

W H I T E F I S H A U T H O R I T Y

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White Fish Authority,
Sea Fisheries House,
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TECHNICAL REPORT 104

Specifications for the freezing and packaging
of oyster meats and oyster products

SPECIFICATION 1

THE FREEZING AND PACKAGING OF
OYSTER MEATS

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White Fish Authority,
10 Young Street,
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SPECIFICATIONS FOR THE FREEZING AND PACKAGING
OF OYSTER MEATS AND OYSTER PRODUCTS

SUMMARY

This report is a collection of six specifications developed by the Authority to assist oyster processors and product manufacturers. The recipes and procedures are based on work conducted by the Authority's Market Development Unit to a point at which interested firms can sophisticate the products to suit their own systems and requirements.

Editors wishing to republish these specifications in full or in part must make full acknowledgement to the White Fish Authority.

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White Fish Authority Concerning the Freezing and
Packaging of Oyster Meats and Oyster Products.

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SPECIFICATION 1

FREEZING AND PACKAGING OF OYSTER MEATS

FOREWARD

This specification has been drawn up by the White Fish Authority to assist processors and growers who are interested in removing the oyster meats from their shells and freezing them, possibly for further processing. The processing procedures are based on work conducted by the Authority's Market Development Unit, but no attempt has been made to sophisticate the process as it is assumed that this will be done in any case by interested processors to suit their own requirements. The advantages of removing the oyster shells and freezing the meats are that the meats may be frozen when they are in prime condition, but can be utilised all the year round. By shucking and freezing at the oyster growing site, transport costs are reduced, because of the decrease in weight and it avoids the problem of opening the oysters at the point of consumption or further processing.

1. THE RAW MATERIAL

1.1. The Oyster

The oysters used by the Authority are Pacific oysters (*Crassostrea gigas*) but the specification can also be applied to other oysters such as the native oyster (*Ostrea edulis*). The Pacific oysters used were 18 to 24 months old, weighing between 50 and 70 grammes in the shell with an actual oyster meat weight of about 15/20 grammes.

1.2. Purification

Before shucking, the oysters should be purified to reduce the level of bacteria. This is done by placing the oysters in tanks of cleansed water for 36 hours. The water is cleansed either by subjecting it to ultra violet irradiation or by adding free chlorine to the water and then chemicals which remove the excess free chlorine. At the end of the purification process the bacteriological standard of the oyster meats should be 0 - 5 *E. coli* per millilitre of oyster flesh and no *Salmonella* present. These standards however are not statutory.

1.3. Shucking

Fresh oysters must first be shucked - removed from their shells - before processing.

1.3.1. Shucking at the present time is a hand operation.

The oysters should be placed in warm sea water, 70°C (158°F) for 2 to 3 minutes to relax the muscle, so that it is easier to insert the knife. It is important that the length of time that the oysters are in water is closely controlled otherwise if they are left in the warm water too long the meat will tend to cook. The oyster meat must be removed by cutting the abductor muscles, which attach it to the shell, as close to the shell as possible so as not to damage the meat. This operation requires skilful, hygienic handling to prevent any dirt being wiped onto the muscle. It is important not to allow an excess loss of liquor as this is used in various recipes.

1.3.1. The Industrial Development Unit of the White Fish Authority is at present working on a prototype shucking machine, which works on the principle of slicing off a piece of the bill-growing end of the shell and inserting a flexible knife to cut the muscle away from the top shell and lift off the shell. The meat is then removed from the bottom shell by hand.

1.4. Removal of Liquor

The liquor from the oysters should be separated from the meats by draining it into a collection vessel. The liquor should then be strained to remove any particles of meat or shell. These two operations may be combined.

1.5. Washing

After shucking, the oyster meats should be washed in cold running water to remove all traces of shell.

1.6. Storage

After shucking, the oyster meats must be kept at chilled temperatures during transport and storage, i.e. at 0°C (32°F) to 4°C (39°F). The period between shucking and processing should be no more than 60 hours. If storage is any longer the oysters lose their flavour.

2. FREEZING OF THE OYSTER MEATS

Freezing should be carried out as soon after shucking as possible, preferably immediately.

Before freezing, the oyster meats should be checked to ensure that they are free from any shell particles.

Oyster meats, which are intended for battering and breading or battering should be drained of all their liquor and moulded before freezing. For all other products the oyster meats should be frozen with their liquor either individually or in blocks.

Oyster meats can be quick frozen in an air-blast freezer, plate freezer or nitrogen freezer.

2.1. Air-Blast Freezer

Air-blast freezers are either part of a batch or continuous operation.

2.1.1. In a batch operation the oyster meats should be laid in layers on trays so that air freely moves all about them, and loaded onto trolleys.

2.1.2. In a continuous operation the oyster meats should either be loaded onto trolleys or onto a conveyor belt which passes through the air-blast tunnel.

Whichever method is used, air temperatures should be constant and within the range -40°C (-40°F) to -30°C (-22°F) giving freezing times of about 30 minutes. At the end of the freezing time the temperature at the centre of the oyster meats should be -18°C (0°F).

2.2. Plate Freezer

Oyster meats can either be block frozen, or individually frozen in a plate freezer.

To be individually frozen the oyster meats can be placed in compartmented trays, which are then placed between the plates of the

freezer. Oysters are block frozen by packing them closely together in rectangular frames. Whether the oyster meat is block or individually frozen it is important that each pack is the same size and the surfaces are completely flat so that there is full contact with the cold plates.

With the plate freezer operating at -30°C (-22°F) the freezing time should be about one hour. At the end of this time the temperature at the centre of the block or individual meat should be -18°C (0°F).

2.3. Nitrogen Freezer

Oyster meats can be frozen in a nitrogen tunnel. The operating conditions will however depend on the type, size etc. of the tunnel. The conditions should be such that at the end of the freezing time the temperature at the centre of the oyster meat is -18°C (0°F).

Oyster meats have been frozen in an air-blast freezer and a plate freezer under the conditions described. In each case the individual oyster meats were placed into the separate compartments of a white 10 thou. high impacted polystyrene "egg box" type oyster tray lined with polythene. These are supplied by Robinson Thermoforming, Yate, Nr. Bristol.

3. GLAZING

The oyster meats can be glazed after freezing by dipping the meats in a tank of cold water.

4. PACKAGING OF FROZEN OYSTER MEATS

The frozen oyster meats should be so packed that they are protected from deterioration during cold storage and transport. The packaging material should provide a barrier against oxygen diffusion or flavour deterioration will occur and it should also be a water vapour barrier to prevent dehydration during cold storage.

The frozen meats have been packed by the Authority in the white "egg box" high impact polystyrene/polythene oyster trays, which are lidded with polythene lids and heat sealed, each tray holding ten oysters. These trays have also been placed into pouches of 60 gauge oriented polypropylene film adhesive laminated to 100 gauge polythene (Metathene PA.0610) and heat sealed. The oyster meats have also been packed directly into these pouches which are supplied by the Metal Box Co. Ltd.

Frozen oyster meats have also been packed into polystyrene boxes with clear high impacted P.V.C. lids supplied by Timpak, Foundry House, Saxthorpe, Norwich, the size of the boxes being 11" long x 6" wide x 3" deep.

5. STORAGE AND SHELF-LIFE

The quick frozen packed oyster meats should be immediately transferred to cold storage, after they have been processed. Preferably the cold store should be operating at -30°C (-22°F), when the oyster meats can safely be stored for six months without loss of flavour or discolouration. If however the cold store is operating at -18°C (0°F) frozen oyster meats can only be stored safely for three months without some kind of deterioration.

It is important not to allow the temperature of the cold store to fluctuate, otherwise the shelf-life of the oyster meats will be reduced.

6. FINAL PRODUCT

The frozen oysters should be thawed under chill conditions and can be served raw in the half shell.

The frozen oyster meats may also be used for further processing.

7. BACTERIOLOGICAL STANDARD

Frozen oyster meats should contain preferably no colonies of *E. coli* per millilitre of tissue and certainly no more than two colonies of *E. coli* per millilitre of tissue. No colonies of *Salmonella* should be present.

This standard is followed by the Ministry of Agriculture, Fisheries and Food, but is not statutory.

SPECIFICATION 2

THE PREPARATION OF OYSTERS IN A
FLAVOURED BATTER

(THIS IS A FROZEN PRODUCT)

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SPECIFICATION 2

PREPARATION OF OYSTERS IN A FLAVOURED BATTER

(FROZEN PRODUCT)

FOREWARD

This recipe and product specification has been drawn up by the White Fish Authority to assist manufacturers and caterers who are interested in the preparation of such a product. The recipe and processing procedures are based on work conducted by the Authority's Market Development Unit, but no attempt has been made to sophisticate the product, as it is assumed that this will be done in any case by interested manufacturers to suit their own system and requirements. Accordingly the product specification is essentially a prototype and as such may require certain modifications. For instance, although the Authority chose to flavour the batter with Guinness, because of the natural association, an unflavoured or another flavoured batter would be equally suitable. If Guinness is used in the batter, permission to use the name must be obtained from Arthur Guinness Limited, as it is a trade name.

1. OYSTER MEATS

The oyster meats for this product should have been prepared and frozen individually, without their liquor, according to the specification laid down for the Freezing and Packaging of Oyster Meats.

2. RECIPE FOR GUINNESS*BATTER

The batter made up by the Authority was flavoured with Guinness, but other flavoured batters are equally acceptable. If Guinness is used, permission must be obtained from Arthur Guinness Ltd., as it is a trade name.

This recipe is sufficient for 100 oyster meats.

Guinness *	300 ml.
Plain Flour	145 g.
Baking Powder	10 g.
Salt	5 g.
White Pepper	0.05 g.
Celacol Gum M2500	2 g.

The Celacol gum M2500 is included in the batter, because it forms a crisper batter, but also allows the oyster meat to retain its moisture. It is manufactured by:-

British Celanese Ltd.,
Chemical Sales Dept.,
P.O. Box 5,
Spondon,
Derby, DE2 7BP.

3. PREPARATION OF BATTER

The batter can either be prepared on a large scale using industrial equipment such as a Hobart mixer, or on a smaller scale using a Kenwood mixer.

- 3.1. Mix the dry ingredients in the bowl of the mixer.
- 3.2. Add two thirds (200 mls) of the Guinness* and beat using a paddle impeller or 'K' beater, depending on equipment, beat at full speed for 2 minutes.
- 3.3. Add the rest of the Guinness*(100 ml) and stir completely into the mix.
- 3.4. Allow the batter to stand for at least 15 minutes under chill conditions 2°C (36°F) to 4°C (39°F).

* as on p.2.

4. BATTERING FROZEN OYSTER MEATS

This can either be done by hand or mechanically.

- 4.1. Cover frozen oyster meats in plain flour.
- 4.2. Cover oyster meats with batter mix either by passing through a batter enrober, or by dipping into a bowl of batter mix.
- 4.3. Drain off excess batter.
- 4.4. The battered oyster meat should then be fried in vegetable oil at 160°C (350°F) for 2 minutes. This can either be done in a continuous fryer or in a small deep fat fryer.
- 4.5. Drain to remove excess frying oil.

Unfrozen oysters may be battered, but give irregular shapes.

5. PACKAGING OF BATTERED OYSTERS

The battered oysters can be packed either before or after freezing depending on the method of freezing. The packaging should protect the product from deterioration and damage, during cold storage and transport. It should have good barrier properties against oxygen and water vapour diffusion. Oxygen will cause flavour deterioration of the product and dehydration will occur in cold storage, if water is lost from the product.

The Guinness*battered oysters have been packed by the Authority in white polystyrene boxes 11" long x 6" wide x 3" deep with clear, high impact P.V.C. lids. These are supplied by Timpak Ltd., Saxthorpe, Norwich.

Guinness*battered oysters can also be packed in heat sealable bags such as those made from 60 gauge oriented polypropylene film adhesive laminated to 100 gauge polythene (Metathene PA0610) supplied by the Metal Box Company.

6. FREEZING OF BATTERED OYSTERS

The Guinness*battered oysters can be frozen in an air-blast freezer, nitrogen freezer or plate freezer.

6.1. Air-Blast Freezer

Air-blast freezers operate as part of a batch or continuous operation. If trolleys are used in the blast-freezer it is best to pack the Guinness battered oysters before freezing. However, if a conveyor belt is used and it is part of a line operation it is probably best to pack after freezing.

The freezing time for Guinness*battered oysters is about 40 minutes, if the air temperature is constant between -40°C (-40°F) to -30°C (-22°F). At the end of the freezing time the temperature at the centre of the oyster meat should be -18°C (0°F).

* If Guinness is used in the batter, permission to use the name must be obtained from Arthur Guinness Limited.

6.2. Plate Freezer

If the battered oysters are to be plate frozen, they must first be closely packed into regular rectangular packs with smooth surfaces so that there is full contact with the plates. All the packs should be the same size in one batch.

The freezing time is about $1\frac{1}{4}$ hours if the freezer temperature is -30°C . At the end of the freezing time the temperature at the centre of the battered oysters or block should be -18°C (0°F).

6.3. Nitrogen Freezer

Battered oysters can be frozen in a nitrogen tunnel. The operating conditions will however depend on size, type, etc. of tunnel used. The conditions should be such that the final temperature at the centre of the frozen battered oysters is -18°C (0°F).

The Guinness*battered oysters have been satisfactorily frozen by the Authority in a Southern and Redfern Model 40/90 air-blast freezer, when packed in polystyrene boxes or trays for 30 minutes with air temperatures of -40°C (-40°F).

7. STORAGE OF BATTERED OYSTERS

Immediately the battered oysters have been frozen and packed, they must be transferred to a cold store, running at a temperature of -30°C (-22°F). They may be stored at these temperatures safely for 6 months from initial freezing of the oyster without any flavour deterioration.

If the cold store is operated at -18°C (0°F) the shelf-life of the frozen battered oysters will be reduced to 3 months from the initial freezing of the oyster.

It is important that the temperature of the cold store is kept constant and not allowed to fluctuate, otherwise the shelf-life of the product will be reduced.

8. REHEATING OF FROZEN BATTERED OYSTERS

The frozen Guinness*battered oysters should be fried in vegetable oil at 162°C (350°F) for 2 - 3 minutes, depending on size of oyster.

The product should have a good cover and be a good shape, the batter should be crisp on the outside, but moist inside. The oyster meat should be wet and tender.

* as on previous page

SPECIFICATION 3

THE PREPARATION OF A RANGE OF FOUR
OYSTER DISHES IN THE HALF SHELL

(THESE ARE FROZEN PRODUCTS)

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SPECIFICATION 3

PREPARATION OF A RANGE OF FOUR OYSTER DISHES IN THE HALF SHELL

FOREWARD

This recipe and product specification has been drawn up by the White Fish Authority to assist manufacturers and caterers who are interested in the preparation of such a product. The recipes and processing procedures are based on work conducted by the Authority's Market Development Unit, but no attempt has been made to sophisticate the product, as it is assumed that this will be done in any case by interested manufacturers to suit their own system and requirements. Accordingly the product specification is essentially a prototype, and as such may require certain modifications.

1. OYSTER MEATS

1.1. The oyster meats used for this product may be either chilled or frozen.

1.1.1. If the oyster meats are chilled, they must have been kept at chilled temperatures 0°C (32°F) to 4°C (39°F) for no more than 60 hours before processing, after they have been shucked.

1.1.2. Frozen oyster meats should have been stored at -30°C (-22°F), although they may have been stored at -18°C (0°F), but this reduces their total shelf life.

The oyster meats should be thawed overnight under chill conditions 0°C (32°F) to 4°C (39°F) and processed within 48 hours of thawing. The thawed meats should be drained and the liquor kept for the sauce.

1.2. Heat the oyster meats in any liquor which has accumulated in the thawing process with sufficient water to cover the meats. This can be done in a boiling pan in a large scale operation, or a saucepan if the operation is on a smaller scale.

This is a delicate process as overheating makes the oysters tough, but heating is necessary to exude some of the oysters' liquid, as this would occur in reheating the cooked dish, resulting in watery patches in the sauce, which would be unappetising.

1.3. Bring the temperature up just to boiling, indicated by persistent bubbles appearing. Agitate the oyster meats from time to time during heating.

1.4. Drain the oyster meats.

1.5. When preparing this product, the Authority removed the tough gill section, which is sometimes black in colour, from the meat and cut the meats into 4 - 6 pieces depending on the size of the meats. However, it may be preferable to use whole meats, so that the consumer can easily identify the oyster meat.

2. OYSTER SHELLS

2.1. The oyster shells, which have been thoroughly cleaned, should be sterilised in a canning retort for 30 minutes at 240°F .

2.2. The sterilised oyster shells should be stored, packed in polythene bags which have been heat sealed. Packaging should be carried out immediately after sterilising.

2.3. For processing, the oyster shells should be removed from the polythene bags, and checked to ensure that they are dry and free from any particles.

2.4. The clean sterilised shells should be mounted in an upright position so that the oyster meats and sauce can be easily placed in them. This has been done by placing the oyster shells onto wire racks.

- 2.5. It is important that if the oyster shells are re-used, they are first sterilised. The oyster shells may be substituted with other sterilised shells, e.g. scallop shells, or with artificial shells of aluminium foil or china.

3. SAUCE RECIPES AND METHODS OF PREPARATION

3.1. Florentine Sauce

This recipe is sufficient for approximately 100 half shell dishes.

Margarine	67.5 g.
Plain Flour	67.5 g.
Purity SDW	90.0 g.
Salt	12.0 g.
White Pepper	0.3 g.
English Mustard (powder)	0.5 g.
Oyster Liquor	170 ml.
Milk	1.54 l.
English Cheddar Cheese	300 g.
Gruyere Cheese	300 g.
Drained Chopped Spinach (frozen)	119 g.
Spanish Paprika	

- 3.1.1. Thaw the spinach overnight at ambient temperatures in a covered container. Drain thoroughly pressing out as much liquid as possible.
- 3.1.2. Using a little of the milk blend the Purity SDW.
- 3.1.3. Heat margarine in the rest of the milk until boiling. Add sieved flour and stir until the sauce thickens.
- 3.1.4. Add the oyster liquor and the blended Purity SDW and bring the mixture to the boil, stirring all the time.
- 3.1.5. Remove from the heat and stir in the cheese. Stir until the cheese is completely incorporated into the sauce, reheating if necessary to complete the process. Do not boil.

3.2. Mornay Sauce

This recipe is sufficient for approximately 100 half shell dishes.

Margarine	76 g.
Plain Flour	76 g.
Purity SDW	100 g.
Salt	13.5 g.
White Pepper	0.3 g.

English Mustard	0.6 g.
Oyster Liquor	190 ml.
Milk	1.70 l.
English Cheddar Cheese	334 g.
Gruyere Cheese	334 g.
Spanish Paprika	

Method as for Florentine Sauce, excluding the thawing of the spinach.

3.3. Spinach/Pernod Sauce. (Rockefeller).

This recipe is sufficient for approximately 100 half shell dishes.

Butter	114.5 g.
Chopped Onion	114.5 g.
Chopped Celery	114.5 g.
Chopped Parsley	28.5 g.
Drained Chopped Spinach (frozen)	572.0 g.
Dill (dried)	0.6 g.
Salt	11.5 g.
Black Pepper	0.3 g.
Water	1388.0 ml.
Purity SDW	23.0 g.
Pernod	71.5 ml.
White Breadcrumbs	57.0 g.

The breadcrumbs used by the Authority were made from the centre of day old bread in a liquidiser.

- 3.3.1. Thaw the spinach overnight at ambient temperature in a covered container. Drain thoroughly pressing out as much liquid as possible.
- 3.3.2. Melt the butter and sauté the chopped onions and celery. This can either be done in a boiling pan or saucepan depending on the size of the operation.
- 3.3.3. Blend the Purity SDW with a little of the water to produce a smooth paste.
- 3.3.4. Add the drained spinach, parsley, dill, salt, pepper and remaining water to the chopped onions and celery. Bring the mixture to the boil and simmer for 30 minutes.
- 3.3.5. Remove from the heat, and add the blended Purity SDW and bring the mixture back to the boil.
- 3.3.6. Remove from the heat and stir in Pernod and white breadcrumbs.

3.4. Spiced Tomato Sauce (Provencale)

This recipe is sufficient for approximately 100 half shell dishes.

Margarine	33.5	g.
Chopped Onion	100.0	g.
Chopped Garlic	6.5	g.
Canned Tomatoes	1320	g.
Dried Parsley Flakes	1	g.
Dried Thyme (soaked)	5	g.
Salt	10	g.
Black Pepper	0.15	g.
Water	500	ml.
Purity SDW	50	g.
Malt Vinegar	50	ml.
Lemon Juice (fresh or canned)	16.5	ml.
White Breadcrumbs		

The white breadcrumbs used by the Authority were made from the centre of day old white bread in a liquidiser.

- 3.4.1. Soak the dried thyme in cold water for at least one hour before weighing.
- 3.4.2. Melt the margarine in a boiling pan or saucepan, depending on the size of the operation and sauté the chopped onion and garlic.
- 3.4.3. Using sufficient water blend the Purity SDW.
- 3.4.4. Add tomato, tomato juice, parsley, thyme, salt, pepper and the rest of the water to the onions and garlic. Bring mixture to the boil and simmer for 45 minutes.
- 3.4.5. Remove from the heat, add blended Purity SDW and bring mixture back to the boil.
- 3.4.6. Remove from the heat and stir in vinegar, lemon juice and breadcrumbs.

The Purity SDW used in the sauce recipes is a waxy starch flour which will produce a sauce which is stable to freezing. If cornflour or wheatflour is used alone the sauce will curdle and cause the water to separate out on reheating. The Purity SDW is supplied by Badex Ltd., Waverly House, Hale Road, Altrincham, Cheshire.

4. MAKE-UP OF THE HALF SHELL DISHES

- 4.1. For the Florentine half shell dish, place a layer of drained spinach into each shell,
- 4.2. For all shell dishes, place a few pieces of oyster meat into each shell. The number of pieces will depend on the size of the shell, but in general at least one "complete oyster" should be placed into each shell.
- 4.3. Add sufficient sauce to cover the pieces of oyster meat.
- 4.4. For the Florentine and Mornay half shell dishes, lightly sprinkle the surface of the sauce with Spanish Paprika (this is just for decoration).

5. FREEZING OF THE HALF SHELL DISHES

The half shell dishes can be frozen in either an air-blast freezer or a nitrogen tunnel.

5.1. Air-Blast Freezer

Air-blast freezers are either part of a batch or continuous operation.

- 5.1.1. In a batch operation the half shell dishes should be placed on trays and loaded onto trolleys.
- 5.1.2. In a continuous operation the half shell dishes should either be loaded onto trolleys or onto a conveyor belt which passes through the air-blast freezer.

In either case, the air should be at a constant temperature between -40°C (-40°F) and -30°C (-22°F) and the freezing time will be about 45 minutes to freeze the product down to a temperature of -18°C (0°F) at the centre.

5.2. Nitrogen Freezer

The half shell dishes can be frozen in a nitrogen tunnel. The operating conditions will depend on the type and size of the nitrogen freezer and the conditions should be such that the temperature at the centre of the frozen product after the freezing time is -18°C (0°F).

6. PACKAGING OF THE FROZEN HALF SHELL DISHES

The half shell dishes should be so packed that they are protected from deterioration during cold storage and transport. The packaging material should provide a barrier against the diffusion of oxygen and water vapour. Oxygen will cause flavour loss of the product, and, if water is lost from the product during cold storage, it will dehydrate.

The half shell dishes have been packed by the Authority in fives in heat sealable bags $6\frac{1}{2}$ " x 9" made of 60 gauge oriented polypropylene film adhesive laminated to 100 gauge polythene (Metathene PA. 0610) supplied by the Metal Box Company, but the sharp shells sometimes pierce through the packaging.

American half shell dishes (not made to this specification) are packed in heat sealable bags which are perforated around each shell dish so that the half shell dishes can be used individually. These are then packed in waxed card boxes, 18 to a box $12\frac{1}{2}$ " x 8" x $3\frac{1}{2}$ ".

Another suggested method of packaging is to place them in trays $11\frac{1}{2}$ " x $11\frac{1}{2}$ " x $1\frac{1}{2}$ " which have six compartments. These are made of polystyrene with clear high impacted P.V.C. lids and are supplied by Timpak Ltd., Foundry House, Saxthorpe, Norwich.

7. STORAGE OF HALF SHELL DISHES

Immediately the half shell dishes have been frozen they should be transferred to a cold store. The temperature of the cold store should preferably operate at -30°C (-22°F) when the half shell dishes can be safely stored for six months from initial freezing of oyster meats, without loss of flavour. If the cold store temperature is -18°C (0°F) the half shell dishes can only be safely stored for three months from initial freezing of oyster meats.

It is important that the cold store temperature is not allowed to fluctuate, otherwise the shelf-life of the frozen half shell dishes will be reduced.

8. REHEATING OF THE HALF SHELL DISHES

The half shell dishes should be reheated in a convection oven at 180°C (370°F) for 6 minutes to 9 minutes depending on the size of the shell, or in a conventional oven at 400°F , Regulo 6 for 20 minutes or under the grill for 10 minutes.

The cooked product should be moist yet not a runny consistency. The oyster flavour should not be masked by the sauce and the oyster pieces must be tender.

SPECIFICATION 4

THE PREPARATION OF A RANGE OF FIVE
OYSTER PIES

(THIS IS A FROZEN PRODUCT)

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SPECIFICATION 4

PREPARATION OF A RANGE OF FIVE OYSTER PIES

FOREWARD

This recipe and product specification has been drawn up by the White Fish Authority to assist manufacturers and caterers who are interested in the preparation of such a product. The recipe and processing procedures are based on work conducted by the Authority's Market Development Unit, but no attempt has been made to sophisticate the product as it is assumed that this will be done in any case by interested manufacturers to suit their own system and requirements. Accordingly the product specification is essentially a prototype and as such may require certain modifications. For instance different types of pastry may be used to make the pie, which may also be varied by using only a pastry lid, or a pie base and lid.

6.3. Nitrogen Freezer

Breaded oysters can be frozen in a nitrogen tunnel. The operating conditions will, however, depend on size, type, etc., of tunnel used. The conditions should be such that the final temperature at the centre of the frozen breaded oyster is -18°C (0°F).

The breaded oysters have been satisfactorily frozen by the Authority in a Southern and Redfern Model 40/90 air-blast freezer, when packed in polystyrene boxes or trays for 30 minutes with air temperatures of -40°C (-40°F).

7. STORAGE OF BREADED OYSTERS

Immediately the breaded oysters have been frozen and packed, they must be transferred to a cold store, running at a temperature of -30°C (-22°F). They may be stored at these temperatures safely for 6 months from initial freezing of the oysters without any flavour deterioration.

If the cold store is operated at -18°C (0°F) the shelf-life of the frozen breaded oysters will be reduced to 3 months from the initial freezing of the oysters.

It is important that the temperature of the cold store is kept constant and not allowed to fluctuate, otherwise the shelf-life of the product will be reduced.

8.8 REHEATING OF FROZEN BREADED OYSTERS

The frozen breaded oysters should be fried in vegetable oil at 162°C (350°F) for 2 - 3 minutes, depending on size of oyster.

The product should have a good cover, be a good shape and the breadcrumbs should be golden brown in colour. The oyster meat inside should be moist and tender.

This specification covers five variations of oyster pie, oyster in a white sauce; mushroom and oyster; steak, kidney and oyster; steak and oyster; and chicken and oyster pies.

1. OYSTER MEATS

1.1. The oyster meats used for these pies may either be chilled or frozen.

1.1.1. If the oyster meats are chilled, they should be drained of their liquor and stored at 0°C (32°F) to 4°C (39°F) for no more than 60 hours before processing, after they have been shucked. The liquor should be kept for use in the sauce.

1.1.2. Frozen oyster meats should have been stored at -30°C (-22°F) although they may have been stored at -18°C (0°F), but this reduces their total shelf-life.

The oyster meats should be thawed overnight under chill conditions 0°C (32°F) to 4°C (39°F) and processed within 48 hours of thawing. The thawed meats should be drained and the liquor kept for the sauce.

1.2. Heat the oyster meats in sufficient water to cover them, until the water boils. This can be done in a saucepan or boiling pan, depending on the size of the operation. This is a delicate operation as overheating toughens the meats, but heating is necessary to exude some of the oyster liquor which would otherwise cause watery patches in the sauce on reheating.

1.3. Drain oysters and discard liquor.

1.4. Remove the gills which have toughened on heating.

1.5. Place weighed oysters on the base of the pie, distributing evenly.

2. PASTRY CASE

When preparing these products, the Authority used one large (13 oz) packet of frozen "Jus Rol" puff pastry. However, fresh pastry may also be made up for these dishes.

2.1. For the frozen pastry, thaw at room temperature for one hour.

2.2. Divide the pastry into two, one portion slightly larger than the other.

2.3. Roll out larger portion of pastry, so that it easily fits into the base of an aluminium foil pie dish of 8" diameter and 1" deep. Do not stretch the pastry. Trim the edges.

2.4. Roll out second portion, so that it easily fits as a lid to the pie.

3. PREPARATION OF SAUCE

A number of variations of sauce have been developed, béchamel sauce; mushroom sauce; and chicken sauce, while two steak fillings, steak and kidney mixture; steak mixture, have also been prepared. The following recipes are sufficient to make 100 pies of the above size.

3.1. Bechamel Sauce

- 3.1.1. Infuse 1530 ml. milk with 2 bay leaves, 1 large onion 6 cloves, 8 peppercorns. Use milk in the sauce.

Margarine	1350 g.
Flour	1350 g.
Salt	240 g.
Pepper	50 g.
Purity SDW	1800 g.
Oyster Liquor	170 ml.
Milk	1530 ml.

- 3.1.2. The Purity SDW should be blended with some milk.

- 3.1.3. Bring milk and margarine to the boil. Add seasoned flour and stir until the sauce thickens.

- 3.1.4. Remove from heat and add Purity SDW.

- 3.1.5. Add 300 g. of sauce to each pie. Each pie should contain 165 g. of cooked oysters, which is approximately 18 - 20 oyster meats. This number can easily be increased or decreased if required, and halved oysters may also be used.

3.2. Mushroom Sauce

Margarine	1670 g.
Sliced Mushroom	8340 g.
Flour	920 g.
Salt	167 g.
Pepper	5 g.
Purity SDW	1250 g.
Milk	1275 ml.
Oyster Liquor	142 ml.

- 3.2.1. Sauté sliced mushroom in margarine.

- 3.2.2. Blend Purity SDW with some of the milk.

3.2.3. Heat margarine in milk until boiling. Add seasoned flour and stir until sauce thickens.

3.2.4. Remove from heat and add Purity SDW.

3.2.5. Add 300 g. of sauce to each pie. Each pie should contain 170 g. of cooked oyster meats.

3.3. Steak and Kidney Mixture

For steak, kidney and oyster pie, the Authority used a small (7½ oz) packet of "Jus Rol" puff pastry to make a pastry lid only for the pie, so that more gravy could be incorporated into the pie. For this reason also the aluminium foil dish was slightly deeper, measuring 8" diameter and ½" deep.

Prepared Stewing Steak	43 kg.
Prepared Ox Kidney	17 kg.
Chopped Onion	11.5 kg.
Cookeen	4 kg.
Plain Flour	1200 g.
Salt	300 g.
Pepper	45 g.
Water	1012 ml.
Oxo Cube (Beef)	14 cubes

3.3.1. Chop steak and kidney into cubes and coat in flour.

3.3.2. Fry meat in cookeen to seal and brown it.

3.3.3. Sauté chopped onion.

3.3.4. Make gravy with water and meat sediment.

3.3.5. Place gravy, onion, meat, water and oxo in boiling pan or saucepan. Bring mixture to the boil, reduce heat and stew gently for 1½ hours.

3.3.6. Add 800 g. of steak and kidney mixture to 170 g. of oyster meats in the pie base.

3.4. Steak Mixture

Prepared Stewing Steak	50 kg.
Chopped Onion	15 kg.
Chopped Garlic	200 cloves
Flour	2850 g.

Salt	325 g.
Pepper	100 g.
Carrot	300 g.
Water	4.26 ml.
Oxo	50 cubes
Oyster Liquor	28.4 ml.
Chopped Parsley	700 g.
Sliced Mushroom	11 kg.

- 3.4.1. Coat steak in seasoned flour and quickly fry in hot fat.
- 3.4.2. Sauté sliced carrot, chopped onion and chopped garlic.
- 3.4.3. Form a gravy with the fried sediment and water.
- 3.4.4. Bring to the boil gravy, carrot, steak, onion, garlic and oxo. Reduce heat and stew for $1\frac{1}{2}$ hours. This should be done in a boiling pan or saucepan, depending on the size of the operation.
- 3.4.5. Add sliced mushroom and chopped parsley and stew for a further $\frac{1}{2}$ hour.
- 3.4.6. Add 800 g. of steak mixture to 170 g. of oyster meats in the base of the pie.

3.5. Chicken Mixture

Margarine	1250 g.
Sliced Mushroom	3322 g.
Flour	1125 g.
Salt	200 g.
Pepper	5 g.
Purity SDW	150 g.
Milk	578 ml.
Chicken Stock	454 ml.
Oyster Liquor	114 ml.
Cooked Chicken Meat	7 kg.

The Authority used "Knorr" chicken stock cubes for the stock.

- 3.5.1. Sauté mushroom in margarine.
- 3.5.2. Blend the Purity SDW with a little of the milk.
- 3.5.3. Blend flour with a little of the milk.

- 3.5.4. Add the rest of the milk to the mushroom and margarine and bring to the boil.
- 3.5.5. Add flour and continue boiling until the sauce thickens, stirring continuously.
- 3.5.6. Remove from heat and stir in blended Purity SDW.
- 3.5.7. Place 70 g. of chicken and 130 g. of oyster meats into each pie.
- 3.5.8. Add 300 g. of sauce to each pie.

The Purity SDW used in the sauce recipes is a waxy starch flour, used to stabilise the sauce during freezing. Purity SDW is supplied by Badex Ltd., Waverly House, Altrincham, Cheshire.

4. FREEZING OF THE OYSTER PIES

Freezing should be carried out immediately after the pies have been prepared.

The pies can be frozen in either air-blast freezers, plate freezers or nitrogen freezers.

4.1. Air-Blast Freezer

Air-blast freezers are either part of a batch or continuous operation.

- 4.1.1. In a batch operation the pies should be loaded onto trays and then onto trolleys.
- 4.1.2. In a continuous operation the pies should be either loaded onto trolleys or onto a conveyor belt, which passes through the air-blast tunnel.

Whichever method is used, the air temperatures should be at a constant temperature between -40°C (-40°F) and -30°C (-22°F) and at the end of the freezing time the temperature at the centre of the pies should be -18°C (0°F).

4.2. Plate Freezer

If the pies are to be frozen in a plate freezer they should first be closely packed into regular rectangular packs. It is important that each pack is the same size and the surfaces are completely flat, so that there is full contact with the cold plates.

The plate freezer should operate at -30°C (-22°F) and at the end of the freezing time the centre of the pies should be -18°C (0°F).

4.3. Nitrogen Freezer

Oyster pies can be frozen in a nitrogen tunnel. The operating conditions will however depend on the type, size etc. of the tunnel. The conditions should be such that at the end of the freezing time the centre of the oyster pie is -18°C (0°F).

The oyster pies have been frozen in an air-blast freezer for 90 minutes under the conditions described.

5. PACKAGING OF OYSTER PIES

The oyster pies should be so packed that they are protected from deterioration during cold storage and transport. The packaging material should provide a barrier against oxygen diffusion as this will cause rancidity of the pastry. It should also be a water vapour barrier, otherwise dehydration of the filling will occur during cold storage.

The pies have been made in aluminium foil trays, 8" diameter, 1" deep, which are manufactured by Alcan Foils Ltd., First Way, Wembley, Middlesex, and placed into heat sealable bags, but can also be packed into cardboard cartons.

6. STORAGE AND SHELF-LIFE

The frozen pies should be immediately transferred to cold storage after they have been processed. The cold store should preferably operate at -30°C (-22°F), when the frozen pies can be safely stored for six months from the initial freezing of the oyster meats. If however the cold store operates at -18°C (0°F) the frozen pies can only be stored safely for three months from the initial freezing of the oyster meats.

It is important not to allow the temperature of the cold store to fluctuate, otherwise the shelf-life of the pies will be reduced.

7. REHEATING OF FINAL PRODUCT

The frozen pies should be heated in a conventional oven at 425°F , Regulo 7 for 55 - 60 minutes. Do not reheat in a convection oven as the hot air current seals the pastry before it has time to rise.

The pastry should rise and be flaky and brown. The oysters should be tender, but the liquor should not leak out into the sauce.

SPECIFICATION 5

THE PREPARATION OF A RANGE OF THREE
OYSTER VOL-AU-VENTS

(THESE ARE FROZEN PRODUCTS)

Editors wishing to republish these specifications
in full or in part must make full acknowledgement
to the White Fish Authority.

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SPECIFICATION 5

PREPARATION OF A RANGE OF THREE OYSTER VOL-AU-VENTS

FOREWARD

This recipe and product specification has been drawn up by the White Fish Authority to assist manufacturers and caterers who are interested in the preparation of such a product. The recipe and processing procedures are based on work conducted by the Authority's Market Development Unit, but no attempt has been made to sophisticate the product as it is assumed that this will be done in any case by interested manufacturers to suit their own system and requirements. Accordingly the product specification is essentially a prototype and so such ingredients as "Jus Rol" vol-au-vent cases can easily be substituted.

This specification covers three variations of oyster vol-au-vent; oyster in a béchamel sauce; mushroom and oyster; and shrimp and oyster vol-au-vents.

1. VOL-AU-VENT CASES

When preparing these products, the Authority has used frozen "Jus Rol" vol-au-vent cases.

- 1.1. Thaw the vol-au-vent cases on baking sheets for 30 - 40 minutes at room temperature.
- 1.2. Brush the cases with milk.
- 1.3. Bake the cases at 425°F for 10 - 15 minutes.
- 1.4. Remove the central doughy part of the vol-au-vent using a knife, leaving the crisp outer shell.

2. OYSTER MEATS

2.1. The oyster meats for the vol-au-vents may be chilled or frozen.

- 2.1.1. If the oyster meats are chilled they should be drained of their liquor and stored at 0°C (32°F) to 4°C (39°F) for no more than 60 hours before processing, once they have been shucked. The liquor should be kept for use in the sauce.
- 2.1.2. Frozen oyster meats should have been stored at -30°C (-22°F), although they may have been stored at -18°C (0°F), but this reduces their total shelf life.

The frozen oyster meats should be thawed overnight under chill conditions 0°C (32°F) to 4°C (39°F), and processed within 48 hours of thawing. The thawed meats should be drained and the liquor kept for the sauces.

- 2.2. Heat the oyster meats in sufficient water to cover them until the water boils. This can be done in a saucepan or boiling pan depending on the size of the operation. This is a delicate process as overheating toughens the oyster meats, but heating is necessary to exude some of the oyster liquor, which would otherwise cause watery patches in the sauce on reheating.
- 2.3. Drain the oyster meats and discard the liquor.
- 2.4. Chop the meats into 4 - 6 pieces, depending on the size.

3. PREPARATION OF THE SAUCES

Three sauces have been developed by the Authority; béchamel sauce; mushroom sauce and shrimp sauce.

The following recipes are sufficient for 100 vol-au-vent cases.

3.1. Béchamel Sauce

Infuse 2.36 litres of milk with 1 onion, 8 cloves, 4 bay leaves and 12 peppercorns. Use this milk for the sauce.

Margarine	94 g.
Flour	94 g.
Purity SDW	125 g.
Salt	17 g.
Oyster Liquor	250 ml.
Milk	2.1 litre
Chopped Oyster Meats	540 g.

3.1.1. Blend the flour with some of the milk.

3.1.2. Blend the Purity SDW with some of the milk.

3.1.3. Heat rest of the milk with the margarine to boiling, either in a saucepan or boiling pan, depending on the size of the operation.

3.1.4. Add the blended flour and beat until the sauce thickens, continuing to heat all the while.

3.1.5. Remove from the heat and add blended Purity SDW and the oyster liquor.

3.1.6. Stir in the oyster meats.

3.1.7. Place 28g. of sauce into each vol-au-vent case.

3.2. Mushroom Sauce

Margarine	133 g.
Chopped Mushroom	667 g.
Flour	75 g.
Purity SDW	100 g.
Salt	20 g.
Pepper	0.6 g.
Oyster Liquor	189 ml.
Milk	1.7 litre
Chopped Oyster Meats	333 g.

3.2.1. Sauté chopped mushroom in melted margarine (but do not brown) in a saucepan or boiling pan, depending on the size of the operation.

- 3.2.2. Stir in flour and cook gently.
- 3.2.3. Blend Purity SDW with some of the milk.
- 3.2.4. Stir in rest of the milk and oyster liquor.
- 3.2.5. Bring the sauce to the boil gradually, stirring constantly.
- 3.2.6. Remove from the heat and stir in blended Purity SDW and chopped oyster meats.
- 3.2.7. Place 30g. of sauce into each vol-au-vent case.

3.3. Shrimp Sauce

Margarine	90 g.
Flour	90 g.
Purity SDW	120 g.
Salt	24 g.
Pepper	0.8 g.
Oyster Liquor	250 ml.
Milk	2.1 litre
Tomato Puree	40 g.
Chopped Shrimps (canned, drained)	320 g.
Chopped Oyster Meats	400 g.

- 3.3.1. Blend Purity SDW with a little milk.
- 3.3.2. Blend flour with some milk.
- 3.3.3. Bring the rest of the milk to the boil with the margarine, in either a saucepan or boiling pan, depending on the size of the operation.
- 3.3.4. Add blended flour and beat until sauce thickens, continuing to heat all the while.
- 3.3.5. Remove from the heat and stir in blended Purity SDW, tomato Puree, oyster liquor, oyster meats and shrimps.
- 3.3.6. Place 31g. of sauce into each vol-au-vent case.

The Purity SDW used in the sauces is a waxy starchflour used to stabilise the sauce during freezing. It is supplied by Badex Ltd., Waverly House, Hale Road, Altrincham, Cheshire.

4. FREEZING OF THE VOL-AU-VENTS

Freezing should be carried out immediately after the vol-au-vents have been made.

The vol-au-vents should be frozen in either air-blast freezers, plate freezers or nitrogen freezers.

4.1. Air-Blast Freezer

Air-blast freezers are either part of a batch or continuous operation.

4.1.1. In a batch operation the vol-au-vents should be loaded onto trays and then onto trolleys.

4.1.2. In a continuous operation the vol-au-vents should either be loaded onto trolleys or onto a conveyor belt which passes through the freezer tunnel.

Whichever method is used the air temperatures should be constant and within the range -40°C (-40°F) to -30°C (-22°F). At the end of the freezing time (approximately 45 minutes) the temperature at the centre of the vol-au-vents should be -18°C (0°F).

4.2. Plate Freezer

If the vol-au-vents are to be frozen in a plate freezer they should first be packed into rectangular packs. It is important that each pack is the same size, the surfaces completely flat and the product closely packed so that there is full contact with the cold plates.

The plate freezer should operate at -30°C (-22°F) and at the end of the freezing time the temperature at the centre of the vol-au-vents should be -18°C (0°F).

4.3. Nitrogen Freezer

Oyster vol-au-vents can be frozen in a nitrogen tunnel and the operating conditions will depend on the type, size etc. of the tunnel. The conditions should be such that at the end of the freezing time the temperature at the centre of the vol-au-vents is -18°C (0°F).

The vol-au-vents have been frozen in Southern and Redfern Model 40/90 air-blast freezer under the conditions described for 90 minutes.

5. PACKAGING OF OYSTER VOL-AU-VENTS

The oyster vol-au-vents should be so packed that they are protected from deterioration during cold storage and transport. The packaging material should provide a barrier against oxygen diffusion to prevent

rancidity of the pastry and it should also be a water vapour barrier to prevent dehydration of the filling, during cold storage.

The vol-au-vents have been packed by the Authority into heat sealable bags made of 60 gauge oriented polypropylene film adhesive laminated to 100 gauge polythene (Metaphane PA 0610) supplied by the Metal Box Company, but these provided insufficient rigidity and pieces of the pastry were broken off in transit. Therefore a more rigid pack is required.

6. STORAGE AND SHELF-LIFE

The frozen vol-au-vents should be immediately transferred to cold storage after they have been processed. The cold store should preferably operate at -30°C (-22°F), when the frozen vol-au-vents can be safely stored for six months from the initial freezing of the oyster meats. If however, the cold store operates at -18°C (0°F) the frozen vol-au-vents can only be safely stored for three months from the initial freezing of the oyster meats.

It is important not to allow the temperature of the cold store to fluctuate otherwise the shelf-life of the vol-au-vents will be reduced.

7. REHEATING OF THE FINAL PRODUCT

The vol-au-vents can be reheated in a conventional oven at 400°F for 20 to 25 minutes, or in a convection oven at 180°C for 9 - 10 minutes.

The final product should be an oyster flavoured sauce in a crisp pastry case. The sauce should be of a thick, smooth, manageable consistency.

SPECIFICATION 6

THE PREPARATION OF OYSTER STEW

(THIS IS A FROZEN PRODUCT)

Editors wishing to republish these specifications
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to the White Fish Authority.

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10 Young Street,
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SPECIFICATION 6
PREPARATION OF OYSTER STEW

FOREWARD

This recipe and product specification has been drawn up by the White Fish Authority to assist manufacturers and caterers who are interested in the preparation of such a product. The recipe and processing procedures are based on work conducted by the Authority's Market Development Unit, but no attempt has been made to sophisticate the product as it is assumed that this will be done in any case by interested manufacturers to suit their own system and requirements. Accordingly the product specification is essentially a prototype and as such may require certain modifications.

1. OYSTER MEATS

1.1. The oyster meats used for the stew may either be chilled or frozen.

1.1.1. If the oyster meats are chilled, they should be drained of their liquor and stored at 0°C (32°F) to 4°C (39°F) for no more than 60 hours before processing. After they have been shucked, the liquor should be kept for use in the stew.

1.1.2. Frozen oyster meats should have been stored at -30°C (-22°F) although they may be stored at -18°C (0°F), but this reduces their total shelf-life.

The oyster meats should be thawed overnight under chill conditions 0°C (32°F) to 4°C (39°F), and processed within 48 hours of thawing. The thawed oyster meats should be drained and the liquor kept for the stew.

2. RECIPE FOR OYSTER STEW

Butter	25 g.
Chopped Spring Onions	5 g.
Chopped Fresh Red Pepper	40 g.
Chopped Celery	40 g.
Chopped Parsley	2.5 g.
Plain Flour	15 g.
Salt	3 g.
Nutmeg	1 g.
Black Pepper	2 g.
Purity SDW	20 g.
Milk	227 ml.
Liquidise Oyster Gills in Water	170 ml.
Oyster Liquor	56 ml.
Medium Dry White Wine	84 ml.
Lemon Juice	10 ml.
Sour Cream	56 ml.
Chopped Oyster Meats	108 g. (12 meats)

3. METHOD OF PREPARATION OF OYSTER STEW

3.1. Saute spring onions, red pepper, celery and parsley.

3.2. Stir in flour, salt, pepper and nutmeg.

- 3.3. Blend Purity SDW with milk.
- 3.4. Add water, oyster liquor, medium dry white wine and lemon juice. Bring to the boil, stirring continually.
- 3.5. Remove from the heat and stir in cream, Purity SDW and oyster meats.

Although the Authority used fresh peppers, chopped frozen peppers are equally acceptable. Purity SDW, a modified starch, was used in the recipe to prevent break-down of the sauce during freezing. Purity SDW is supplied by Badex Ltd., Waverly House, Altrincham, Cheshire.

4. PACKAGING

The Authority's packaging was based on the "boil in the bag" principle Colodense Complex L1584A bags measuring 7" (178 mm) x 5½" (140 mm) were filled with 325 g. of product and then vacuum heat sealed.

If larger quantities are required to be packed, say for catering purposes, foil trays are suitable.

Colodense complex L1584A bags are supplied by Colodense Ltd., West Street; Bedminster, Bristol 3. Other materials such as high density polythene, medium density polythene/polyamide laminate, medium density polythene/nylon laminate, medium density polythene/polythene terephthalate (Mylar) laminate are also suitable for "boil in the bag" type bags.

5. FREEZING

Oyster stew should be frozen in either a plate freezer or air-blast freezer.

5.1. Air-Blast Freezer

5.1.1. In a batch operation the packets of stew should be loaded onto trays and then onto trolleys.

5.1.2. In a continuous operation the packs of stew should be either loaded onto trolleys or onto a conveyor belt, which passes through the air-blast tunnel.

Whichever method is used, air temperatures should be -40°C (-40°F) to -30°C (-22°F) and at the end of the freezing time the temperature at the centre of the pack should be -18°C (0°F).

5.2. Plate Freezer

The packs of stew are placed between cold plates and the slight applied pressure keeps the packs in good shape with no curving or bulging in freezing, if the bags are held in shape by "formers" between the plates.

The plate freezer should operate at -30°C (-22°C) and at the end of the freezing time the temperature at the centre of the pack should be -18°C (0°F).

6. STORAGE AND SHELF-LIFE

The frozen stews should be immediately transferred to cold storage after processing. The cold store should maintain an air temperature of -30°C (-22°F) when the stew can be safely stored for six months from the oyster meats being initially frozen. If the cold store is maintained at -18°C (0°F) the shelf-life of the product is reduced to three months from the initial freezing of the oyster meats.

It is important however that the air temperature is not allowed to fluctuate, otherwise the shelf-life of the stew will be reduced.

7. REHEATING OF THE STEW

To reheat the stew the bag should be placed in boiling water for 15 minutes.

The final product should have an oyster flavour, which is not too rich. The vegetables should be crisp to add texture and interest.

SPECIFICATION 7
THE PREPARATION OF OYSTERS IN
BREADCRUMBS

(THIS IS A FROZEN PRODUCT)

Editors wishing to republish these specifications
in full or in part must make full acknowledgement
to the White Fish Authority.

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SPECIFICATION 7

PREPARATION OF OYSTERS IN BREADCRUMBS

(FROZEN PRODUCT)

FOREWORD

This recipe and product specification has been drawn up by the White Fish Authority to assist manufacturers and caterers who are interested in the preparation of such a product. The recipe and processing procedures are based on work conducted by the Authority's Market Development Unit, but no attempt has been made to sophisticate the product, as it is assumed that this will be done in any case by interested manufacturers to suit their own system and requirements. Accordingly the product specification is essentially a prototype and as such may require certain modifications.

1. OYSTER MEATS

The oyster meats for this product should have been prepared and frozen individually, without their liquor, according to the specification laid down for the Freezing and Packaging of Oyster Meats.

2. RECIPE FOR BATTER

The recipe for the batter used by the Authority to coat the oysters prior to breading was as follows:-

Plain Flour	42%
Salt	2%
Water	56%

A little pepper may also be included to improve the flavour.

3. PREPARATION OF THE BATTER

The batter may either be prepared on a large scale using industrial equipment such as a Hobart mixer, or on a smaller scale using a domestic mixer such as a Kenwood mixer.

- 3.1. Place water in the bowl of the mixer.
- 3.2. Add the blended dry ingredients gradually with constant beating using a paddle impeller.
- 3.3. Beat for 3 minutes.
- 3.4. Allow batter to stand for 5 minutes before using.

4. BATTER ENROBING AND BREADING OF THE FROZEN OYSTER MEATS

This may be carried out by hand or mechanically. If glazed oyster meats are used the glaze must first be removed, otherwise the batter does not adhere to the surface and an incomplete coating is obtained. The Authority removed the glaze by dipping the glazed meats in warm water for half a minute. This process allows the glaze to be removed, but the meat to remain frozen in the centre. To ensure the temperature of the water is sufficiently high and that it does not become a bacterial risk, the water must be changed frequently.

The enrobing and breading may be carried out on a breading machine, in which case the oyster meats are fed onto a conveyor belt and pass under a curtain of batter and through the breadcrumbs automatically.

The Authority have successfully breaded oysters on a Greer 12" batter and breading machine formerly manufactured by J.W. Geer Co. Ltd., 3-5 Trinity Drive, Trinity Trading Estate, Sittingbourne, Kent.

Alternatively, the oysters may be coated and breaded by hand. This is carried out by first placing the oyster meats in the batter and agitating them to achieve complete immersion. The oyster meats are then removed and dipped in breadcrumbs.

The breadcrumbs used by the Authority quite successfully include sorak breadcrumbs produced by Liverpool Rusk Co. Ltd., Sorak Mills, Victoria Road, Liverpool. L13 8AN., and T. Lucas and Company's "GHDMF" dressing obtained from T. Lucas & Co. Ltd., Ruskit Mills, Kingswood, Bristol.

5. PACKAGING OF BREADED OYSTERS

The breaded oysters can be packed either before or after freezing depending on the method of freezing. The packaging should protect the product from deterioration and damage, during cold storage and transport. It should have good barrier properties against oxygen and water vapour diffusion. Oxygen will cause flavour deterioration of the product and dehydration will occur in cold storage, if water is lost from the product.

The breaded oysters have been packed by the Authority in white polystyrene boxes 11" long x 6" wide x 3" deep with clear, high impact P.V.C. lids. These are supplied by Timpak Ltd., Saxthorpe, Norwich.

The breaded oysters can also be packed in heat sealable bags such as those made from 60 gauge oriented polypropylene film adhesive laminated to 100 gauge polythene (Metathene PA06 10) supplied by the Metal Box Company, or white opaque 200 gauge plastic bags supplied by Terrant Plastics Ltd., 70, Westbourne Grove, London. W2 5SH.

6. FREEZING OF BREADED OYSTERS

The breaded oysters can be frozen in . . air-blast freezer, nitrogen freezer or plate freezer.

6.1. Air-Blast Freezer

Air-blast freezers operate as part of a batch or continuous operation. If trolleys are used in the blast-freezer it is best to pack the breaded oysters before freezing. However, if a conveyor belt is used and it is part of a line operation it is probably best to pack after freezing.

The freezing time for breaded oysters is about 40 minutes, if the air temperature is constant between -40°C (-40°F) to -30°C (-22°F). At the end of the freezing time the temperature at the centre of the oyster meat should be -18°C (0°F).

6.2. Plate Freezer

If the breaded oysters are to be plate frozen, they must first be closely packed into regular rectangular packs with smooth surfaces so that there is full contact with the plates. All the packs should be the same size in one batch.

The freezing time is about $1\frac{1}{2}$ hours if the freezer temperature is -30°C . At the end of the freezing time the temperature at the centre of the breaded oysters or block should be -18°C (0°F).