

Responses to the Self Assessment Questions

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SAQ1 The most important properties which are changed are flavour, texture and appearance.

Changes which occur in the water and fat content and the bacteria and enzyme concentration all help to determine these 3 main effects.

SAQ2 The main effects of adding salt are:

- To cause water to be drawn out of the flesh;
- To cause salt and water in the flesh to combine.

This results in reduced chemical decomposition as well as reduced bacterial action.

SAQ3 You must add pure dry salt. Do not try to increase the strength by adding 100° brine.

SAQ4 The heat exchangers can be placed so that the smoke temperature does not greatly vary across the chamber;

The humidity and the chemical content can be controlled by introducing a mixture of smoke and air which is in part freshly introduced into the chamber and partly recirculated.

SAQ5 Sawdust is preferred because it does not allow air to penetrate within the pile of fuel so easily. It therefore smoulders rather than flares which would be likely to occur if wood chippings were used.

The slow smouldering fire gives off smoke which contains more flavouring and preserving chemical substances.

- SAQ6** CAP is a vacuum pouch technique whereby the fish, which may or may not be supported on a tray, is inserted into a plastic pouch. The air is withdrawn and replaced by a mixture of gases. The end is then heat sealed. CAP prolongs the shelf life of the product.
- SAQ7** The three processes which cause fish to spoil are:
- Chemical decomposition;
 - Bacterial action;
 - Oxidation.
- SAQ8** The reaction of the surface flesh with the salt in the brine leaves an attractive glossy finish on the surface of the fish.
- SAQ9** The amount of salt accumulated in the flesh of the fish will depend upon:
- The size and thickness of the fish ;
 - The strength of the brine ;
 - The length of time the fish is left in the brine ;
 - The fat content.
- SAQ10** During the smoking operation tarry droplets can accumulate in the ducts causing a fire risk or, at least, affecting the product. The amount deposited will depend upon the particular process being carried out. It will require more frequent cleaning after hot smoking processes rather than after cold smoking.
- SAQ11** PAH substances are known to be harmful in high concentrations. It is therefore very important to know what quantities are present in the smoked products.

SAQ12 Enzymes help chemical reactions to take place. When enzymes are present therefore the chemical decomposition of the fish tissue will occur more easily.

In particular if enzymes are released from the gut into the flesh spoilage will quickly result.

SAQ13 A quality grading system is necessary in order that the person who fails to sell a quantity of fish will know that, if all the fish are at least equal to or better than a minimum standard, he will obtain a defined amount of compensation. In addition a buyer of a quantity of say E quality fish will know that:

- There will be either a fresh seaweedy odour or at the worst no odour at all;
- The fish will not be physically damaged;
- The fish will have spent no more than 3 days in ice.

SAQ14 If the flesh is left in a wet condition it is likely to rapidly turn stale.

SAQ15 Even air flow is obtained by:

- The inclusion of vertical splitters and aerofoil sections in the top section;
- A precise diffuser wall at the input to the smoking chamber;
- A diffuser wall at the outlet end. If the kiln is not fitted for reversing the flow of air this second diffuser design is not critical.

SAQ16 People who handle food must make sure that they reduce as far as possible the risk of passing on to the food harmful bacteria. Since we all may have such bacteria in our respiratory tracts and in our intestines the need for the correct use of special clothing and toilet facilities is very important.

SAQ17 It is necessary to reduce the possibility of bacteria entering the flesh, multiplying there and causing spoilage.

To achieve this every effort must be made to:

- Keep the temperature of the fish as low as possible consistent with the stage of handling;
- Make sure that the skin of the fish is kept intact;
- Make sure that the gut cavity wall is not perforated and that the guts are intact.

Much of the bacteria on both the skin and in the gut cavity can be removed by washing. This is covered more fully in Segment Three.

SAQ18 You must remember that a number of factors go towards determining the quality grading of a fish. However since we are considering only the information given then:

1. The cod would be in category E;
2. The haddock would be in category A;
3. The herring would be in category B.

SAQ19 Although other devices may be used to drain the products the most suitable are:

1. Butchers Hook;
2. Speat;
3. Tenter Stick;
4. Butchers Hook;
5. Mesh Tray.

SAQ20 The main advantages are:

- The time in which the unit is not usefully employed is reduced. This is known as the 'down-time';
- The automatic smoke unit does not require to be manned by a skilled operator.

SAQ21 If the two foods are in close proximity or worse still in contact then cross contamination can occur.

The fresh fish if ungutted could contaminate the smoked product with bacteria. These could multiply and lead to spoilage and cause a health hazard.



Remember that a hot smoked product is often eaten without further cooking.

The smoked fish could contaminate the fresh fish with both colour and smell.

SAQ22 To prevent the quality of the fish in storage from deteriorating the following conditions must be provided:

- The temperature of the fish must be kept down to about 2°C by whatever means are available e.g. ice, chill rooms etc;
- The fish must be packed and stacked carefully to avoid physical damage;
- The storage place should be free from sources of infestation e.g. insects, rodents etc.

- SAQ23**
1. The haddock would be left whole. The head and gut removed and the gut cavity cleared out. The washed fish would then be tied in pairs by their tails.
 2. The herring should have their head and long gut removed and then rinsed thoroughly.
 3. Cod Roes require only to be thoroughly washed but take care not to burst the skins when handling them.
 4. The salmon is first cut around the gills and through the backbone to remove the head.

A pair of fillets is cut from the backbone but the shoulder bones and lugs are attached to the fillets if they are to be hung but not if, as is more usual, they are to be placed on trays.

The covering skin and the belly bones are then removed.

Finally the fins are removed.

Remember throughout all preparations thorough washing with running water and good personal hygiene are essential.

- SAQ24** The 3 stages are for the fish to spend:
1. A period of time at 30°C for drying to take place;
 2. A partial cooking period at 50°C;
 3. A final cooking period at between 70°C and 80°C.

SAQ25 The inlet damper controls the amount of air being drawn over the smouldering sawdust. This then controls the combustion which is taking place. i.e. the speed at which the sawdust is burning and the amount and temperature of the smoke.

SAQ26 The most common source of mould spores is the air around the smoked fish.

The other likely source is the smoke itself particularly if it is produced from damp sawdust.

To prevent the spores growing into a mould the product should be kept as dry as possible particularly by cooling before packaging.

SAQ27 You should have ticked items 1 and 3 in the SAQ.

A high temperature such as is used in hot smoking (70 – 80°C) will kill bacteria. The chemicals phenol and formaldehyde, and to a lesser extent the tar droplets in the smoke, will all kill bacteria.

You may have ticked item 2 but in fact most smoking processes do not remove enough water to kill the bacteria although they may slow down their growth and multiplication.

SAQ28 There are very few products which need to lose the considerable quantities of water that requires dry salting.

Most products are adequately salted by the quicker process of brining.

SAQ29 If the product is packed in a warm condition mould is encouraged to grow.

SAQ30 This device cools the smoke and the more volatile substances are then less likely to flare.

SAQ31 You should have given any three of the ten stated on page 77.

Note that these ten could be grouped into

- Containment and protection of the product ;
- Handling, storing, displaying the product ;
- Attraction of the display due to labelling and packaging.

SAQ32 Three effects of a high temperature are:

- The fish is cooked;
- Enzymes are destroyed;
- Surface bacteria are killed;
- Water content is reduced.

All of these are good preservative effects.

SAQ33 The most important effects of brining are:

- Flavour ;
- Appearance: The product has a glossy sheen;
- Preservation: This is more important in some products, for example, mackerel, than in others. This is dealt with later in this segment.

SAQ34 If drying occurs too quickly due to excessive movement of warm air past the fish or due to a temperature which is too high then hardening of the outer layer occurs. This is called case hardening and it prevents the further entry of smoke chemicals and the exit of water from the product. A wet layer under the surface will cause the product to spoil from the inside.

- SAQ35**
- If the kiln is being used when the outside weather is humid and warm then air, drawn into the kiln, will not be sufficiently heated to rise rapidly. Because this causes little draught the smoke is slow in rising up the chimney and may cool sufficiently to start falling again.
 - The second cause of a down draught occurring is the rush of air into the top of the chimney caused by a sudden gust of wind.

In both cases down draughts often disturb the smouldering fires on the floor of the chimney. The ash, which is blown about, can spoil the fish hanging above the fires.

SAQ36 By pre-packing the products they can be:

- Placed in an unmanned chilled cabinet;
- Handled by the customer along with other groceries without additional packaging being required;
- Clearly seen by the customer;
- Clearly labelled with the essential information regarding weight, price and sell by date.

SAQ37 If the temperature is kept below 30°C this will make sure that the product will not be cooked during the smoking process.

SAQ38 The strength of the solution will change as water and impurities enter the brine and salt is removed.

- SAQ39** The fish will lose weight during the smoking process. Therefore the amount of salt present in the fish after brining is a smaller percentage than after the smoking process.
- SAQ40** The rotary hood serves two purposes:
- It prevents rain, snow etc. entering the chimney;
 - Because it is fitted with a fin it swivels in the wind so that the opening is never facing the direction from which the wind is blowing. Sudden gusts of wind cannot enter the chimney to cause down draughts.
- SAQ41** The smoke may:
- Cool as it moves further from the smoke producing unit;
 - Become more humid as it gathers moisture from the drying fish;
 - Lose some of its' chemical substances as they enter the fish.
- SAQ42**
1. Softwoods, such as pine spruce, fir, etc. give the best colouring.
 2. Hardwoods, such as oak, beech, cherry etc. give the better flavours.