AF

ADVANCED FISHMONGER

MFS COURSE WORKBOOK

MASTER FISHMONGER STANDARD

MASTER
FISHMONGER
STANDARD

Fulfilment of this workbook should help you with build upon your existing knowledge concerning:

- Fisheries
- Aquaculture
- Handling and Processing
- Supply Chain: Traceability and Transparency
- Customer Service
- Retail & Display
- Quality Assessment
- Food Safety & HACCP
- Nutrition
- Recipes / Cooking

Unless stated, one mark is allocated based on one true and relevant answer. For example, if there are three marks available then three relevant and correct statements or answers should be given to obtain the full marks available.

Research

Within this workbook you will find links to important learning resources that will help you to complete your answers. Please ensure that you take the time to read or watch them, and reference them when possible to ensure that your marker understands where you have obtained your information from.

Good luck!

Acknowledgements
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FISHERIES

Fisheries

LEARNING RESOURCES

The Seafood Guide: The UK Seafood Industry – An Overview

MSC: What is sustainable fishing?
https://20.msc.org/what-we-are-doing/our-approach/what-is-sustainable-fishing

Glossary of Statistic Terms
https://stats.oecd.org/glossary/index.htm

Seafish: Guide to IUU
http://www.seafish.org/media/publications/SeafishGuidetoIUU07-2016.pdf

Marine Conservation Society: Good Fish Guide
https://www.mcsuk.org/goodfishguide/search

Seafood Guide: Species and Availability
Buying Seasonal Fish
https://www.mcsuk.org/media/seafood/BuyingFishInSeason.pdf

The Seafish Guide to Responsible and Sustainable Sourcing
http://www.seafish.org/media/publications/Seafish_Resp_sourcing_and_sustainabilit_09_08_2016.pdf

Seafish: Traceability Requirements
http://www.seafish.org/industry-support/legislation/traceability-and-labelling/fish-traceability-requirements

Towards Sustainable Fisheries Management
https://www.pcfisu.org/wp-content/uploads/2010/12/MRAG-report_best-practice-examples1.pdf

De-coding Seafood Eco-Labels: Why we need public standards
https://www.ftc.gov/sites/default/files/documents/public_comments/guides-use-environmental-marketing-claims-project-no.p954501-00152%C2%A0/00152-56693.pdf

Managing Fisheries

1. Describe what is meant by the term 'fishing effort'. (2 marks)

The European Union defines fishing effort as fleet capacity (tonnage and engine power) x days at sea (time; t), however different measures of fishing activity are often used, such as the number of hours spent fishing, numbers of hooks used (in long- line fishing), kilometres of nets used, etc.

2. Describe what is meant by the terms Maximum Sustainable Yield (MSY) and Optimum Yield (OY). (4 marks)

MSY
In fisheries terms, maximum sustainable yield (MSY) is the largest average catch that can be captured from a stock under existing environmental conditions. MSY aims at a balance between too much and too little harvest to keep the population at some intermediate abundance with a maximum replacement rate.

OY
Optimum Sustainable Yield is the level of effort (LOE) that maximizes the difference between total revenue and total cost. This level of effort maximizes the economic profit, from fishery being harvested. It usually corresponds to an effort level lower than that of maximum sustainable yield.

3. Describe two pros and two cons of using 'days at sea' as a mechanism to control fishing effort. (4 marks)

Pros:
1. Vessels could land everything that they catch, resolving the discard ban
2. Quota management, which is complex and requires top-down management, could be dispensed
3. Fishers have more control over their livelihoods
4. Days at sea prevents the issue of choke species with regards to the landing obligation

Cons:
1. Quota allocation works to put constraints on total fishing mortality on each species, whereas the days at sea does not
2. Quota allocation is a convenient way to distribute fishing rights amongst different countries and groups of fishermen
3. Calculating the number of days at sea allowed would likely be based on the weakest species, not the strongest, therefore fishing effort and revenue would likely be decreased.
4. Research shows that fishing effort does not have the same level of control over fishing mortality, meaning vessels may only target the most valuable species or fish more

Managing Fisheries

Cons (continued)
4. intensively during the days they are permitted to go to sea, thus causing sustainability concern
5. Days at sea can cause a race to fish the highest value species
6. Days at sea has been criticised for its lack of control over scientific data collection and management
7. There are safety implications associated with limiting time at sea that aren't there in a quota system.

4. Describe what is meant by Total Allowable Catch (TAC)? (2 marks)

Total allowable catches (TACs) or fishing opportunities, are catch limits (expressed in tonnes of live-weight or numbers of fish) that are set by the EU for most commercial fish stocks. The Commission prepares the proposals, based on scientific advice on the stock status from advisory bodies such as International Council for the Exploration of the Sea (ICES) and Scientific, Technical and Economic Committee for Fisheries (STECF).

5. List two risks associated with Total Allowable Catches (TACs)? (2 marks)

1. Sometimes the cost of the quota can be more expensive than the catch landed within that quota, therefore, fishing fleets need to know and understand what the value of the catch is.

2. Related to the above answer, the value of fish products can fluctuate rapidly, which causes problems if the catch value goes down too much.

3. Choke species and the landing obligation can cause fishing fleets to dock early with available quotas if fishing vessels are not part of a Producer Organisation.

4. TACs can result in a 'rush to fish' which has associated safety concerns and puts undue pressure on captain, crew and vessel.

6. Describe three major fishing locations/regions/grounds around the coast of the UK and the common commercial species harvested there. (6 marks)

Examples could include:
North Sea – Shetland and Gulf Stream – migratory pelagic species – herring and mackerel
Northern North Sea and west of Scotland – whitefish, nephrops
Irish sea – deep-water, pelagic, demersal – herring, cod, whiting
Central North Sea – mixed demersal and shellfish fleet – whitefish and nephrops
English Channel – mixed demersal and shellfish fleet – whitefish and nephrops
West of Scotland - mixed demersal and shellfish fleet – whitefish and nephrops

Sustainable Fisheries

1. What is meant by the terms, ‘responsibly-sourced’ and ‘sustainably-sourced’? (4 marks)

There are many descriptions of the terms responsibly-sourced and sustainable-sourced, therefore this is just one example.

Responsible sourced

In seafood the term 'responsible sourcing' refers to securing long-term sustainable sources of fish to provide high quality nutritious food for today's consumers and future generations. Sustainability is the goal, responsible fishing is the behaviours and practices which can help achieve it.

Sustainably Sourced

MSC definition:

Sustainable fishing means leaving enough fish in the ocean, respecting habitats and ensuring people who depend on fishing can maintain their livelihoods.

Wikipedia definition

Sustainable seafood is seafood that is either caught or farmed in ways that consider the long-term vitality of harvested species and the well-being of the oceans, as well as the livelihoods of fisheries-dependent communities. It was first promoted through the sustainable seafood movement which began in the 1990s.

2. Name three benefits and three limitations of using certification programmes (such as the Responsible Fishing Scheme, Marine Stewardship Council (MSC), Aquaculture Stewardship Council (ASC) (6 marks).

Benefits:

1. Customers feel confident that the products they are buying are from responsible and sustainable sources.
2. Customers are encouraged to eat certified sustainable seafood.
3. The process of certifying a fishery or farm ensures best practice.
4. Labelling can be used an incentive for businesses to clean up their practices, and allows business to market their products and business over their competitors.

Sustainable Fisheries

Benefits:

5. Certified seafood raises awareness about overfishing and poor fisheries management.
6. Certification programmes will require members to be certified to an environmental third-party standard or independent third-party audit, thus improving the reliability of the certification.

Limitations:

1. Limited access to market; Certified seafood forms a very small percentage of legally landed seafood.
2. Certifying seafood is expensive and can be unattainable for smaller, less profitable fishing fleets
3. Eco-certification programs need to be well-marketed and trusted by consumers for it to have an impact
4. Existing eco-labels have the potential to override the authority of governments, particularly in developing countries
5. Eco-labelling programs fail to promote local seafood options or account for the miles that imported seafood travels
6. For some programs, there is a conflict between the intent to promote change within a certain fishery and the product labelling program, which can place a seal of approval on a product from a certified fishery before it has made conditional improvements in ecological performance to meet the standards for the label.
7. Some eco-certificates show inadequacies with regards to meeting standards such as environmental standards, social responsibility, community relations, labour regulations, international law and/or transparency.
8. Eco-labels that certify foraged fish can damage marine food webs and negatively impact food security in developing countries.

3. Using the Marine Conservation Society's Good Fish Guide, name <u>two</u> species and their harvesting techniques which are regarded as sustainably-sourced, and <u>two</u> species and the harvesting technique listed as 'fish to avoid'. (4 marks)

Any species can be provided so long as the information is accurate.

4. Using the Seafood Guide, describe the seasonality (i.e. breeding / not-breeding, peak / low quality) for four UK commercial species, provide information on alternative species during the low season (i.e. during the breeding season / poor quality product). (8 marks)

Any species can be provided so long as the information is accurate.

Sustainable Fisheries

5. Describe and explain three advantages and three disadvantages of purchasing food commodities during 'peak season' (i.e. not-breeding / peak quality). (6 marks)

Advantages

1. The quality of the fish should be at its best during 'peak season'.
2. Selling seafood during the 'peak season' supports sustainability efforts as it encourages consumers to purchase seafood out of the breeding season.
3. Selling fresh fish based on their 'peak season' provides an opportunity to promote other fish species.
4. Purchasing seafood during the peak season allows the fish to be frozen at the peak of their annual quality, which means that customers can use the fish in the same way as out of season and the quality will be maintained.
5. Purchasing seafood during the peak season provides an opportunity to engage with customers, offer expertise and a high level of service, and show an environmentally aware business approach.

Disadvantages

1. Customers often want the same species year-round, meaning the supply of local fish will, if available out of season, be of poorer quality, have high quantities of roe, or need to come from frozen stocks.
2. Prices are higher when the quality is better.
3. If sourcing from other sources, it is possible that the seafood will be more expensive, have travelled further and will be less fresh.
4. There are also misconceptions against the sustainability of the fishery if fishing out of season.

6. Explain what is meant by the term 'illegal, unregulated, unreported (IUU) fisheries'. (4 marks)

1. IUU is the term used to describe any unauthorised fishing and fishing activities conducted in breach of regional, national or international rules and regulations.
2. Illegal fishing violates the laws of a fishery. It includes fishing out of season; harvesting prohibited species; using banned gear or techniques; catching more than a set quota and fishing without a licence.
3. Unreported fishing is that which is not declared (or is misreported) to the relevant authority or regional fisheries management organisation.
4. Unregulated fishing is conducted by vessels without nationality; flying a flag of convenience; or flying the flag of a State not party to the regional organisation which governs that particular fishing region or species. It also relates to fishing in places – or for fish stocks – where there is a lack of detailed knowledge, conservation or management measures in place (this doesn't include data deficient fisheries).

Gear & Equipment

LEARNING RESOURCES

Watch:

Beam Trawl Selectivity:
https://www.youtube.com/watch?v=COeEq_yQO1c

Read:

Fishing UK: past, present and future
www.seafish.org/media/Publications/UKFishing_PastPresentFuture.pdf

Harvesting Methods
http://www.seafoodwatch.org/ocean-issues/fishing-and-farming-methods

Seafish: Basic Fishing Methods:
http://www.seafish.org/media/publications/BFM_August_2015_update.pdf

Gear & Equipment

1. What is classed as an active gear, what are its characteristics and what type of species do they catch? (3 marks)

Active gears refer to gears such as towed gears, trawls and dredges.
Active gears can be designed to fish at different depths from the sea bed to the surface waters so are able to chase and often concentrate fish. They can catch a very wide range of demersal and pelagic species.

2. What are the benefits and challenges associated with using active gear? When did it become popular and when were the challenges first realised? (5 marks)

Benefits
Active gears can be very efficient at catching large quantities of fish/shellfish by fishing over a large area.
Active gears, such as demersal beam trawling in a mixed fishery, can catch large volumes and varieties of non-target creatures and can impact the physical habitat.

Challenges
Pelagic purse seines can also catch predator species, such as marine mammals, orca/dolphin. Active gears can also catch high number of species, causing overfishing if it is not suitably managed.
Global examples of over fishing with active gears started a little earlier in the 1970s e.g. North Sea Herring, but it was first widely recognised as a problem in the 1980's.

3. What are the names of two common encircling gears, what are the general characteristics of encircling gears and what do each of these encircling gears do? (5 marks)

Purse seine and Scottish seine.
Encircling gears herd and surround fish, they are mainly used in mid-water but some types are also used on the seabed.
Purse seine target pelagic species and are surface deployed nets which fish from the surface down and can be massive! 6,500 feet in length (2,000 meters) and 650 feet deep (200 meters)
The Scottish seine catches demersal fish from towards the sea bed.


AQUACULTURE

Aquaculture

LEARNING RESOURCES

Watch:

Shellfish!
https://www.youtube.com/watch?v=AN5OZn7M318

Read:

Harvesting Methods
http://www.seafoodwatch.org/ocean-issues/fishing-and-farming-methods

FAO: Why Aquaculture?
http://www.fao.org/docrep/t8598e/t8598e03.htm

FAO: State of the World Fisheries: Aquaculture
http://www.fao.org/3/a-i5555e.pdf

Fish Feed
https://www.skretting.com/en-AU/faqs/whats-in-fish-feed/

Aquaculture

1. Explain the importance of aquaculture and mariculture in providing a viable protein source. (4 marks)

Despite large increases in the fishing effort for capture fisheries the landings have only slightly increased. However, harvest from aquaculture has increased by over 30% and the industry is becoming increasingly important in supporting the global food supply.

Managed carefully and in a sustainable way, aquaculture provides a means of expanding the world fish supply and making up future shortfalls in wild capture fisheries.

2. Aquaculture falls into three broad areas, as defined by the Seafood Guide. Briefly describe the processes involved in each area and provide an example of a farmed species for each aquaculture type. (3 marks)

Farming – the whole process is done in captivity (salmon)

sea rearing – where young stocks are caught from the wild then harvested (eels, mussels, tuna)

sea ranching – juveniles are bred in captivity, then released into the wild to increase stock (lobster – National Lobster Hatchery)

3. List six seafood species farmed commercially for consumption in the United Kingdom. (3 marks)

Examples include:
Atlantic Salmon, Scotland
Mussels and oysters and manila clams are grown around the coast of the UK
Rainbow trout (fresh and saltwater reared) UK
Salmon smolts, England and Scotland
Halibut, Scotland
Wrasse and lumpfish (as cleaner species), Scotland

Aquaculture

4. What are the principles of organic aquaculture? (2 marks) What are three advantages and three disadvantages of this type of fish farming? (6 marks) (Total: 8 marks)

Organic aquaculture is a holistic method for farming species in line with organic principles. The ideals of this practice are to establish sustainable environments with consideration for naturally occurring ecosystems, use of pesticides, and the treatment of aquatic life. Managing aquaculture organically has become more popular since consumers are concerned about the harmful impacts of aquaculture on themselves and the environment.

Advantages

1. A certified organic product seal on aquaculture products would mean that an accredited certifying body has verified that the production methods to meet or exceed a country's standard for organic aquaculture production.
2. There is a consumer demand for organic seafood.
3. Organic aquaculture may become a significant management option with continued research.

Disadvantages

1. Consumers can be confused or sceptical about an organic label due to conflicting and misleading standards around the world.
2. Organic regulations designed around soil-based systems don't transfer well into aquaculture and tend to conflict with large-scale, intensive (economically viable) practices/goals.
3. Difficult sourcing and certifying organic juveniles (hatchery or sustainable wild stock);
4. There is a 35-40% higher feed cost over traditional aquaculture.
5. It’s more labour-intensive than traditional aquaculture.
6. Time and cost of the certification process is high.
7. There is a higher risk of diseases
8. The benefits of organic fish are uncertain.

Aquaculture

5. What ingredients may be typically found in fish feed? (3 marks)

1. Marine ingredients such as fishmeal and fish oil from wild-caught fish and marine trimmings sources;
2. Land-animal co-ingredients (i.e. poultry, cattle, pig and sheep industries such as poultry meal, feather meal, meat meal, blood meal, and poultry oil;
3. Vegetable/grain ingredients such as wheat and its derivatives, soya protein concentrate, lupin meal, faba bean meal and canola oil;
4. Vitamins and minerals; and
5. Carotenoids, such as astaxanthin and canthaxanthin

6. Aquaculture often receives a poor reputation in the media. What are some of the negative impacts of aquaculture that have been highlighted in the past? (6 marks)

1. High levels of organic and inorganic nutrients from pens can cause damage (pollution) to the marine habitat
2. Escaped farmed fish can breed with wild stocks reducing the health of wild stocks
3. Sea lice on farmed fish can spread to wild fish
4. Carnivore fish species require large volumes of wild stocks to supplement their fish feed
5. Smolts can be taken from wild stocks, thus depleting wild stocks
6. Fish feeds can take fish away from poorer countries, also degrading these environments to produce luxury food for the developed world.

7. In Europe, fish and shellfish farms need to be registered and inspected regularly to check the standards of the health, hygiene and welfare. Using the Seafood Guide, describe some of the initiatives that individual farms and their associations are working on to improve standards and maintain a healthy environment. (4 marks)

1. Developing and promoting codes of practice to ensure cultivation sites and stocks are well managed
2. Addressing issues relating to the supply of fishmeal and fish oil in aquaculture feeds
3. Sourcing feeds from sustainably managed and accredited fisheries is becoming a priority.
4. Investigating better use of feeds through development of improved feeding systems

Aquaculture

8. Complete the following table: (6 marks)

Aquaculture Method	Description	Species harvested
Hatchery	Artificial breeding, hatching and rearing of spat, and juvenile fish and crustaceans.	Oysters, clams, mussels, salmon, tilapia, scallops, lobster, trout, arctic char, halibut.
Bag / rack	Oysters are stored in mesh bags on racks	Oysters
Submersible net pens / cages	Pens and cages are used for finfish, they are fully submersible in marine or freshwater waters	Salmon, tilapia, catfish, seabass etc.
Recirculating systems	Operate by filtering water from the fish (or shellfish) tanks so it be reused within the tank.	Any fish / shellfish used for aquaculture: Carps, barbels and other cyprinids Miscellaneous freshwater fishes Clams, cockles, arkshells, oysters Tilapias and other cichlids Shrimps, prawns Salmon, trout, smolts Freshwater crustaceans Scallops, pectens halibut

HANDLING & PROCESSING

Handling & Processing

LEARNING RESOURCES

Watch:
Seafish: The Business of Processing
https://www.youtube.com/watch?v=GPaorAYnFqY

Read:

The Seafood Guide: Seafood Processing / Processing and Techniques

Seafood Processing Industry Report:
http://www.seafish.org/media/publications/2014_Seafood_Processing_Industry_Report.pdf

Receiving Deliveries
http://sop.nfsmi.org/HACCPBasedSOPs/ReceivingDeliveries.pdf

Super Freezing
https://www.soshinsen.com/blogs/news/what-is-super-freezing

Handling & Processing

1. What six measures can be taken to avoid cross-contamination during the processing and packing of seafood? (3 marks)

1. clean and sanitise work areas
2. accurate labelling / tagging
3. packing seafood separately depending on the species
4. keeping shellfish / sea vegetables / cooked products / raw products separate
5. icing properly
6. clearing away melt water

2. List eight things you need to check / do when receiving fish to process? (4 marks)

1. Delivery time: this should be scheduled during normal operational hours so the product is not left out of temperature control.
2. Rejection policy (if boxes are damaged/ out of temperature control)
3. There is space in the fridge/ freezer to store goods
4. Check receiving area is clean and well light
5. Gather product specification lists and purchase orders, temperature logs, calibrated thermometers, pens, flashlights, and clean loading carts before deliveries.
6. Determine whether foods will be marked with the date arrival or the “use by” date and mark accordingly upon receipt
7. Compare delivery invoice against products ordered and products delivered.
8. Transfer foods to their appropriate locations as quickly as possible.
9. Inspect the delivery truck when it arrives to ensure that it is clean, free of putrid odours, and organized to prevent cross-contamination.
10. Be sure refrigerated foods are delivered on a refrigerated truck.
11. Check the interior temperature of refrigerated trucks.
12. Confirm vendor name, day and time of delivery, as well as driver’s identification before accepting delivery.
13. If driver’s name is different from what is indicated on the delivery schedule, contact the vendor immediately.
14. Check frozen foods to ensure that they are all frozen solid and show no signs of thawing and refreezing, such as the presence of large ice crystals or liquids on the bottom of cartons.
15. Check the temperature of refrigerated foods.
16. For fresh meat, fish, and poultry products, insert a clean and sanitized thermometer into the centre of the product to ensure a temperature within guidelines

Handling & Processing

3. State how stock rotation and storage links to sustainable working practices. (3 marks)

Using the first in, first out rule means that customers purchase the seafood which has a shortest life expectancy, thus reducing the amount of waste that needs to be discarded if the product isn't sold in a timely manner.

4. Describe what is meant by the term super freezing, and the processes that occur. (3 marks)

The process involves the fish being caught, gilled, gutted and bled out then being placed in super freezers on board the fishing boats, where their internal temperature will reach the optimum low temperature of -60°C. This freezing process takes about 2-3 hours, stops the natural decay through the prevention of dehydration and spoilage, and effectively kills of all bacteria that presents itself on the fish. Once defrosted, the fish will retain the freshness that it possessed before freezing.

Watch the Seafood Processing video then answer the following two questions:

5. Describe what improvements can be made to help the seafood processing industry? (4 marks)

1. Fishermen and processors should communicate more effectively which would help the processors to plan ahead
2. Quota management needs revised
3. Younger people need to get into the industry
4. Clear regulatory framework, trade strategy to help stabilise raw material supply
5. Increase consumer awareness
6. Train staff to meet skills shortages
7. Support methods to secure finance/ funding to promote investment

6. What impacts can quality seafood processing facilities have on a region? (3 marks)

1. Gaining an excellent reputation worldwide can noticeably improve a region's social and economic opportunities through increased livelihoods and potential tourism.
2. Quality seafood processing facilities can allow businesses to maintain and grow their turnover in a global market place, this benefits the region by offering secure and increasing number of jobs.
3. Associated supply/ maintenance/ storage/ tourism businesses may also be established in the area to support these facilities and create more jobs.

SUPPLY CHAIN: TRACEABILITY & TRANSPARENCY

Supply Chain: Traceability & Transparency

LEARNING RESOURCES

Read:

The Seafood Guide: The UK Seafood Industry – An Overview

'UK Seafood Industry: Dashboard 2016'
http://www.seafish.org/media/publications/Dashboard_Screen.pdf

UK Sea Fisheries Statistics
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/647482/UK_Sea_Fisheries_Statistics_2016_Full_report.pdf

Supply Chain: Traceability & Transparency

1. What does the term 'transparent seafood' mean? (2 marks)

Provides visibility into supply chain activities and simplifies tracking regardless of location. This does not necessarily mean a product is responsibly or sustainably sourced but it is often used in conjunction with these policies to support their authenticity.

2. Name three procedures and arrangements that could be put in place to monitor product control and traceability. (3 marks)

Quality control, sensory assessment; rejection criteria
Daily stock records (FIFO)
Healthmark tickets for live bivalve molluscs
MSC traceability documents

3. How can traceability and transparency help a business to improve its sales? (3 marks)

Transparency refers to communicating general sourcing policies and information to the public about your stock. Evidence suggests 'storied seafood' the process of relaying information about a product (such as landing date / location, details about the fisher / fishing vessel) results in more customers purchasing the product.

4. Why are arrangements for product control and traceability in the fisheries sector so important? (4 marks)

1. Fish and shellfish supply chains are complex and varied and require robust systems in place to manage them effectively;
2. To comply with food law and protect both consumers and traders;
3. To assist Fisheries Control, identify over fishing, minimise the trade of Illegal, Unreported or Unregulated (IUU) seafood on the market;
4. Fish Marketing: to ensure products are sold accurately.

5. When purchasing wholesale seafood from a supplier, what are the legal labelling requirements that should be stated on the packaging. (6 marks)

1. The commercial designation (name)
2. The scientific name
3. The relevant geographical area
4. The production Method
5. Whether the products have been previously frozen or not
6. Declaration of additives

CUSTOMER SERVICE

Customer Service

LEARNING RESOURCES

Read:

What defines good customer service in retail?
https://www.highspeedtraining.co.uk/hub/good-customer-service-retail/

Food Labelling guide for fishmongers
http://www3.hants.gov.uk/tradingstandards/tradingstandards-business/ts-business-food/tsguide-labelling-fishmongers.htm

Customer Service

1. Explain the taste and texture attributes of chilled and frozen products and how these are perceived by customers. (4 marks)

1. Fresh seafood (never been frozen) is perceived to be of higher quality.
2. Frozen fish tends to be viewed as less premium, likely due to the perception that it is not as fresh.
3. Customers are often willing to pay a premium for prepared products like smoked fish, cooked crab etc.
4. If freezing or thawing has been in the correct way, then it is perfectly possible to have the same eating experience as with chilled seafood that has never been frozen. Seafood should be firm and juicy and free from unpleasant odours or flavours.

2. What kind of sea vegetables are available for sale in the UK, how would you promote these products? (3 marks)

There are many types of sea vegetables, including brown algae (I.e. kombu/kelp, wakame, arame), red algae (i.e. nori and dulse) and green algae (I.e. sea lettuce) and seagrass.

Customers could be encouraged to purchase sea vegetables by:
1. Promoting the numerous health benefits (I.e. high in iron, vitamin C, vitamin B2, vitamin A and mineral iodine)
2. Providing recipe ideas (salads, sushi, garnish on main dishes)

3. Using the Seafood Guide, describe the optimum storage conditions and temperatures for: live crustaceans, chilled fish, cooked shellfish, live mussels - oysters and scallops (4 marks)

Live crustaceans – 4 – 8 Celsius
Chilled fish, cooked shellfish – 0 – 4 Celsius (ideally as close to 0 as possible)
Live mussel, native oyster and scallops – 4 – 8 Celsius

4. Using the Seafood Guide, summarise the appropriate recommendations to consumers for handling and storage of fresh fish prior to consumption. (4 marks)

Shellfish should be handled carefully and should not dry out. They should be stored at constant temperatures, live shellfish should be stored 4-8'C which is a typical domestic fridge temperature. Ideally live shellfish should be placed in a bowl covered with a damp cloth at the bottom of the fridge. Net bags will allow air to circulate around the shellfish and also water to drain as they open and close.

Customer Service

5. Using the Seafood Guide, summarise the appropriate recommendations to consumers for handling and storage of frozen fish prior to consumption, including recommended storage temperatures. (4 marks)

Frozen fish should be stored in the freezer at least -18'C, labelled, and should be well wrapped in proper freezer bags sealed and ideally eaten within a 1-3 months to avoid freezer burn.

Defrosting frozen fish should be done slowly overnight in the fridge. Frozen products should be put on a tray or plate and covered with plastic film, excess meltwater should be removed.

Thawed fish should be treated like chilled fish.

RETAIL & DISPLAY

Retail & Display

LEARNING RESOURCES

Read:

Reference fish labelling Regulations 2013
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/245013/pb13760-fish-labelling-regs-guidance.pdf

Seafood Freshness Quality
http://www.seafish.org/media/publications/seafishfactsheet_seafoodfreshnessquality_201101.pdf

Seafish – Buying Seafood
http://www.seafish.org/eating-seafood/buying-seafood/buying-fresh

Retail & Display

1. Explain the six labelling regulations required by law when selling seafood to customers. (6 marks)

Every product must have a sticker, which should state: product description, price per 100 grams, price per kilo, provenance message, average price per portion, legal declaration/ price per pound.
On the back of each label should be EAN barcode, product description, display until date boxes, CQ order number and price look up code.

2. Describe six processes involved in setting up a fish counter (6 marks)

Examples include:

1. A good set up needs a good close down night before, careful packing of product/ storage, sanitising counter etc
2. Ice counter should be compact to prevent ice shrink, no higher than the counter sides
3. When displaying fish/ shellfish consider how attractive this will look use symmetry and fanning of fillets (alternating side displayed), breaking up colours while always maintaining temperature control, do not display fish piled up and maintain ice contact (with film membrane barrier as required)
4. Display products according to value, the higher value most visible. On a typical counter this means cheaper products at the front and lower down; most valuable higher and at the back of the counter/ counter section.
5. Promotions should be front and centre of the display. Consider grouping the display of different formats of fish together e.g. whole salmon, whole fillets, salmon steaks and salmon fillet portions.
6. When displaying whole fish/ fillets start in a lower corner and build the display sections from here to prevent slippage down the counter.
7. Display pelagic fish together and consider counter position as they may bleed; take particular care regarding temperature control and the development of histamines, ensure direct ice contact and only display as a single layer. Again fanning whole fish looks attractive. Remember to top up ice throughout the day.
8. If marinated products are being sold, use bowls buried in ice at back of counter to minimise drip on other products, displayed with other ready to eat separated from raw products.
9. Raw shellfish should be kept separate (consider allergies/ religious beliefs), using bowls in ice or shells buried in ice to maintain temperature control.
10. Raw value added products should have their own section on the counter and should be displayed on film membrane, if not suitable to be displayed in a bowl buried in the ice such as kebabs.

Retail & Display

11. A further separate section should be set up for smoked fish again displayed on a film membrane. Membrane should also be used to prevent transfer of colour between dyed and natural smoked products. Only displayed single layer for direct ice contact do not top ice or spray smoked fish.
12. Carefully code and display tickets, regularly top ice and spray (with cold water and ice) throughout the day as required.
13. The use of baskets, trays, dividers and vegetation such as paisley or kelp can be used to separate products.

3. Explain the importance of hygiene on the fish counter. (4 marks)

1. Poor hygiene can lead to cross-contamination, your customers getting sick and not returning to your place of work.
2. Cleanliness helps to prevent cross-contamination and spread of germs, and makes the products look attractive and ready to sell.
3. High standards in hygiene (food safety) minimises the risks associated with the growth of pathogenic bacteria (causing sickness for customers) and food spoilage bacteria (helping to maximise quality and shelf life)
4. Poor food safety leads to cross contamination; loss of customers and customer confidence and the whole business' reputation.

4. Explain the importance of temperature control when setting up the fish counter. (2 marks)

Temperature control is the single most important element of the spoilage equation fresh seafood should be stored as close to 0°C as possible from the point of catch, slaughtering and through all sequences of the supply chain.

It is important to remember that any loss of quality due to poor temperature control cannot be gained back by subsequent improved handling, and that for every 5°C rise in fish storage temperature, the shelf life more than halves.

5. Explain the importance of promotions, include sitting, space allocation and point of sale material. (4 marks)

1. Promotions can encourage your customers to purchase more seafood that they came into buy!
2. Promotions may encourage customers to purchase products that they would not normally try.

Retail & Display

3. Promotional seafood can be used to sell seafood that has a shorter best before date, or when you have high volumes to sell.
4. Promotional products should be an eye-catching place (usually front and centre of the display), easy to access, well signed using a big or bright sign. They should take up more space than they would normally have.

6. Explain the importance of the display cleaning schedule and how this is monitored and maintained. (4 marks)

The cleaning schedule identifies:
1. all working/ display/ storage/ sales areas
2. details the cleaning that is required
3. how this should be carried out, using which tools and chemicals (dilution rates) and the frequency this should be done;
4. monitored using simple rota,
5. checklist (documented),
6. who is responsible for the work, and
7. who should check this has been done correctly.

Thorough cleaning of the work area is one of the critical control points that minimises the risk of food safety problems issues. By following a professional cleaning schedule and documenting the cleaning has been undertaken and business can protect itself from prosecution by using the 'due diligence' defence.

7. Design your own seafood display using the diagram. Label the counter where you would place the following items: catch of the day, on special offer, cooked shellfish, sea vegetables, stock that is two days old, large whole fish, small whole fish and already filleted products. Explain why you have chosen that place below. (10 marks)


QUALITY
ASSESSMENT

Quality Assessment

LEARNING RESOURCES

Quality Assessment

Watch:

Seafood Quality Assessment Systems (videos 1 – 4)
https://www.youtube.com/watch?v=9No0yWcQ78w&list=PLjmL1YNydu1EKxilnxGWrJMaB_5Gw9o2u

Seafish Training: Health and Safety
https://www.youtube.com/watch?v=fzPbxBqfFis&list=PLjmL1YNydu1GzUti-rmjNtdjFbaXI5FTP

Read:
Seafood Freshness Quality
http://www.seafish.org/media/publications/seafishfactsheet_seafoodfreshnessquality_201101.pdf

Seafish – Buying Seafood
http://www.seafish.org/eating-seafood/buying-seafood/buying-fresh

Seafish Sensory Assessment Scoresheets
http://www.seafish.org/media/Publications/sensory_assessment_scoresheets_14_5_10.pdf

HACCP

Watch:
Seafish Training: Hygiene in the Seafood Industry
https://www.youtube.com/watch?v=ZeBoQN4azxQ&list=PLjmL1YNydu1Gu6iNTYbdf05LAPE_JNN2I

Read:
An Introduction to Hazard Analysis Critical Control Point
http://seafoodacademy.org/pdfs/haccp-olm-segment.pdf

Quality Assessment

1. Outline the main causes of fish/shellfish spoilage (2 marks)

Spoilage occurs as soon as the fish dies.
Enzymes and bacteria are the main causes of deterioration in seafood, however, autolysis (triggered by enzymes) and oxidation of natural fats and oils also play a part. Elevated temperatures and excessive/ careless handling will speed up the rate of deterioration.

2. Why might handling and temperature control impact fish/shellfish quality? (2 marks)

1. Poor handling and temperature control can encourage bacteria growth and the flesh breaking down with natural enzymes.
2. Spoilage occurs as soon as the fish dies, therefore the time and distance the seafood has travelled will have an impact on the quality.
3. Careless handling can bruise flesh and break the connective tissues between muscle blocks and cause gaping in fish fillets. This reduces quality and potentially accelerates spoilage.
4. There is a direct link between shelf life and temperature control. For every 5°C rise in fish storage temperature, the shelf life more than halves.

3. Describe how to use TORRY and QIM quality assessment techniques. (4 marks)

TORRY – is for cooked, raw, whole and filleted species. TORRY rates different attributes of the seafood based on a points system of 0 – 9 (9 being the best score, 6 being not fit for consumption).

QIM – is only for whole, raw species but covers more species than TORRY. It works on a scale of 0-3 (with 0 being the best). The lower the overall number of points, the better quality.

Both TORRY and QIM use the sensory measures (smell, feel, look) to examine the quality.
In Torry and QIM the score is used to estimate the 'days on ice' of the seafood and (QIM only) estimate the remaining shelf-life. All the schemes have been developed using seafood that has been produced according to good manufacturing practice (i.e. held in melting ice since capture). This makes it possible to identify seafood that shows atypical characteristics or which appears to have spoiled more quickly than expected, which can be linked to poor practices such as high temperature spoilage, inadequate icing etc.

Quality Assessment

4. Explain what is meant by sensory assessment and name three of the sensory assessments commonly used. (3 marks)

Using the appearance and/or properties of raw seafood enables the freshness quality to be determined i.e. freshness quality measurement. Sensory assessment relies on using the appearance, odour and texture of the seafood to derive an overall score.

Several sensory assessment methods have been used in the UK over the past 37 years. These include the Torry Sensory Assessment scheme, the European E-A-B scheme and the Quality Index Method.

5. Describe four similarities and differences between the principles of the TORRY and QIM quality assessment techniques. (4 marks)

Similarities
Both TORRY and QIM use the sensory measures (smell, feel, look) to examine the quality.
In Torry and QIM the score is used to estimate the 'days on ice' of the seafood.

Both schemes have been developed using seafood that has been produced according to good manufacturing practice (i.e. held in melting ice since capture). This makes it possible to identify seafood that shows atypical characteristics or which appears to have spoiled more quickly than expected, which can be linked to poor practices such as high temperature spoilage, inadequate icing etc.

Differences
QIM estimates the remaining shelf-life, but TORRY does not.
QIM is only for whole, raw species, TORRY uses cooked, raw, whole or filleted
The points system is different.
There are more species which can examined using TORRY

6. Explain what spoilage bacteria is.

Spoilage bacteria are microorganisms that cause the deterioration of food and develop unpleasant odors, tastes, and textures.

A spoiled food has lost the original nutritional value, texture or flavor and can become harmful to people and unsuitable to eat.

Quality Assessment

6. (continued)
Spoilage bacteria are able to grow in large number in food, decompose the food and cause changes in the taste/smell, which affect the quality of the products.

Spoilage bacteria normally do not cause illness; however, when consumed in high concentration, they can cause gastrointestinal disturbance.

7. Complete the following table

Problem	Cause	Impact
Badly gutted fish	Bad practice on-board fishing vessel Bad practice on a fishmonger's counter	Accelerated spoilage from gut contents, poor quality fish product. Bad taste for customer!
Squashed and distorted fish	Overfilled boxes, fish not laid out before icing (poorly/ handled boxed), trawled fish (full cod end)	Slower to process and poorer yields. Loss of texture may effect 'mouth feel' for consumer.
Softer than usual fish flesh	As above, seasonality (flesh softer during spawning season)	As above
Gaping flesh in the final product	Fillets handled carelessly; seasonality also effects gaping i.e. they are more likely to gape when spawning as nutrients to roe rather than replenish flesh	Fillets look less attractive; effect on portioning/ mouth feel for consumer. This also happens when quality is lost/ spoilage so may be associated as such.
Red spots or bruises in flesh of products	Bleeding occurs when the fish are still alive so is associated with the harvesting/ primary processing stage. This typically takes place in the trawling process or when the fish are brought on board deck and poorly handled	This is a visual impact which the consumer will reject so causes a loss of yield.

Food Safety & HACCP

Food Safety and HACCP

LEARNING RESOURCES

HACCP

Watch:

Seafish Training: Hygiene in the Seafood Industry
https://www.youtube.com/watch?v=ZeBoQN4azxQ&list=PLjmL1YNydu1Gu6iNTYbdf05LAPE_JNN2I

Seafish: Scallop Food Safety
https://www.youtube.com/watch?v=PopQe9OozWU

Read:
An Introduction to Hazard Analysis Critical Control Point
http://seafoodacademy.org/pdfs/haccp-olm-segment.pdf

Seafish: HACCP Training Folder
http://seafoodacademy.org/pdfs/haccp-training-folder-contents-v2.pdf

Food Safety & HACCP

1. In HACCP terms., what are food hazards? (2 marks)

Food hazard: a biological, chemical or physical agent that is reasonably likely to cause illness or injury in the absence of its control.

There are **four types of hazards** to consider:
Microbiological hazards
Microbiological hazards include bacteria, yeasts, moulds and viruses. Some of these are pathogens or may produce toxins.
Chemical hazards
Chemical hazards include water, food contact materials, cleaning agents, pest control substances, contaminants (environmental, agricultural and process e.g. acrylamide), pesticides, biocides and food additives.
Physical hazards
Physical hazards include glass, packaging, jewellery, pest droppings, screws etc.
Allergens
This refers to the risk associated with the unintended presence of one or more of the 14 EU listed food allergens, due to cross-contamination.

2. What is HACCP and why is it needed? (2 marks)

Hazard Analysis and Critical Control Points or HACCP is a systematic preventive approach to food safety from biological, chemical, and physical hazards in production processes that can cause the finished product to be unsafe, and designs measurements to reduce these risks to a safe level. In this manner, HACCP attempts to avoid hazards rather than attempting to inspect finished products for the effects of those hazards. The HACCP system can be used at all stages of a food chain, from food production and preparation processes including packaging, distribution, etc.

3. What is the difference between safe seafood and quality seafood (2 marks)

Safe seafood means that it will not cause the person consuming the fish any harm / health problems. This can be linked to ‘use by dates’ (see below) if kept under temperature control.

Quality seafood refers to seafood that is of a good or excellent standard, and tastes how it should. Quality seafood has a close link to freshness and requires fishmongers to operate high standards of food safety, temperature control and stock rotation.

Food Safety & HACCP

4. Name two species classed as 'a higher risk seafood' (1 mark)

Any example can be provided, so long as it is accurate. For example: tuna, mackerel, herring are susceptible to histamine at elevated temperatures, therefore care should be taken to store them correctly. Oysters are consumed raw, therefore, the risks are higher.

5. Explain the importance of holding induction and on-going training of staff for Food Safety and HACCP.

There are a number of reasons why suitable training of food handlers is important:

1. **Mistakes when handling food can cause food poisoning.** This may result in severe illness or in extreme cases the death of the person who has eaten infected food.
2. **Ignorance of hygiene rules can cost money.** It can lead to civil claims for compensation from dissatisfied customers, unnecessary wastage of food due to spoilage and fines resulting from legal action where hygiene laws are broken or sub-standard food has been sold. In some cases it can even lead to the closure of food businesses.
3. **The Food Safety (General Food Hygiene) Regulations 1995 require proprietors of food businesses to ensure.**

Food handlers are supervised and instructed and/or trained in food hygiene matters commensurate with their work activities. This means the level of training given should be appropriate for the type of work the food handler is required to do.'

6. Explain what the difference is between the 'best before date' and 'use by date'.

Use by date is about safety
Use by date is about safety and the most important date to remember! Foods can be eaten (and most can be frozen) up until the use by date, but not after. You will see use by dates on food that goes off quickly, such as meat products or ready-prepared salads. For the use by to be a valid guide, you must carefully follow storage instructions.

Best before date is about quality
Best before date is about quality and not safety. The food will be safe to eat after this date but may not be at its best. Its flavour and texture might not be as good. The best before dates appear on a wide range of frozen, dried, tinned and other foods. The best before date will only be accurate if the food is stored according to the instructions on the label.


NUTRITION

Nutrition

LEARNING RESOURCES

Read:
Fish a food
https://en.wikipedia.org/wiki/Fish_as_food

Seafish – Health benefits
http://www.seafish.org/eating-seafood/seafood-for-health/health-benefits

NHS - Fish & Shellfish in your diet
http://www.nhs.uk/Livewell/Goodfood/Pages/fish-shellfish.aspx

Scombrotoxin – Histamine
http://www.foodsafetywatch.org/factsheets/scombrotoxin-histamine/

NHS - Fish & Shellfish in your diet
http://www.nhs.uk/Livewell/Goodfood/Pages/fish-shellfish.aspx

Nutrition

1. Name three things omega-3 fats help with? (3 marks)

1. They help the heart to work normally
2. They help maintain normal blood pressure
3. They help maintain blood triglyceride levels
4. DHA contributes to normal brain development in babies
5. DHA contributes to normal eye development in babies
6. DHA maintains normal brain function
7. DHA maintains normal vision

2. Give three examples of groups of people who need to take care with fish and shellfish, explain the reasons why and what their limitations are. (3 marks)

1: The general population shouldn't have more than four portions of oily fish a week
2: Pregnant and breastfeeding women, and those planning a pregnancy should have no more than two servings of oily fish a week because pollutants found in these fish may affect the future development of a baby in the womb.
3: Children, pregnant women and women trying to get pregnancy should avoid swordfish, shark and marlin as they contains more mercury than other fish. Other adults should eat no more than one portion of these fish a week.
4: Anyone who eats a lot of fish should avoid eating sea bream, sea bass, turbot, halibut, rock salmon and brown meat from crabs as they can contain similar levels of pollutants as oily fish
5: If you are pregnant or trying for a baby you shouldn't have more than four cans of tuna a week as it contains more mercury than other fish.

3. You want to put up a sign in your shop that talks about the benefits of omega-3 fat. What do you need to do?

You need to check that all the statements you make comply with the EU Nutrition and Health Claims regulation.

4. A customer tells you they need to avoid gluten. Outline the specific ingredients they need to avoid (1 mark)

Anything containing wheat (including spelt), rye, barley or oats.

5. What nutrients do fish provide? Give some examples.

All fish contain protein and most supply phosphorus, selenium and vitamin B12. Different varieties provide different vitamins and minerals, too, for example, white fish provide potassium and B vitamins; shellfish contain copper, zinc, iron and iodine; and oily fish contain vitamin D.

Nutrition

6. Describe what you should do when a customer asks about a question relating to dietary concerns and consumption of seafood? (2 marks)

Fishmongers should be aware of the health benefits of eating at least two portions of fish a week and be ready to explain these:

http://www.seafish.org/eating-seafood/seafood-for-health/health-benefits

However, they should not be expected to answer specific medical questions/ concerns.

RECIPES & COOKING

Recipes & Cooking

LEARNING RESOURCES

Read:
Fish Easy
Mitch Tonks

Fish & Shellfish / Seafood Odyssey
Rick Stein

Leith's Fish Bible
Caroline Waldegrave & CJ Jackson

Fish
Mat Follas

Fresh Fish
Jennifer Trainer Thompson

200 Fab Fish Dishes
Gee Charman

Hook, Line and Sinker
Galton Blackiston

Fish Without a Doubt
Rick Moonen and Roy Finamore

Passion for Seafood
Gordon Ramsay

Simply Fish
Fishmongers' Company and Steve Pini

Recipes & Cooking

1. Describe how to cook fish 'en papilotte' style (1 mark)

A fast method of cooking 'en papilotte' is cooked at a high temperature – the seafood to be cooked is wrapped securely in a paper case or in foil parcel with or without a squeeze of lemon. This method is a combination of baking and steaming as the fish cooks in its own juices.

2. Describe the potential problem with cooking seafood on the barbeque (1 mark)

It is a fast and furious method and it is therefore essential it is performed with care, as over-cooked, the seafood will dry out in the intense heat of a BBQ.

3. One of our customers would like to cook seafood using a healthy technique. Suggest a couple of ways in which they could do this. (3 marks)

Healthy and quick methods of cooking fish include roasted / baked, steamed, grilled, en papilotte, barbeque or even stir-fried if using a small amount of a healthier oil such as coconut butter.

4. Provide a healthy recipe a parent could prepare for their young children (6 marks)

A recipe that is easy to eat and that would allow children to consume small, bite-sized pieces would be appropriate, such as homemade fish fingers.

5. Provide a recipe that a customer could prepare for a dinner party (6 marks)

A recipe that is more formal or that can impress the guests would be appropriate, such as salted fish or 'en papilotte' style.

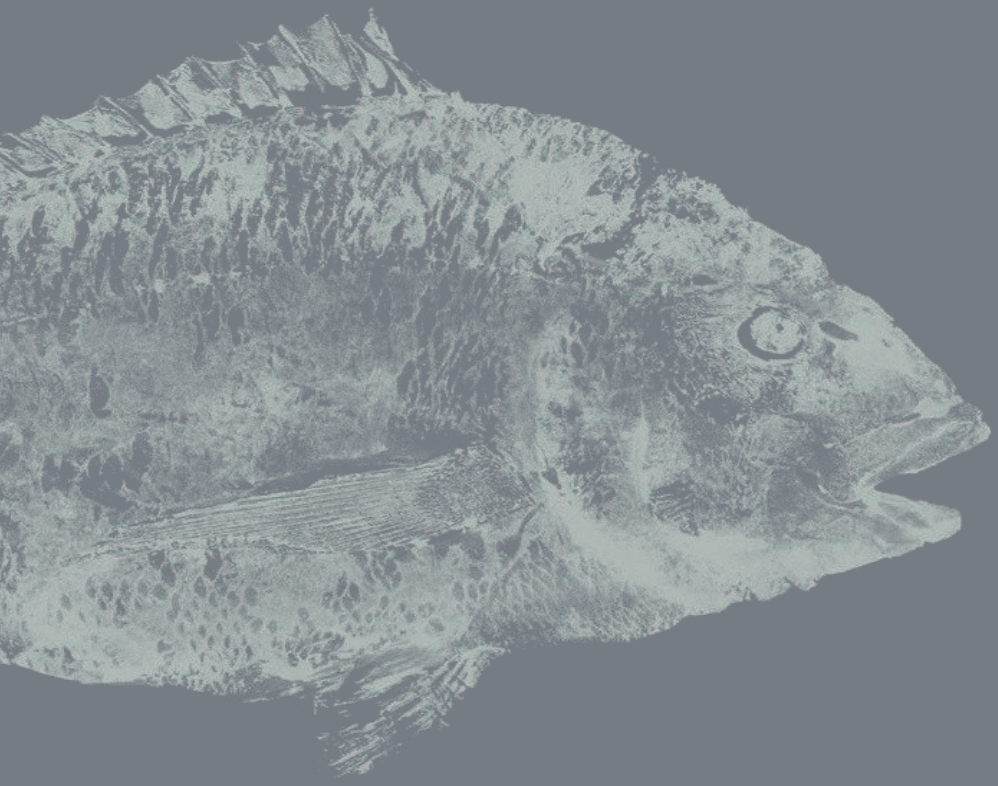
Useful Contacts

General Programme Enquiries
The Master Fishmonger Standard
The Fishmongers' Company
Fishmongers' Hall
London Bridge
London EC4R 9EL

www.masterfishmonger.co.uk
MFS@FishHall.org.uk
020 7626 3531

MFS Preparation Course and Examination Enquiries
Seafood School at Billingsgate
Office 30, Billingsgate Market
Trafalgar Way
London
United Kingdom
E14 5ST

www.seafoodtraining.org
admin@seafoodtraining.org
020 7517 3548



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