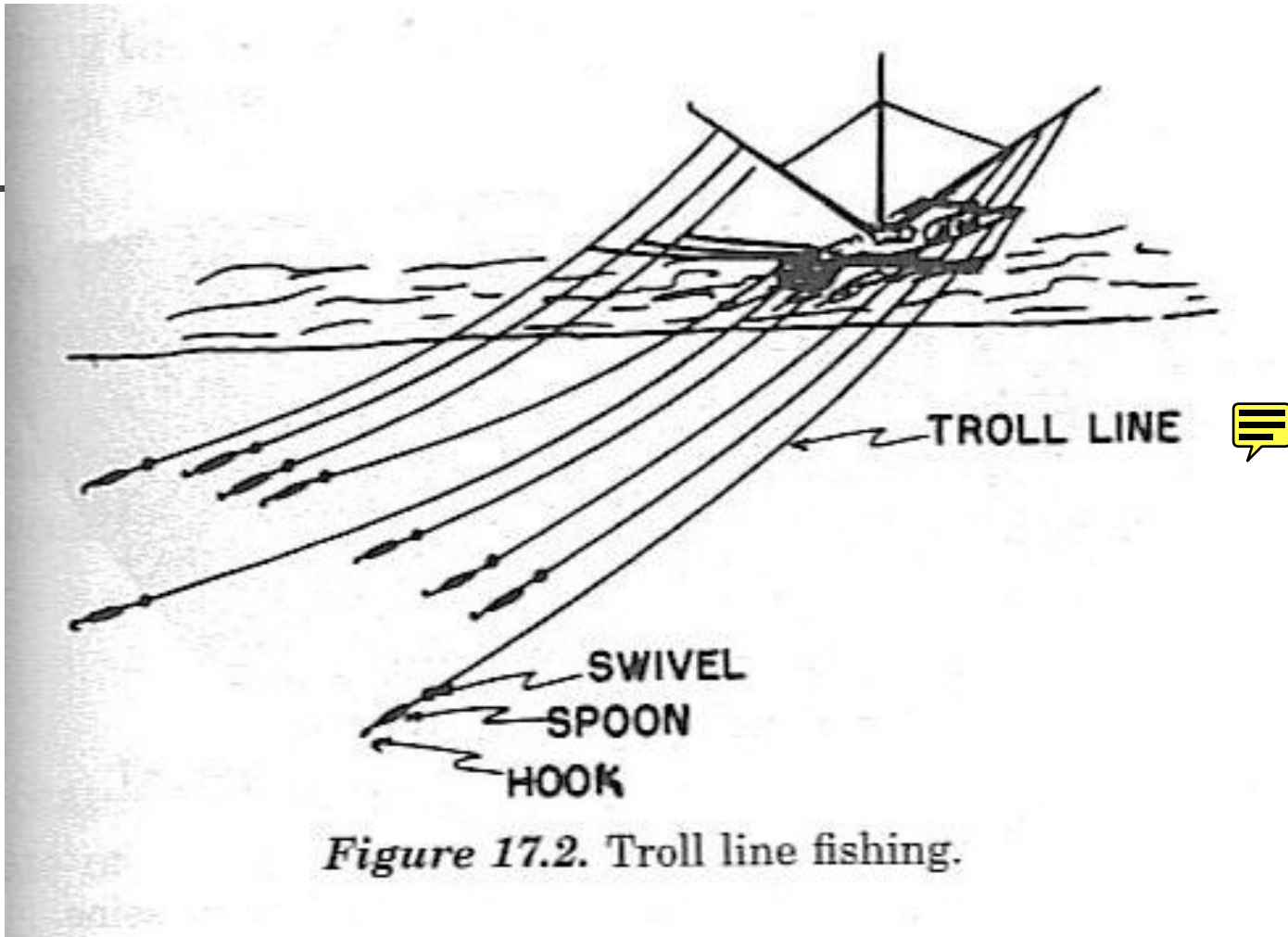
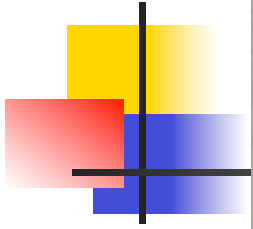


Figure 17.2. Troll line fishing.

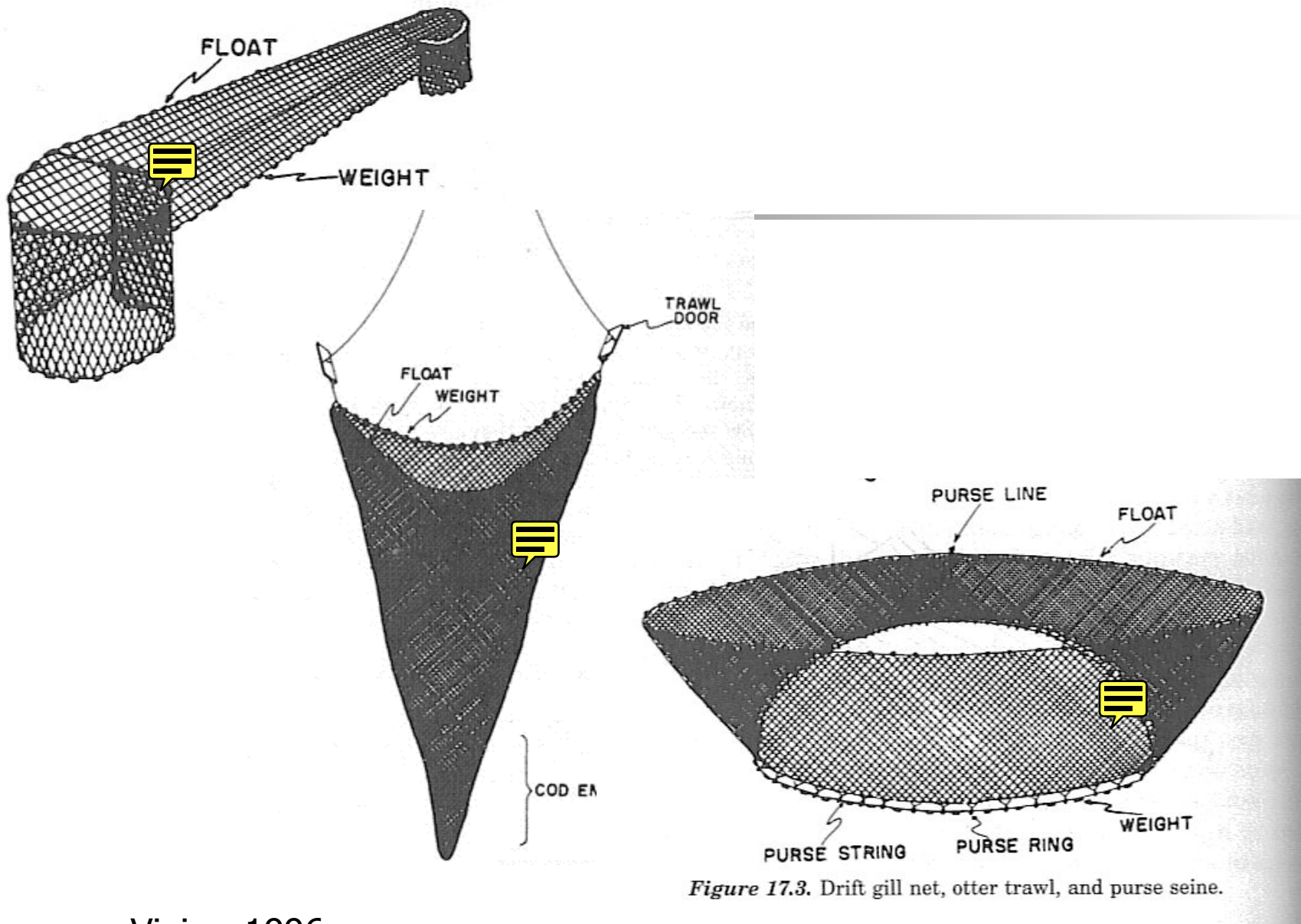


Figure 17.3. Drift gill net, otter trawl, and purse seine.

Vieira, 1996

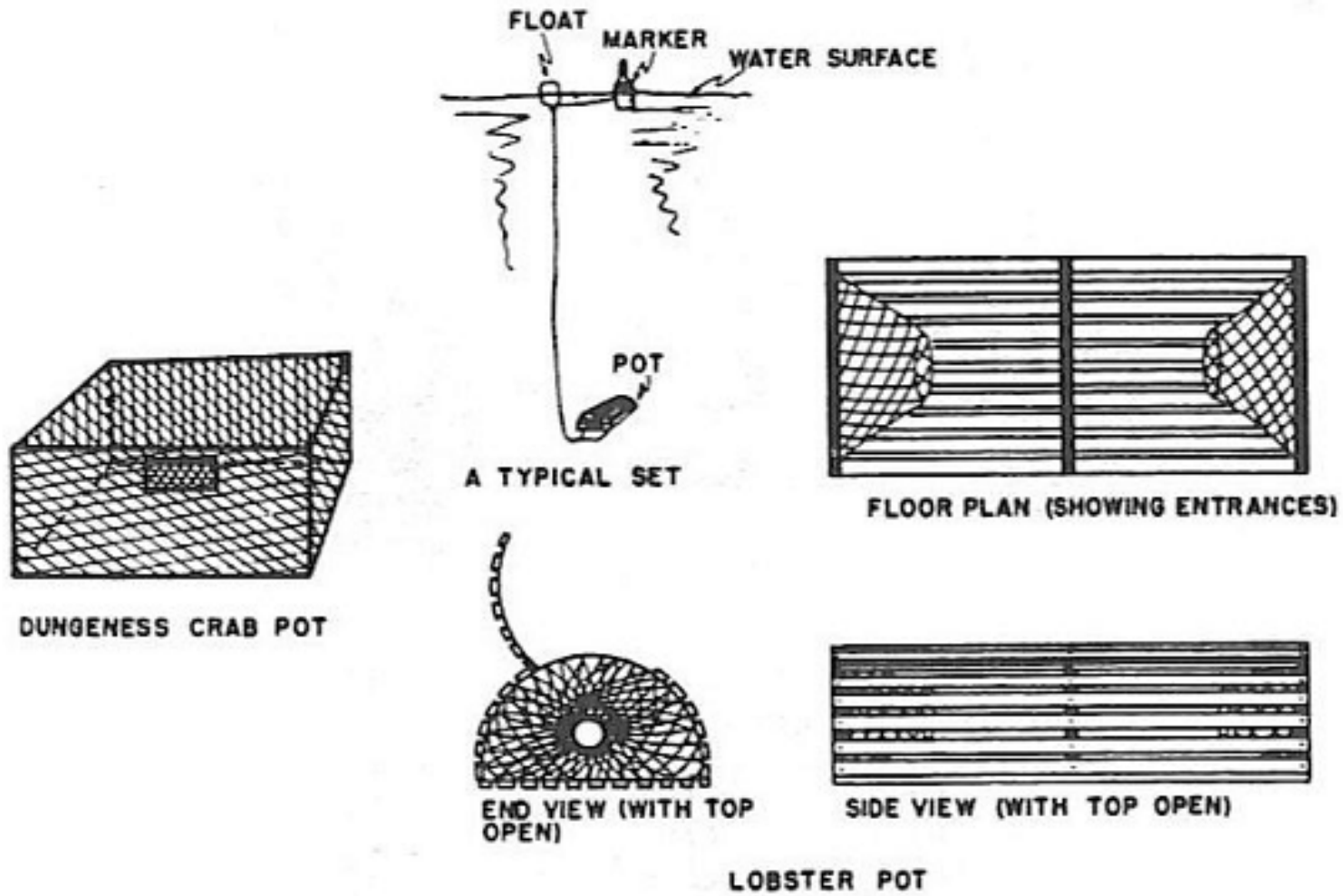


Figure 17.4. Entrapment devices.

Vieira, 1996

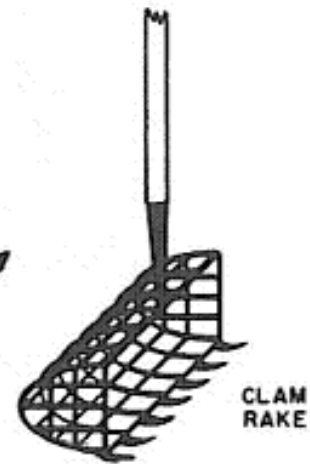
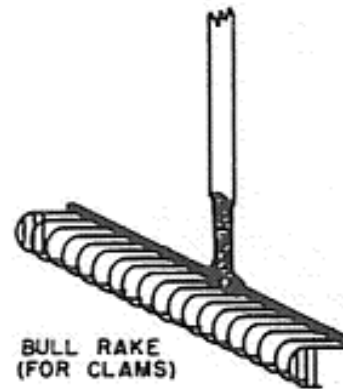
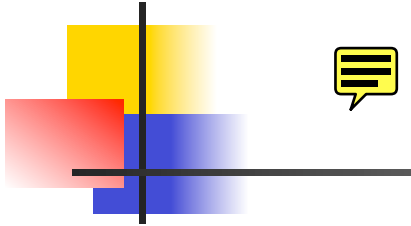


Figure 17.5. Shellfish harvesting devices.

Vieira, 1996






Fish Farming

- Many must be caught in the wild
 - May be sustainable resources if properly managed
 - Pollution of habitats a concern
 - Threat of over fishing
- Some species successfully cultivated
 - Overcrowding
 - Excessive use of artificial feeds
 - Spread of disease



Fish

- Fish are highly perishable
- Soon after they are caught changes take place
 - Softening of the muscle tissue 
 - Growth of the naturally occurring bacteria in the viscera causing decomposition  
 - Bacterial growth on the skin and gills
- Changes proceed slowly at ice temperature



Freshness

- Fresh finfish
 - Firm flesh
 - Stiff body
 - Tight scales
 - Red gills
 - Eyes bright and not sunken
 - Pressure on body does not leave an indentation
 - Little or no slime on exterior of fish
 - Should not smell fishy






Storage

- Fresh fish – keep at near 0° C if possible 
 - At least keep in coldest part of your refrigerator until cooked
 - Use within 2 days of purchase
 - OR freeze
- Live mollusks – refrigerate in containers loosely covered with a clean, damp cloth 



Cooking Fish

- Cook by **dry or moist heat** methods
 - Frying, broiling and baking often preferred
- Careful handling to retain the form of the fish
- Cook until thoroughly done
 - Flakes separate easily
 - Minimum temperature of **63°C** (145°F)
 - **~10 minutes per 1 inch of thickness** 
- Avoid overcooking



Cooking Shellfish

- Easily toughened by high temperature
 - Avoid high temperatures and long cooking
- Moist methods with a simmering temperature of 82 - 85 °C often used
- Live lobsters parboiled in salted water
 - 2 tsp salt/quart of water
 - Water boiling when lobster added
 - Keep at simmering temp ~ 12 minutes
 - Remove flesh from the shell
- Shrimp
 - Simmer 3-5 min or until shrimp begin to curl and turn pink
 - Deep fry



Something's Fishy Video

- http://www.cbc.ca/marketplace/2010/somethings_fishy/main.html