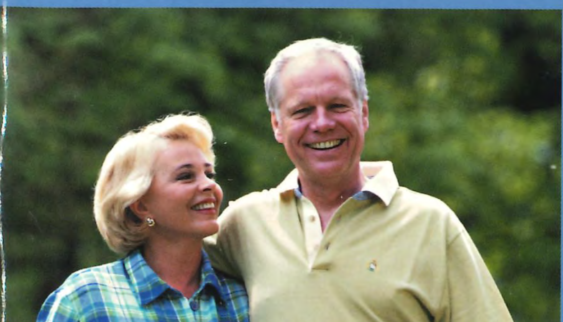
FISHERIES RESEARCH & DEVELOPMENT CORPORATION

What's so healthy about seafood?

A GUIDE FOR SEAFOOD MARKETERS



What's so healthy about seafood?

A GUIDE FOR SEAFOOD MARKETERS

IMPORTANT NOTICE

Information in this book has been highly condensed and simplified so that it is suitable for marketers of seafood who have varying levels of knowledge and expertise. It does not purport to provide advice for any form of personal medical intervention. The information, opinions and advice contained in this book may not relate to, or be relevant to, the particular circumstances of any reader.

Any person wanting authoritative information about their personal dietary needs is advised to consult a medical practitioner.

Please refer also to the disclaimer overleaf.

This book is available electronically on the web at http://www.frdc.com.au/bookshop/index.htm

What's so healthy about seafood? — a guide for seafood marketers

Published by: Fisheries Research and Development Corporation

Postal address: PO Box 222, Deakin West ACT 2600

Office location: Fisheries Research House, 25 Geils Court, Deakin, Australian Capital Territory

Telephone: (02) 6285 0400; from overseas + 61 2 6285 0400

Facsimile: (02) 6285 4421; from overseas + 61 2 6285 4421

E-mail: frdc@frdc.com.au

Internet: http://www.frdc.com.au

ISBN 0 9577587 0 7

Project managed by Pacific Project Management Pty Ltd, Canberra.
Designed by Angel Ink Pty Ltd.
Printed by Paragon Printers Australasia Pty Ltd.

DISCLAIMER

Contents

Foreword

Seafood's changing place in health

Water and what is found in it to eat have always been an important part of the human experience. Waterways, rivers, lakes, estuaries and oceans have generally provided an abundance of creatures and plants for humans to eat. The edible creatures have been diverse and have included finfish, crustaceans and molluscs — and the mark of ancient human settlements has been the midden, with its remains of aquatic food. It is difficult to imagine our species without such food, except where it is in short supply or where belief systems preclude its use.

However, communities remote from the sea and in which other animal-derived foods are abundant have tended to eat little seafood, especially when storage, transport and safety have been issues. In recent times, seafood has become more accessible and very safe for the majority of the population in Australia and in the countries to which Australia exports. The increased availability of seafood, further enhanced by that most popular of pastimes and sports, fishing, has been matched with an increased interest in its health properties.

It was only a few years ago that the essentiality of certain so-called Omega-3 fatty acids in the human diet became clear. In their most beneficial form they are "long-chain" — the not-so-long ones (like alpha-linolenic acid) coming from plants in the sea and, to a lesser extent, on the land, on which sea creatures and some land animals feed and turn them into the "long-chain Omega-3 polyunsaturated fatty acids" (LCn-3PUFA). The best source of these LCn-3-PUFA is seafood, especially finfish (the fatty tissue of finfish), but also crustaceans and shellfish.

Not enough Omega-3 fatty acids in the diet amounts to a deficiency, and is associated with a wide range of health problems which include cardiovascular disease, diabetes, certain cancers, osteoporosis and disorders of the central nervous system, including depression in some instances, and impaired cognition (leading to dementia).

One of the most interesting findings is that, even though some seafood contains a significant amount of cholesterol, its effects on the blood cholesterol (in its various forms) may not be unfavourable, depending on the way in which the fish is prepared and cooked, and what it is eaten with. Moreover, other favourable more direct effects in the arteries and the heart itself actually protect against cardiovascular disease. Studies, especially in Australia, of the effects of finfish on the health of arteries and on the likelihood of fatal abnormal heart rhythms show it to be a protective food.

As major shifts in seafood science and health began to take place, Shawn Somerset and Martin Bowerman began to assemble this material for industry and the community. Their thorough analysis and interpretation of current nutritional research is the foundation on which this book is based. Following their work, and as the field of enquiry became more active and clearer, the best current evidence was critiqued and interpreted for the present publication, to assist those responsible for the seafood chain and how it might promote health.

The evidence is now largely unequivocal that, provided a person has no individual sensitivity, some fish each week is an advantage to health and longevity. This is not to say that added health value may not be achieved where it is combined together with a varied plant-based diet. Indeed, variety amongst sea-foods is also likely to confer health benefit.

Above all, if most of the world's population is to benefit from seafood intake, the resource has to be valued and protected and its sustainability ensured. Available evidence indicates that small amounts of fish — up to about three or four servings of about 100 grams of finfish a week — are enough to optimise health. The corollary is that small changes in seafood consumption by most of the world's population will make major changes in health outcomes.

Mark L. Wahlqvist

Professor Mark Wahlqvist, AO, BmedSc, MD BS (Adelaide), MD (Uppsala), FRACP, FAIFST, FACN, FAFPHM, is Professor of Medicine, Monash University. He is regarded as one of the world's leading nutrition scientists, Professor Wahlqvist received his first professorial appointment in 1978 when he was appointed as Foundation Professor of Human Nutrition at Deakin University, Adelaide. Since then he has held a number of senior academic and clinical appointments including Professor and Head of Medicine at Monash University, Chairman, Division of Medicine and Director of the Professorial General Medical Unit at Prince Henry's Hospital and subsequently the Monash Medical Centre, Melbourne and Associate Dean, International Health and Development, Faculty of Medicine, Monash University. He has written and edited numerous publications on nutritional science and has been a member and Chair of a number of eminent nutritional science and advisory committees. He is currently Chair, Food Safety Council of Victoria, a Director of the Australia New Zealand Food Authority and President of the International Union of Nutritional Sciences. On Australia Day, 26 January 2000, Professor Wahlqvist was awarded the Officer of the Order of Australia (AO) for his contribution to the field of nutritional science and public health.

Photographer Eva Boogaard, Lochman Transparencies

About this book

Source: Sydney Fish Markets

Much scientific information on the health benefits of eating seafood is accumulating, yet relatively little of this information has been effectively communicated to the general public, largely because of the technical, specialised nature of many research findings. However, a project funded by the Fisheries Research and Development Corporation — in keeping with the Corporation's consumer education strategy of developing knowledge of seafood and seafood products among consumers — radically changed that situation. FRDC project 1996/340, *Enhanced usage of contemporary scientific findings on health benefits of seafood to promote fresh seafood consumption*, collated and distilled the results of a broad collection of scientific research and made them more widely available. This book builds on the project's outputs by presenting the findings specifically to people who market seafood.[1]

The project reviewed and analysed a substantial number of scientific papers and found that consumption of seafood has positive health benefits for all age groups and has significantly higher benefits for certain medical conditions. However, the level of evidence to support these benefits varies significantly. The project's final report provides in-depth technical support for the information in this book. The project also establishes a clear path from the original research to the statements made in this document.

1 A hard copy of the full report is available within Australia from the FRDC. The project's non-technical summary is available on the web at http://www.frdc.com.au/pub/reports/files/96-340.htm

Acknowledgements

The FRDC is grateful for the enthusiastic cooperation of many people who gave their expertise and time to help to prepare this book.

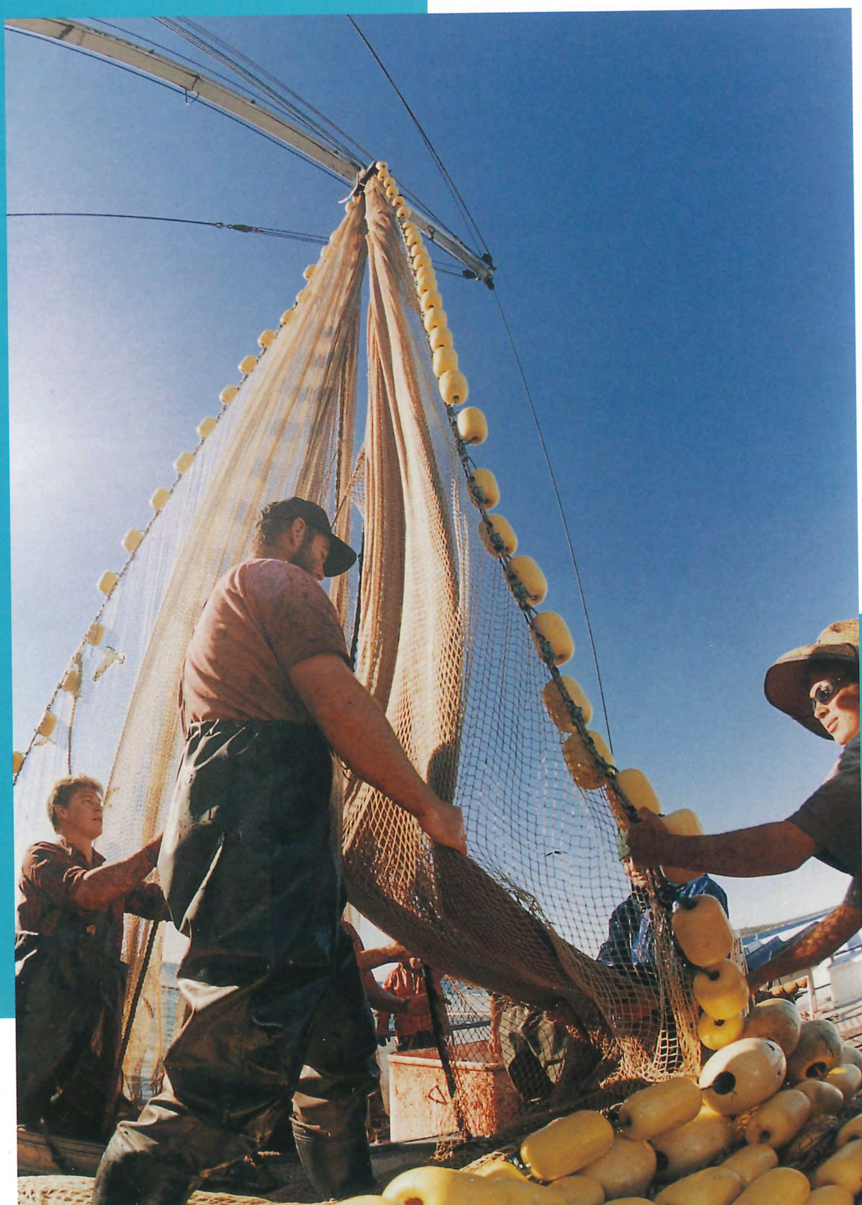
The FRDC R&D project from which most of the book is derived — project 1996/340 — was undertaken by Dr Shawn Somerset and Martin Bowerman. Extensive comment and advice, especially on presenting complex research findings to general audiences, was subsequently provided by some of Australia's leading nutritionists and medical specialists. The principal contributors and commentators were Professor Peter Howe, Dr Rosemary Stanton, Dr Richard Telford, Dr David Topping, Professor Mark Wahlqvist, Phillip Walsh and Dr Naiyana Tikky Wattanapenpaiboon.

Text and commentary from contributors was selectively edited and further developed by Dr Patrick Hone, Clive Huggan, Michael Parolin, Kylie Paulsen and Marty Walsh. Consequently, the final text is not necessarily consistent with all contributed material.

How to use this book

This book provides information on the health benefits of seafood to people who market seafood, meeting a long-felt need to provide a technical basis for telling consumers about the benefits of eating seafood. It is presented in three sections:

- **Section 1** provides an overview.
- **Section 2** provides more detailed information on seafood and specific conditions.
- **Section 3** covers legislation governing the way you can communicate information about seafood nutrition.



Source: Joseph Puglisi Jnr

Different sections give different levels of information. For example:

- If you simply want to tell customers in broad terms about the general benefits of eating seafood, you should read the overview and section 3.
- If you want to provide general information on the effects of eating seafood on a certain condition (for example, in response to a customer's inquiry), you should read the summary of benefits in the overview and the notes on their condition in section 2 — and when talking with customers you should advise them to consult their doctor for further advice.
- If you are providing detailed information about seafood to consumers, you should study section 3 to ensure you are complying with the law. *Giving information to people about health benefits brings certain obligations!*

A glossary, on pages 34–35, provides an explanation of terms used in this book.

What's in a word?

— make sure you understand the key words used in this book

Source: Department of Primary Industries, Queensland (DPIQ)

This book describes the results of wide-ranging nutritional research in terms that — as far as possible — are suitable for a general readership. However, in the interests of accuracy it has often been necessary to use technical terms that are not generally well known. Some of these terms are in the glossary on pages 34–35.

It is important that you become familiar with, the following key terms used in this book:

- **Seafood**: in this book, "seafood" is used specifically to describe, collectively, finfish and other aquatic animals such as Crustacea and molluscs.
- **Finfish**: aquatic vertebrates having gills, fins and typically an elongated body usually covered with scales. *Note: this more specific term has been used where appropriate to avoid the confusion that could result from the word "fish", which is often taken to include other aquatic animals such as crustaceans or molluscs. (Reference to "fish" has been retained when quoting legislation or research findings, and in very general contexts.)*
- **Crustaceans**: a large family of arthropod animals, characterised by a hard, close-fitting shell that is shed periodically. Includes prawns, crabs, lobsters, shrimps, bugs and freshwater crayfish.
- **Molluscs**: invertebrates characterised by a calcareous shell (sometimes lacking) of one, two or more pieces that wholly or partly encloses the soft unsegmented body — for example, abalone.
- **Shellfish**: species of crustaceans and molluscs.

Important: Section 3 — Guidelines for Communication about Seafood Nutrition, includes excerpts from the Australia New Zealand Food Standards Code. In this code '**fish**' means any of the cold-blooded aquatic vertebrates and aquatic invertebrates including shellfish, but does not include amphibians and reptiles.


FNUJ
Morgans
Seafood Restaurant
Scarborough Boat Harbour
Brisbane
Queensland

Section 1 Overview of health benefits of eating seafood

Finfish and other foods from oceans, rivers and lakes have long been recognised as nutritious. They are an excellent source of protein and are rich in essential polyunsaturated fatty acids.

Seafood is the best food source of iodine; salt water seafood contains about twice the iodine found in freshwater varieties. It also provides an excellent source of selenium and fluoride. Other minerals which are provided in moderate amounts are iron, zinc and magnesium. The iron content is about a third to a half that in red meat.

Shellfish is similar in food value to finfish, but crustaceans contain about twice as much cholesterol as other seafoods. Molluscs used to be classified as foods high in cholesterol, but it is now known that most of the sterols in these foods are compounds other than cholesterol. Moreover, cholesterol in food is not the main predictor of blood cholesterol. The issue of cholesterol from seafood and blood cholesterol is discussed on page 20.

From the early days of nutrition science, finfish in particular has been acknowledged for being a high protein, low calorie food. In recent years, the importance of finfish in the diet has extended from its image as a cornerstone of a healthy diet, to more specialised roles in disease prevention. Scientists working on coronary heart disease in Nordic countries during the 1970s observed that Greenland Inuits (Eskimos) had one-tenth to one-third the heart attack rate of Danes. Subsequent studies found that Inuit people have much lower blood cholesterol, triglyceride and 'bad' cholesterol (low-density lipoprotein) levels, and higher 'good' cholesterol (high-density lipoprotein) levels, than their Danish equivalents. Similar results have been observed with Japanese people from Kohama Island — where people have the lowest incidence of heart disease in Japan and much higher serum levels of certain fatty acid due to higher intake of fresh finfish.

In recent years, the importance of finfish in the diet has extended from its image as a cornerstone of a healthy diet, to more specialised roles in disease prevention.

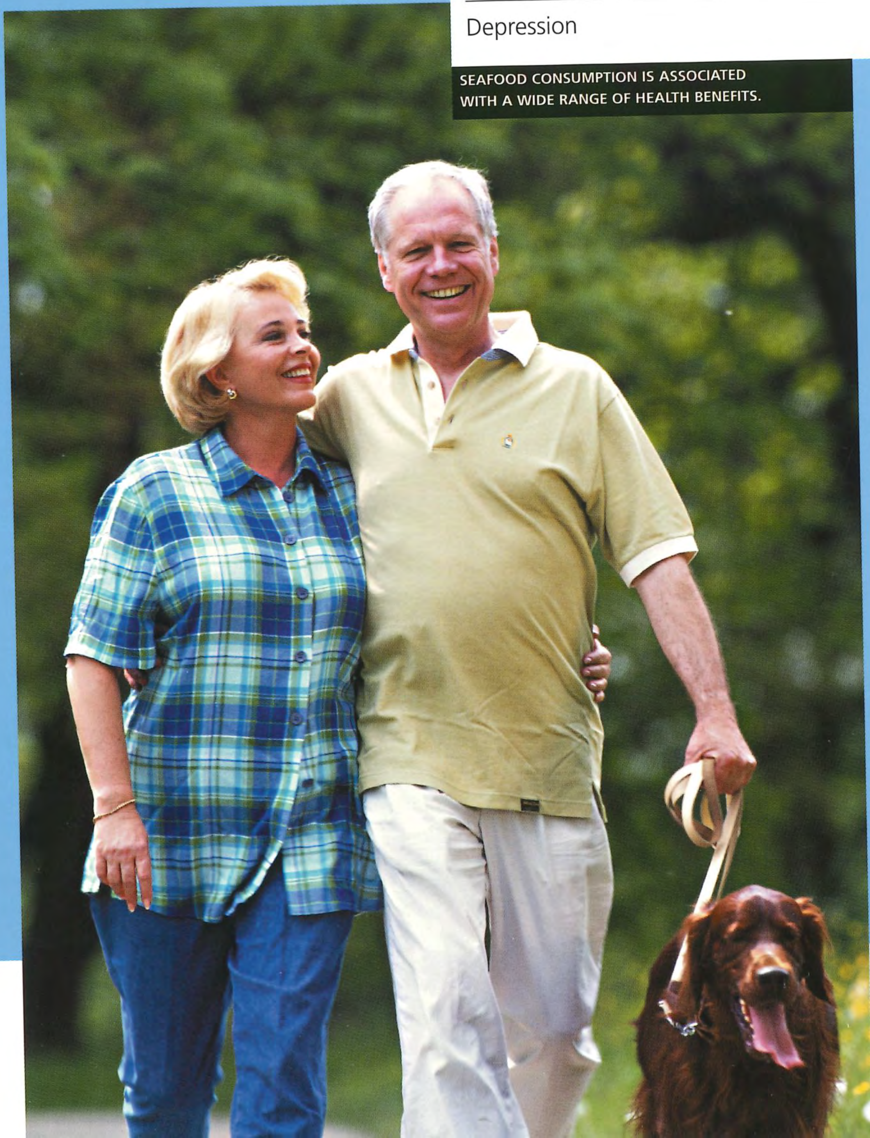
In the last decade it has been observed that the consumption of two or more serves of finfish per week is associated with a lower prevalence of heart disease. This has further highlighted the possibility of additional health benefits associated with eating finfish.

Beneficial effects of seafood consumption have also been reported on other diseases or conditions. These benefits have been linked to the long-chain, highly polyunsaturated Omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which are found in seafood. However, the levels of supporting evidence are different.

The physiological conditions which may benefit from optimal finfish consumption and the level of supporting evidence are summarised in **table 1**. Further details on each condition are provided in Section 2.

TABLE 1: HEALTH BENEFITS ASSOCIATED WITH FINFISH CONSUMPTION AND LEVELS OF SUPPORTING EVIDENCE

Disease or health condition	Strong evidence of significant health benefits	Promising preliminary results	Possible health benefits (require more substantiation)
Coronary heart disease	✓		
High blood pressure	✓		
Irregular heart beat (arrhythmia)	✓		
Diabetes	✓		
Cancer			
Bowel cancer		✓	
Laryngeal cancer			✓
Pancreatic cancer			✓
Asthma		✓	
Rheumatoid arthritis	✓		
Crohn's disease		✓	
Central nervous system			
Neural development		✓	
Memory			✓
Depression			✓



SEAFOOD CONSUMPTION IS ASSOCIATED WITH A WIDE RANGE OF HEALTH BENEFITS.

Seafood is high in beneficial fats

Humans can manufacture some types of fatty acids in the body, but must obtain those essential for good health (the polyunsaturated Omega-3 and Omega-6) from the diet. Omega-3 fats are best found in seafood and plants such as soybean, canola, flaxseed and purslane. Omega-6 fats are also found in seafood of all kinds: crustaceans, molluscs, shellfish and, to a variable extent, finfish. However, plant foods such as sunflower seed, corn and soybean are usually a better source of Omega-6 fats. In recent times, the emphasis in affluent diets has been on polyunsaturated fatty acids of the Omega-6 type, so that the ratio of the Omega-3 to Omega-6 has been too low. Regular seafood intake plays an important role in allowing a healthy ratio of Omega-3 to Omega-6 fatty acids.

To prevent essential fatty acid deficiency, nutritionists generally recommend that humans must consume at least 2.4% of total fat intake as Omega-6 fats, and 0.5–1.0% of total fat as Omega-3 fats. Plants alone may not provide enough essential fatty acids, especially long-chain Omega-3 fats. These are best obtained from seafood.

ESSENTIAL FATTY ACIDS ARE BEST OBTAINED FROM EATING SEAFOOD. SWORDFISH AND ATLANTIC SALMON (PICTURED) ARE TWO SPECIES THAT CONTAIN HIGH LEVELS OF OMEGA-3 FATS.

OMEGA-3 FAT CONTENT OF AUSTRALIAN SEAFOODS

Different types of seafood have different levels of Omega-3 fats. As a general rule, plant-eating finfish have less Omega-3 fats than Omega-6 fats (e.g. 30% Omega-3 and 70% Omega-6 as a percentage of total fat content), whereas carnivorous finfish have more Omega-3 fats than Omega-6 fats (e.g. 70% Omega-3 and 30% Omega-6 as a percentage of total fat content). These Omega-3 fat contents are far higher than the amounts found in plants.

The Fisheries Research and Development Corporation has published three detailed books on Australian commercial seafood and its fat content and composition:

- *Seafood the good food: oil content and composition of Australian commercial fishes, shellfishes and crustaceans*;
- *Australian Seafood Handbook: an identification guide to domestic species*;
- *Australian Seafood Users Manual — making the most of the world's best*.

The contents of Omega-3 fats in various species of seafood, derived from the Australian Seafood Handbook, is shown in **tables 2a and 2b**.

TABLE 2A: OMEGA-3 OIL CONTENTS OF VARIOUS AUSTRALIAN SEAFOOD SPECIES

	Total oil content		
Species	Oil (%)	PUFA* (mg/100g)	DHA (mg/100g)
School shark	0.9	300	250
Swordfish	7.7	1350	550
Snapper	0.6	220	150
Barrumundi	0.9	110	50
Pink ling	0.5	120	80
Spanish mackerel	1.2	400	275
Atlantic salmon	2.7	650	425
Tiger prawn	0.8	180	75
Blue mussel	1.7	330	170
Pacific oyster	1.0	300	150
Sydney rock oyster	1.3	300	160

* PUFA = Omega-3 poly-unsaturated fatty acids

(Nichols et al. 1999, in *Australian Seafood Handbook: Domestic Species*, eds G.K. Yearsley, P.R. Last & R.D. Ward).

TABLE 2B: AMOUNT OF SEAFOOD REQUIRED TO PROVIDE VARIOUS INTAKES OF FISH OILS

	Grams of seafood that must be eaten to obtain the following levels of Omega-3 fats, fish oil and DHA		
Species	1 gram of Omega-3 fats	2.5 grams of fish oil	200 milligrams of DHA
School shark	333	278	80
Swordfish	74	32	36
Snapper	455	417	133
Barramundi	909	278	400
Pink ling	833	500	250
Spanish mackerel	250	208	73
Atlantic salmon	154	93	47
Tiger prawn	556	313	267
Blue mussel	303	147	118
Pacific oyster	333	250	133
Sydney rock oyster	333	192	125

(Nichols et al. 1999, derived from *Australian Seafood Handbook: Domestic Species*, eds G.K. Yearsley, P.R. Last & R.D. Ward).

Seafood is also a good source of other nutrients

SELENIUM

Finfish can be a useful source of dietary selenium, which is now recognised as an essential element for humans. In Australia, low levels of selenium in soils make this particularly relevant. Selenium plays a major role in the enzyme systems that control the accumulation of free radicals in the body. Adequate dietary selenium helps to protect against situations that create substantial oxidative damage to genetic materials, such as exposure to various chemicals and radiation. Selenium deficiency has a characteristic pathology that involves adverse changes to heart muscle.

CO-ENZYME Q10

Although it has been known for more than 40 years that co-enzyme Q10 functions as an anti-oxidant at the sub-cellular level, it has only recently received attention in relation to dietary source. Co-enzyme Q10 concentrations rise under the influence of oxidative stress (e.g. physical exercise) and in degenerative conditions of the brain, such as Alzheimer's disease, whereas it is reported that its concentrations drop in several diseases including degenerative muscle diseases and liver carcinomas. Although co-enzyme Q10 can be synthesised in the body, additional intake from food is required, and finfish is one of the good sources of co-enzyme Q10.

TAURINE

Seafood contains a large amount of taurine. This amino acid is long known for its role in the formation and excretion of bile salts, which are the breakdown products of cholesterol. It also plays a role in the function of the neonatal retina and in cognitive function.

Which one is better — finfish or fish oil supplements?

On the basis of Omega-3 fatty acid content, fish oil is an attractive commodity, because it has a higher concentration of these than the whole finfish. Fish oil can be a useful option for people who are unable to eat seafood, or who cannot eat it in quantities sufficient for their health needs. For example, to achieve the required effects of Omega-3 fatty acids, some people may need to have the equivalent of 2–3 serves (at 100 g per serve) of finfish a day, or about 6–9 grams of finfish fat per day (an average finfish has about 3 grams fat per 100 grams). Such effects may be to reduce the concentration of blood triglyceride (a blood fat), decrease the risk of an abnormal heart rhythm or perhaps correct a mood disorder (depression).

Fish oil may achieve these effects much more conveniently than eating finfish. However, some health effects of finfish are not seen with fish oil. Reduction of high blood pressure is an example; this is thought to be due to the relatively higher proportion of DHA to EPA in finfish compared with that in fish oils. Again, factors from the flesh (muscle) of finfish, other than fatty acids — such as protein and its amino acid content, micronutrients, or co-enzyme Q10 — may be important to health. In finfish there are also factors that are anti-oxidants, which protect the polyunsaturated fatty acids from oxidation — whether before or after ingestion. These may not be as well represented in fish oil, although this can be addressed during processing.

There is a natural constraint as to how much finfish we can eat, but less so (unless because of taste or after-taste) for fish oil. To this extent, it is theoretically possible to have an excessive amount of Omega-3 fats from fish oil. However the larger amounts are normally given under medical supervision, where effects can be carefully managed. Such effects can increase bleeding tendency or increase not only the 'good' cholesterol (HDL) but also the 'bad' cholesterol (LDL), especially in diabetes, while lowering the triglyceride (a favourable outcome).

On the whole it can be said that finfish (and seafood in general) are to be preferred to fish oil, but where larger amounts of Omega-3 fatty acids are needed and finfish intake is a problem, fish oil can play a valuable health role.

Fish oil may achieve effects much more conveniently than eating finfish, but some health effects of finfish are not seen with fish oil.

STEAMING IS RECOGNISED AS A PARTICULARLY HEALTHY METHOD OF COOKING SEAFOOD

Source: DPIQ

Healthy ways to cook seafood

There is really no perfect oil for deep frying. Other cooking methods such as grilling or steaming should be encouraged.

The best ways to cook seafood and maintain its health benefits are by steaming, micro-waving, grilling or baking. If seafood is to be fried, it should be pan-fried in a small amount of oil rather than solid fat (these tend to be more saturated or hydrogenated, and have a higher trans fatty acid content).

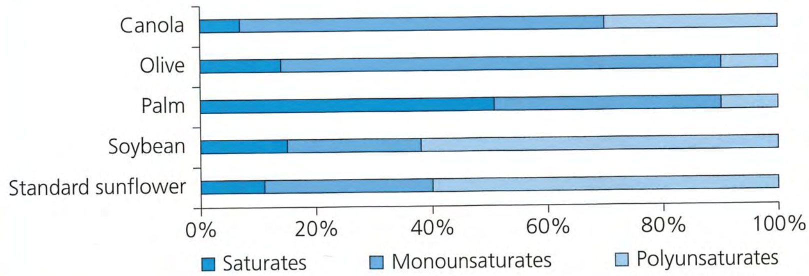
Deep-frying of seafood provides few — if any — health benefits. The important consideration in deep frying is to use oils that are clean and replaced regularly.[2]

Most 'fish and chip' shops use saturated oils as they last longer and are generally cheaper than monounsaturated or polyunsaturated oil. Olive oil (monounsaturated) is generally too expensive, and polyunsaturated oil, with essential fatty acids, may undergo unfavourable chemical changes. There is really no perfect oil for deep frying. Other cooking methods such as grilling or steaming should be encouraged.

The cooking temperature of oil is important. For example, with chips that are often served with finfish, if the cooking oil temperature falls below 180–185°C, up to 40% more fat is absorbed into the chip (or about 3 teaspoons of extra fat — amounting to about 100 calories or 420 kilojoules — in a single serve of chips). Table 3 shows the relative contents of saturated, unsaturated and monounsaturated oils in various cooking oils.

TABLE 3: RELATIVE PERCENTAGES OF FATS IN COMMON COOKING OILS.

	Saturates	Monounsaturates	Polyunsaturates
Canola oil	7	63	30
Olive oil	14	76	10
Palm oil	51	39	10
Soybean oil	15	23	62
Standard sunflower oil	11	29	60



Source: Peerless Holdings Pty Ltd

2 Poly-unsaturated oils oxidise with repeated heating and cooling, and should therefore be used only two to three times before changing.

Finfish do not lose their positive health benefits by being canned. Finfish canned in fish oil have a particular advantage, but are now less available in the market place. Finfish canned in olive or canola oil bring with them the health benefits of these oils; canned in brine or spring water, there are less calories.

Finfish do not lose their positive health benefits by being canned.

Cooking seafood with various herbs may also be beneficial to health — for example, supplementing seafood with garlic can significantly lower cholesterol and triglyceride levels. Herbs are normally anti-oxidants as well, and can help to preserve the essential fatty acid value of seafood and reduce the formation of potentially harmful heterocyclic amines (derivates of amino acids in proteins) if it is over-cooked.

Nutritionists increasingly advocate the use of a Mediterranean diet (which contains seafood) as a healthy diet for people at risk or suffering from coronary heart disease. Seafood is important in disease prevention but should not be considered in isolation. It has a premium place in a healthy diet for most people.

WHAT IS THE MEDITERRANEAN DIET?

The Mediterranean diet consists of:

- more bread,
- more vegetables and legumes,
- more seafood,
- less meat (beef, lamb, pork) — replaced by poultry,
- no day without fruit,
- no butter or cream, and
- olive oil or other monounsaturated oil source.

Seafood is important in disease prevention but should not be considered in isolation. It has a premium place in a healthy diet for most people.

Other key messages

ONE TO FOUR SERVES A WEEK ARE PROBABLY BEST

Several studies now demonstrate that even a limited finfish intake — say one serve (about 100 g) per week — is better than none, especially in relation to heart disease. Up to four serves a week may be useful in some health respects, such as blood pressure control. The amount recommended will depend not only on benefits but also on risks. For example, heavy-metal toxicity may be avoided with modest intake while the nutritional benefits of finfish are preserved.

With crustaceans, shellfish and molluscs, the concerns felt by some people about cholesterol content are hardly relevant with occasional intake (say weekly); and of even less concern where the cooking technique and food habits avoid the use of saturated animal fat (as with deep frying and fatty spreads).

Message: Have between one and four serves (about 100 grams per serve) of finfish a week, because increasing health benefits may be seen across this range of intake.

Concerns about cholesterol content of crustaceans and shellfish are hardly relevant with occasional intake, and of even less concern when saturated animal fat is avoided.

BENEFIT OF SMALL PORTIONS

When preferred, convenient, more affordable or culturally appropriate, serving sizes smaller than 100 grams of finfish can be used in a cumulative way for health over the day or over a few days. Examples would be sushi, marinated herrings or small tins of finfish such as sardines.

Message: Small serves of finfish as a snack or meal adjunct are healthful.

Photographer Clifford Young

HEAVY METALS AND CONTAMINANTS

Sea creatures near the top of the food chain and 'filter feeders' such as molluscs — normally accumulate certain heavy metals (notably mercury), mainly as organic compounds. Where water has been polluted by manufacturing or mining, the amounts can be unacceptable and intolerable from a human health point of view. The most vulnerable is the human foetus, so that pregnant women need to take as much care as they can to ensure that seafood comes from areas with pollution controls.

However, many components of seafood are very important for foetal development — for example protein and its amino acids, Omega-3 fatty acids, iodine and calcium. Therefore, having up to 400 grams per week of finfish during pregnancy is normally safe and beneficial to the foetus.

Message: Consider up to about 400 grams of finfish a week as safe in relation to heavy metals (such as mercury) or other contaminants, unless the finfish is harvested from an area without pollution controls. This guideline is relevant to pregnancy, as well as for adults in general; children will generally have somewhat smaller portions.

[More information is on page 27.]

SUSTAINABILITY

As the health evidence for regular seafood intake becomes clearer and more widely known, demand will increase and wild-caught seafood stocks will be under greater pressure. Optimising intake for the greatest majority globally will be important. As will the methods of harvesting and farming seafood. Another consideration will be the maintenance of aquatic biodiversity to which the interest in, and acceptability of, a variety in seafood intake will also contribute. A more contemporary science-based education program about the health benefits of finfish, crustaceans, shellfish and sea plants will promote biodiversity and, with it, sustainability.

A useful source of information on sustainability factors in the fishing industry is *Investing for tomorrow's fish: the FRDC's research and development plan, 2000 to 2005*. It is available from the FRDC on telephone: 02 6285 0400 or at www.frdc.com.au.

Message: Eat a variety of seafood as part of a varied diet for its health benefits — both direct and indirect — which are achieved by encouraging biodiversity and sustainability.

Section 2 More detailed information on seafood and specific conditions

Finfish and mortality

In the early 1970s, evidence was emerging that finfish intake had important health implications. Most studies focused on protection by finfish against heart disease and consequent death. It was demonstrated in a clinical controlled trial that, for those who recovered from heart attacks, consuming fatty finfish two or three times a week could reduce overall mortality by nearly one-third after two years.

Similarly, in another trial, with supplements of marine Omega-3 fats, total mortality was reduced by 20%, cardiovascular death by 30%, and sudden death by 45%. The Mediterranean diet, which includes a recommendation for eating moderate amounts of finfish, has also been shown to be more effective than a low-fat diet in protecting against sudden cardiac death.

Studies indicate that one or two serves of finfish per week can substantially lower the risk of coronary heart disease.

Finfish and heart disease

Coronary heart disease is a major cause of death and disability in Australia. While many individual factors are involved in the onset and progression of the disease, including genetics and lifestyle, the positive benefits of finfish in reducing the risk of coronary heart disease have been widely studied and are now well accepted. However, it is important to emphasise that no single food will cause or prevent coronary heart disease.

Studies have found that decreased risk of death from heart attack is related to increased finfish consumption. In one study, finfish consumers had less than half the mortality rate of people who ate no finfish. The highest rates of heart disease have been recorded for men who ate no finfish at all. These studies indicate that one or two serves of finfish per week can substantially lower the risk of coronary heart disease.

Prevention of coronary heart disease through diet relies on a combination of the following strategies:

- reducing total serum (blood) cholesterol,
- reducing serum LDL cholesterol and increasing serum HDL cholesterol,
- minimising LDL oxidation,
- optimising blood pressure,
- minimising heart arrhythmia,
- improving blood flow, and
- preventing obesity.

The following sections discuss the benefits of finfish consumption on key factors in coronary heart disease, including:

- secondary prevention of coronary heart disease,
- nitric oxide production,
- cholesterol,
- heart arrhythmia,
- blood composition, and
- high blood pressure.

SECONDARY PREVENTION OF CORONARY HEART DISEASE

After someone has had a heart attack, it is very important to prevent further damage that may bring about another heart attack. Steps taken to lower the risk of another heart attack are called secondary prevention measures.

Secondary prevention has presented many challenges to researchers and most research has been unrewarding. However, one study achieved results from increasing the intake of Omega-3 fish oils. Further studies have shown that a Mediterranean diet that includes 47 grams of finfish per day can reduce the incidence of recurring heart attack — even compared with a low-fat diet. People on the Mediterranean diet consumed less fat, saturated fat, cholesterol and linoleic acid, but significantly more oleic acid and alpha-linolenic acid (a plant Omega-3 oil). This resulted in far lower heart attack and death rates in the five-year follow-up period. In fact, only two years into the study the researchers found the results so striking that they stopped the trial and recommended that all the participants follow the Mediterranean diet.

People on a Mediterranean diet in a trial had far lower heart attack and death rates in the five-year follow-up period than people on a low-fat diet. Two years into the study, the results were so striking that the trial was stopped; all participants were recommended to follow the Mediterranean diet.

NUTRITIONISTS INCREASINGLY ADVOCATE THE USE OF A MEDITERRANEAN DIET (WHICH INCLUDES SEAFOOD) FOR PEOPLE AT RISK OR SUFFERING FROM CORONARY HEART DISEASE.

Source: Corbis Images

CHOLESTEROL FROM SEAFOOD AND BLOOD CHOLESTEROL

Most studies confirm that increasing dietary cholesterol results in higher blood cholesterol, and is associated with increased heart disease risk. This is particularly so when combined with eating saturated fat. Only 15% of the population experience increases of blood cholesterol greater than 10%. There are a number of factors modulating this effect. Gender, age and distribution of body fat can influence the way the body handles cholesterol from food. Another is the fatty acid composition of the diet. Two classes of dietary fatty acids can raise blood cholesterol: saturated fats (mostly from animal foods, such as meats) and *trans*-monounsaturated fats (produced by hydrogenation of vegetable oils).

Cholesterol in the body is transported by low-density lipoproteins (LDL) and high-density lipoproteins (HDL). Cholesterol-laden LDL is deposited in part of the wall of blood vessels. The accumulation of LDL can cause tissue damage and, as a result, the artery becomes completely blocked. If this happens to the arteries of the heart (coronary arteries), it leads to a heart attack. For this reason, LDL cholesterol is considered to be 'bad' cholesterol — although it is not *all* bad since the body requires some LDL cholesterol for body metabolism.

In contrast, HDL cholesterol is considered to be 'good' cholesterol, as HDL helps to remove LDL cholesterol from the body. High cholesterol, high LDL and low HDL levels are risk factors for heart disease. High triglycerides in combination with these factors multiply this risk further.

Furthermore, LDL can undergo a chemical reaction of *oxidation*, which is enhanced by certain reactive molecules normally produced as part of the defence system, and as the by-products of metabolic processes that utilise oxygen. This 'oxidised' LDL has been implicated in hardening of the arteries and arterial damage. LDL oxidation appears to be influenced by the type of fats we eat and minimised by the intake of various anti-oxidant foods. Whilst replacing saturated fat with Omega-6 fats is a healthy strategy, a healthier strategy would be to reduce the amount of dietary saturated fats and Omega-6 fats in the diet by replacing some of these with Omega-3 fats from seafood which also contains its own natural anti-oxidants such as vitamin E, carotenoids and co-enzyme Q10.

Seafood should be combined with a diet rich in fruit and vegetables.

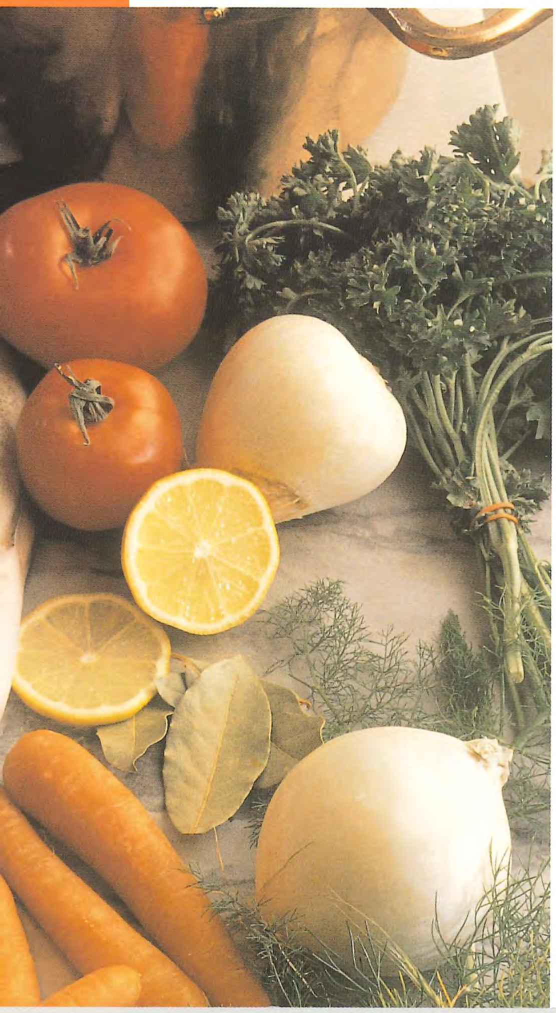
ANTI-OXIDANTS IN VEGETABLES ENHANCE THE BENEFITS OF OMEGA-3 AND OMEGA-6 FATS FOUND IN SEAFOOD.

Anti-oxidants — such as vitamin C, E, beta-carotene and certain compounds found in fruits and vegetables — are crucial in protecting the body against the process of oxidation. The amount of anti-oxidants in the body protects against unwanted oxidation of the fats in seafood. Hence, to maximise the benefits of Omega-3 and Omega-6 fats, anti-oxidants should be eaten as well. To further enhance the intake of anti-oxidants, seafood intake should be combined with a diet rich in fruit and vegetables.

The general dietary approach for lowering blood cholesterol is to limit cholesterol intake to less than 300 mg per day and reduce dietary fat, especially animal saturated fat. Low-fat diets also reduce the protective HDL levels. If the person has high blood cholesterol, intake is restricted further, to less than 200 mg per day.

People at risk of developing coronary heart disease are often advised to only rarely eat crustaceans (prawns, crabs, lobsters) because these foods contain high cholesterol. However, it should be noted that oysters, clams, mussels and crab can be found to be suitable for diets that lower blood cholesterol, in combination with a reduced saturated fat intake. Moreover, their Omega-3 fat content provides protection against heart disease by means other than the effects on blood cholesterol.

Use of seafood in conjunction with low-fat diets can increase HDL cholesterol and reduce triglycerides; therefore, use of seafood may be more suitable for reducing the risk of coronary heart disease than a low-fat diet on its own. Some of the disadvantages of a low-fat diet are avoided by supplementation with fish oil.



FISH OIL MAY HELP TO IMPROVE BLOOD FLOW

Blood flow in injured arteries is restricted by the hardening of blood vessels caused by the deposition of fatty plaques and calcium in the arterial wall. Nitric oxide, which is a major contributor to dilation of blood vessels, can ease the blood flow. Injured parts of an artery wall produce much less nitric oxide.

Fish oils are thought to increase nitric oxide levels released by blood vessel tissue (especially when it has been injured), and to locally relax blood vessels. Other research shows that Omega-3 fish oil helps to dilate the coronary artery in heart transplant patients. In patients with non-insulin dependent diabetes mellitus, the oil also improves blood flow in the forearm — indicating protection against blood vessel constriction and thrombosis.

FINFISH PROTECTS AGAINST HEART ARRHYTHMIA

Many scientists consider that Omega-3 fats from finfish may help to prevent disruptions to the rhythm of the heart (heart arrhythmia or ventricular fibrillation). In one study, patients who had recently suffered a heart attack were given 5.2 grams per day of fish oil. Heart rates were examined for variability, since such variability protects against ventricular arrhythmia. It was found that fish oil had the beneficial effect of increasing heart rhythm variations in the patients.

There is considerable evidence that the consumption of Omega-3 fat-enriched diets leads to a marked reduction in the susceptibility of the heart muscle to develop heart arrhythmia and subsequent sudden cardiac death.

FINFISH AND HIGH BLOOD PRESSURE

Early studies on the effect of fish oil supplements on high blood pressure showed significant lowering of blood pressure. However, other studies have shown no — or relatively small — effects on blood pressure. It is suggested that in severe and life-threatening situations, fish oil may be useful for rapid exchange of Omega-3 fats for Omega-6 fats to help normalise blood pressure and a range of other risk factors for myocardial infarction (heart attack).

One study has shown that in overweight people with high blood pressure, incorporating finfish into a weight-reduction diet has additive effects in reducing blood pressure, as well as beneficial effects on heart rate. These effects may be due in part to constituents of finfish other than Omega-3 fats, such as finfish protein. It was recently reported in an animal model study that Omega-3 fats supplied in the early development period can affect blood pressure later in life.

There is considerable evidence that the consumption of Omega-3 fat-enriched diets leads to a marked reduction in the susceptibility of the heart muscle to develop heart arrhythmia and subsequent sudden cardiac death.

Seafood and other diseases or conditions

FINFISH AND RHEUMATOID ARTHRITIS

Rheumatoid arthritis is a painful and debilitating illness. In its most severe forms, it can shorten life expectancy. However, recent studies have indicated that increased consumption of finfish may improve symptoms of rheumatoid arthritis. Comparisons between people who live in the Faroe Islands in the northern Atlantic and mainland Nordic countries show that people from the Faroe Islands have a much lower prevalence of rheumatoid arthritis. This lower prevalence is associated with higher finfish consumption and much lower meat, dairy and vegetable consumption. The inhabitants of the Faroe Islands also consume significant amounts of whale meat and fat, further increasing their intake of Omega-3 fats.

Supplementing diet with Omega-3 fats while patients have continued with their usual medications has improved symptoms. In addition, supplementing diet with EPA and DHA decreases the need for non-steroidal anti-inflammatory drugs. Omega-6 fat content in the patient's diet, and drug therapy, affect how well the medication works. Therefore, Omega-3 fats may potentially allow medication dosages to be decreased.

FINFISH AND OBESITY

Obesity in Australia is generally a reflection of changing lifestyles: more Australians than ever before are obese. Being overweight is unhealthy, often leading to serious problems such as diabetes, coronary heart disease and cancer. Diet and physical activity are regarded as the most important factors in obesity.

IN ADDITION TO BEING LOW IN SATURATED FAT, SOME STUDIES SHOW THAT INCREASED FINFISH INTAKE MAY PROTECT AGAINST OBESITY AND GLUCOSE INTOLERANCE.

Total dietary fat is a large contributor to obesity. Hence, low fat diets are popular for reducing weight. However, the type of fat consumed is just as important as the total fat consumed. The popular belief that all fats contribute to weight gain is not accurate — whether the fats are unsaturated or saturated significantly affects their contribution to weight gain. Some studies also show that increased finfish intake may protect against obesity and glucose intolerance.

Finfish is a protein source that has low saturated fat content and can contribute usefully to calorie-controlled weight loss diets, particularly when it replaces high-fat sources of protein.

Important: Capsules of Omega-3 oil with dosages between 4 and 10 grams per day may increase blood sugar levels in people with diabetes, although other benefits, such as the reduction in certain risks for coronary heart disease, usually outweigh this consideration. People with diabetes should consult their medical practitioner.

Finfish is a protein source that has low saturated fat content and can contribute usefully to calorie-controlled weight loss diets, particularly when it replaces high-fat sources of protein.

FISH OIL AND CROHN'S DISEASE

Crohn's disease is characterised by inflammation, thickening and ulceration of any part of the intestine. Inflammation of the liver, kidneys, joints, eyes and skin can also occur. Patients suffer bouts of illness interspersed with periods of remission. In Japan, increasing incidence of Crohn's disease has been associated with increased dietary intake of fat, animal fat, Omega-6 fats, animal protein and milk protein, increased proportions of Omega-6 compared to Omega-3, and decreased dietary intake of Omega-3 fats.

A study of Crohn's disease patients who consumed fish oil (2.7 g per day of Omega-3 fatty acids) showed significantly higher remission. Using fish oils to treat Crohn's patients requires substantially more fish oil than can be obtained from eating finfish. Consequently, fish oil capsules are usually required. The need for capsules rather than fresh finfish to treat Crohn's disease patients is evident from findings showing that countries with high finfish consumption also have quite appreciable incidences of Crohn's disease. Patients with Crohn's disease should consult their physician for advice on the amount of fish oil they should consume.

FINFISH AND ASTHMA

Dietary factors have been implicated in increasing rates of asthma in children and young adults over the last two decades. The effects of eating finfish on development and prevention of asthma require substantial research to be conducted before strong claims can be made. However, a recent study found that children who consumed fresh (not canned) finfish had a lower risk of developing asthma. The evidence is not clear as to which components of finfish might be important in asthma prevention. Studies into the effect of fish oil on patients who already have asthma have been inconclusive.

SEAFOOD AND CANCER

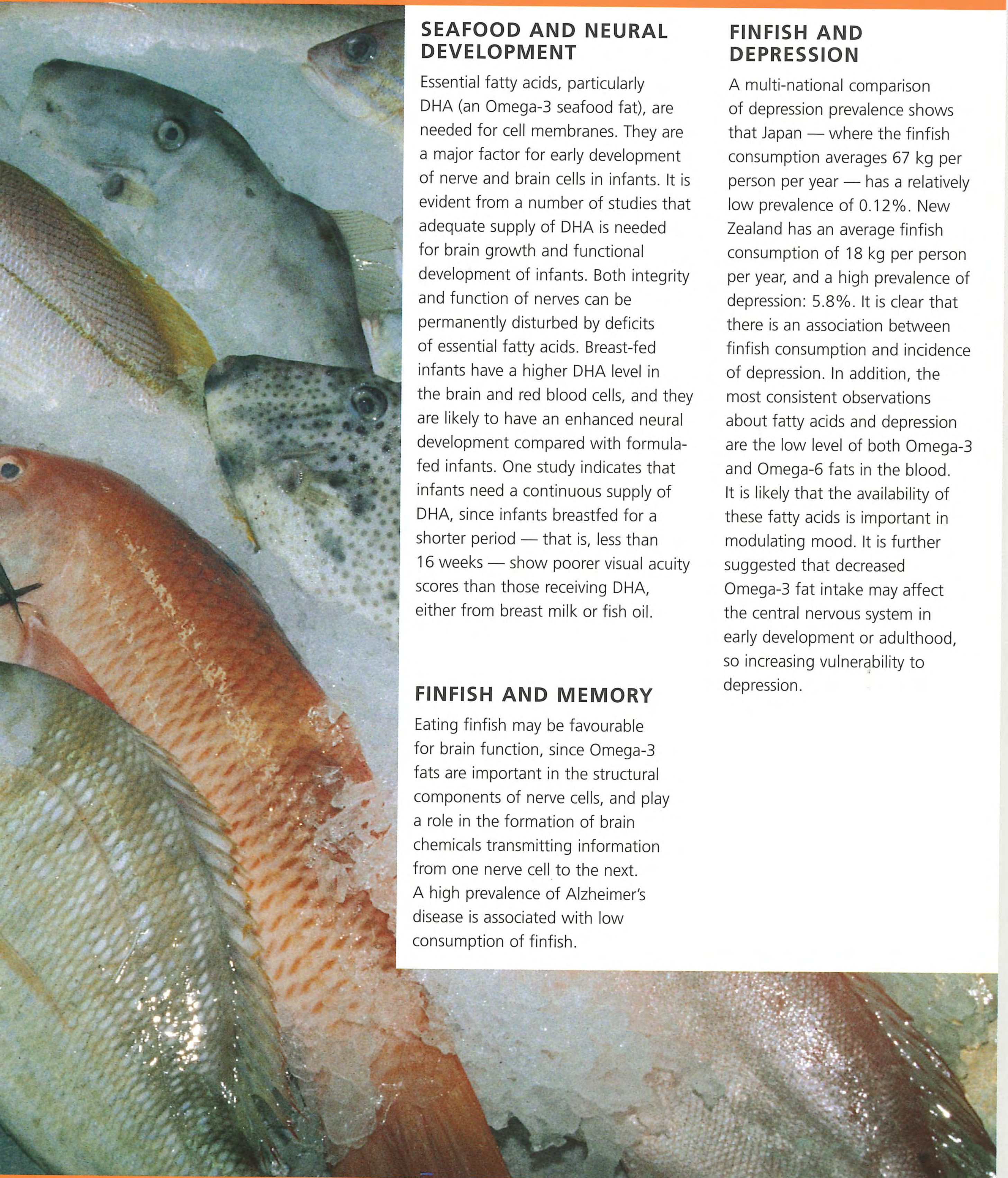
Many foods and nutrients have been studied for good and bad effects on the risk of bowel cancer. These include red meat (especially charred), fruits and vegetables, dietary fibre, fat and alcohol. Although dietary fat is considered to be a risk factor for bowel cancer, indications are that EPA and DHA intakes are associated with a decreased risk of bowel cancer. It is thought that the long-chain polyunsaturated fatty acids in fish oil suppress the formation of inflammatory metabolites in the gut. Inflammation may decrease the immune surveillance. This immune surveillance reduces the growth of cancer cells. Thus seafood consumption may be protective against this disease.

Studies have also indicated that fish oil may also be associated with a decreased risk of developing laryngeal and pancreatic cancer. However, these findings require more substantiation before strong claims can be made.

SEAFOOD AND DIABETES

People with diabetes have an increased risk of developing heart and other cardiovascular diseases. Consequently, diabetes and heart disease management require a combined strategy. Omega-3 seafood fats have a positive effect on heart disease risk factors such as platelet aggregation, blood pressure and plasma lipoprotein metabolism. In people with diabetes, caution needs to be exercised in supplementation with Omega-3 fish oil capsules (where 1 gram of fish oil is about 30% Omega-3 fatty acids). This is because dosages between 4 and 10 grams per day (equivalent to or more than 1–3 serves of seafood per day) may result in increased levels of blood sugar (glucose). However, lower doses (2.5 grams per day) have been shown not to increase blood sugar levels, although they still provide useful effects on heart disease risk factors. Generally, eating seafood does not create a problem and is actually an advantage.

Omega-3 fat intake can reduce insulin resistance in skeletal muscle. A high dietary proportion of Omega-6 and Omega-3 fats has been implicated in increased insulin resistance; hence, an increase in dietary Omega-3 fats from seafood may address this.



SEAFOOD AND NEURAL DEVELOPMENT

Essential fatty acids, particularly DHA (an Omega-3 seafood fat), are needed for cell membranes. They are a major factor for early development of nerve and brain cells in infants. It is evident from a number of studies that adequate supply of DHA is needed for brain growth and functional development of infants. Both integrity and function of nerves can be permanently disturbed by deficits of essential fatty acids. Breast-fed infants have a higher DHA level in the brain and red blood cells, and they are likely to have an enhanced neural development compared with formula-fed infants. One study indicates that infants need a continuous supply of DHA, since infants breastfed for a shorter period — that is, less than 16 weeks — show poorer visual acuity scores than those receiving DHA, either from breast milk or fish oil.

FINFISH AND MEMORY

Eating finfish may be favourable for brain function, since Omega-3 fats are important in the structural components of nerve cells, and play a role in the formation of brain chemicals transmitting information from one nerve cell to the next. A high prevalence of Alzheimer's disease is associated with low consumption of finfish.

FINFISH AND DEPRESSION

A multi-national comparison of depression prevalence shows that Japan — where the finfish consumption averages 67 kg per person per year — has a relatively low prevalence of 0.12%. New Zealand has an average finfish consumption of 18 kg per person per year, and a high prevalence of depression: 5.8%. It is clear that there is an association between finfish consumption and incidence of depression. In addition, the most consistent observations about fatty acids and depression are the low level of both Omega-3 and Omega-6 fats in the blood. It is likely that the availability of these fatty acids is important in modulating mood. It is further suggested that decreased Omega-3 fat intake may affect the central nervous system in early development or adulthood, so increasing vulnerability to depression.

Seafood and women's health

RESEARCH HAS INDICATED THAT SEAFOOD CONSUMPTION MAY HAVE A RANGE OF BENEFITS FOR WOMEN DURING PREGNANCY AND LACTATION.

Much of the research on heart disease has concentrated on men, since they have a higher risk of developing this disease. However, women also develop coronary heart disease. A recent study into the effects of various foods on heart disease risk in women found that eating foods such as meat, salami, butter and coffee was associated with increased coronary heart disease risk. Eating foods such as carrots, fresh fruit, green vegetables, finfish and moderate alcohol reduced risk. In addition, women who ate finfish more than once per week had a 40% lower chance of developing heart disease than those who consumed finfish less than once per week.

Research has also indicated that seafood consumption may have a range of benefits during pregnancy and lactation. During pregnancy, the foetus requires large amounts of Omega-3 fatty acids and obtains them from the mother. In general, DHA levels get progressively lower as the pregnancy becomes more advanced. Furthermore, maternal DHA levels are higher in women during their first pregnancy compared with levels in subsequent pregnancies. As a result, first-born children have a higher DHA status than that of following children. It appears that the mother's DHA source is not easily replenished in time for subsequent pregnancies and if the mother breastfeeds, this replenishment is likely to take longer.

DHA is found in breast milk and the levels in breast milk are predicted by how much seafood the mother eats. In one study, breast-feeding mothers achieved an average DHA level in breast milk of 0.46% by consuming 400 milligrams per day of DHA (equivalent to 97 grams of Atlantic salmon). A level of 1.13% was achieved by consuming 1300 milligrams per day.

It is important to ensure adequate intake of Omega-3 fatty acids during pregnancy and lactation, to top up maternal DHA stores. Increasing the intake of essential fatty acids during pregnancy and lactation will benefit both mother and child. The DHA status in premature infants has been positively related to head circumference, birth weight and birth length. Increasing the foetal DHA status could promote foetal growth, thereby improving the survival chances of premature infants.

It is important to ensure adequate intake of Omega-3 fatty acids during pregnancy and lactation, to top up maternal DHA stores.

Furthermore, fats from seafood have an important role in development of nerve cells in infants. It is therefore advisable for pregnant or breast-feeding women to increase their seafood consumption. A number of studies indicate that breast-fed infants have enhanced neural (brain) development compared with formula-fed infants. DHA is thought to contribute to enhanced neural development since breast milk contains this oil but, until recently, artificial formulae did not. In one study, the DHA content of red blood cell membranes in infants who were breast-fed or had their formula supplemented with fish oil remained the same as the levels at birth. However, infants who only consumed unsupplemented formula showed significant decreases in DHA levels.

Seafood and older people

Seafood, because it is high in nutrient density, has an important role to play in diets designed to maintain health and well-being as people get older. Studies from three countries with relatively low intakes of finfish indicate that finfish intake is associated with reduced risk of death from coronary heart disease. Of particular note are the benefits of even small levels of finfish intake. Middle-aged men who ate no finfish were at a much higher risk than those who ate finfish once or twice per week. One study showed that older people who regularly ate 24 grams of finfish per day (127 milligrams of Omega-3 fats, or 58 grams of snapper) had about half the chance of dying from coronary heart disease as those who ate no finfish.

Seafood and indigenous Australians

Indigenous Australians are at particular risk of developing type II diabetes, having up to six times the rates of Australians of European descent. Research showed that remarkable improvements to diabetes and coronary heart disease risk factors can result from changing the diet. In the research, ten indigenous Australians with diabetes changed from a modern Western diet (high in fat and low in unrefined carbohydrate) to a more traditional diet (low in fat, low in saturated fat and high in dietary fibre). The group lost an average of 8 kg over the seven-week period, and had significant improvements in glucose tolerance and insulin sensitivity. Of the total energy in the traditional diet, 19% was derived from finfish.

Heavy metals in seafood

The health hazards associated with the consumption of seafood contaminated with heavy metals such as mercury have received world-wide publicity. Large carnivorous finfish such as tuna, swordfish and some species of shark eat smaller plant-eating finfish. Further up the food chain, these heavy metals can become more concentrated in the flesh of the finfish. Problems have only arisen when individuals eat large amounts of finfish that have fed in contaminated waters. There have been no reported cases of mercury poisoning in Australia as a result of seafood consumption. In Australia, two separate limits for mercury, as prescribed by the Australian Food Standards Code, are imposed for seafood:

- 1.0 mg/kg for finfish that are known to contain high levels of mercury (such as swordfish, southern bluefin tuna, barramundi, ling, orange roughy, rays and shark), and
- 0.5 mg/kg for all other species of finfish, crustaceans and molluscs.


NOW SERVING
13520 QUALITY UNIDEX SERIES
Morgans
BREAM FILLETS
$14-99 kg
ATLANTIC SALMON FILLETS
$29-99 kg
SKINNED KING SNAPPER FILLETS
$21-99 kg
OCEAN TROUT FILLETS
ICE FISH FILLETS
$9-99 kg
DORY FILLETS
$19-99 kg
WHITING FILLETS
CORAL TROUT FILLETS
MACKEREL FILLETS

Section 3 Guidelines for communication about seafood nutrition

This section summarises what can and cannot be said about the health benefits of seafood. If you are involved in marketing seafood, you should read this section carefully.

The two main influences on what seafood marketers can say about their product are:

- what the law specifies they can say; and
- within those constraints, what is in the interests of 'good practice' for their customers, themselves, and the seafood industry.

This section of the book provides information under these two headings. The information was prepared in September 2001. It is important for seafood marketers to keep up with developments: contact the Australia New Zealand Food Authority through its website (http://www.anzfa.gov.au) or telephone (02 6271 2222).

Legal restraints on what you can say

In Australia the Food Standards Code, prepared by the Australia New Zealand Food Authority (ANZFA) and approved by the Council of Health Ministers with input from agriculture and fisheries ministers, is the primary source of information on food regulation. ANZFA is an independent, bi-national statutory authority.

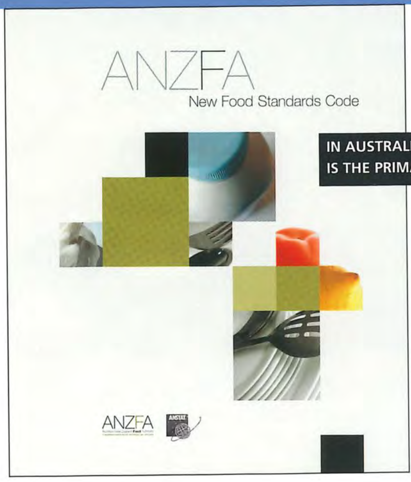
The ANZFA Act lists three objectives of food regulation. In order of priority they are:

- protection of public health and safety,
- provision of adequate information relating to food to enable consumers to make informed choices, and
- prevention of misleading or deceptive conduct.

This last objective is also the cornerstone of the *Trade Practices Act 1974*, administered by the Australian Competition and Consumer Commission (ACCC). As this Act has a much wider charter than food, ANZFA generally defers to the Trade Practices Act. For example, the terms 'Product of Australia' or 'Made in Australia' are defined by the Trade Practices Act.

The Food Standards Code is the primary source of reference on what can and cannot be said when promoting the health and nutrition benefits of seafood.

Over a number of years, ANZFA developed a new Food Standards Code to harmonise food standards between Australia and New Zealand. It was intended to be less prescriptive, thus allowing greater innovation, but at the same time require more consumer information on labels.



IN AUSTRALIA, THE FOOD STANDARDS CODE, PREPARED BY ANZFA IS THE PRIMARY SOURCE OF INFORMATION ON FOOD REGULATION

The new Joint Australia New Zealand Food Standards Code was gazetted in December 2000. A transitional standard allows food producers the choice of preparing any particular food to meet the requirements of Volume 1 (the old code) or Volume 2 (the Joint Code) during the transitional period up to December 2002. At the time of writing (September 2001), a seafood processor could, for example, pack raw product to Volume 2 requirements and cooked product to Volume 1 requirements — but not to a combination of the two codes.

It is expected that the Joint Code will eventually be the sole code. Accordingly, to minimise confusion, the following comments on particular elements of the Code refer to the requirements of Volume 2 (the new Joint Code). They only refer to Volume 1 where the requirements differ.

Nutrition information in relation to food marketing falls into the following three categories:

- *Health claims*: suggestions that food or nutrient is good for health or can prevent, treat or cure a disease.
- *Nutrition claims*: declaration of amounts of nutrients — for example, 'low fat' and 'cholesterol free'.
- *Nutrition labelling*: inclusion of nutrient composition on a label.

Important: In the Australia New Zealand Food Standards Code '**fish**' means any of the cold-blooded aquatic vertebrates and aquatic invertebrates including shellfish, but does not include amphibians and reptiles.

In Australia it is illegal to make health claims in relation to food.

HEALTH CLAIMS

Standard 1.1.3 of the Food Standards Code includes the requirement that any label on a package containing food, or any advertisement for food, is not to:

- include a claim for therapeutic or prophylactic action or a claim described by words of similar import;
- include the word 'health' or any word or words of similar import as a part of or in conjunction with the name of the food;
- contain any word, statement, claim, express or implied, or design that directly or by implication could be interpreted as advice of a medical nature from any person; or
- contain the name of, or a reference to, any disease or physiological condition.

The regulation is based on the fact that no single food can markedly influence health; it is the total diet that matters. 'Stop heart attacks — eat fish!' is an example of the claims that ANZFA wish to prevent.

However, the regulation does not prevent information on the Omega-3 content of seafood being made available to the public, or pamphlets containing information on the factual health benefits of Omega-3 fats in the diet.

The consumer may make the connection between the health benefit of Omega-3 and consuming seafood, but the proprietor cannot make that connection for them.

ANZFA is considering a proposal to allow health claims in food labels and advertisements under certain conditions. A pilot system for the management of health claims has been introduced by allowing claims for the benefits of folate supplementation of certain foods. At the time of writing (September 2001), the Food Regulations Standing Committee (comprising senior officials from the Commonwealth, New Zealand and Australian states and territories) is developing policy for health and nutrition claims.

Regulations do not prevent information on the Omega-3 content of seafood being made available to the public, or pamphlets containing information on the factual health benefits of Omega-3 fats in the diet. The consumer may make the connection between the health benefit of Omega-3 and consuming seafood, but the proprietor cannot make that connection for them.

NUTRITION CLAIMS

Standard 1.2.8, Nutrition Information Requirements, covers:

- nutrition information that must be provided on food labels, and
- the specific conditions for making certain nutrition claims.

In the old code (Volume 1), nutrition information on labels was only required if a nutrition claim was made. In the new code (Volume 2) most packaged foods must now display a nutrition information panel. Exemptions are unpackaged food and "fish that comprise a single ingredient or category of ingredients".

Thus, unpackaged seafood at the deli does not need nutrition information. Packaged salmon fillets do not need a nutrition information panel, but packaged smoked salmon and packaged crumbed finfish will need one because finfish is not the sole ingredient.

A nutrition information panel must provide information on energy, protein, fat, carbohydrate and sodium in a format prescribed by the standard. For detailed requirements, refer to Standard 1.2.8.

Once a 'nutrition claim' is made, the exemptions do not apply. A nutrition claim relates to the function, presence or absence of a nutrient in a food. A statement that 'Atlantic salmon is a good source of Omega-3 fatty acids' is considered a nutrition claim. A claim that 'canned sardines are a good source of calcium' or a label declaring 'reduced salt' canned tuna are also nutrition claims.

Some nutrition claims are specifically regulated in Standard 1.2.8. Other claims — for example, 'low fat' — are prescribed in the industry-developed *Code of Practice on Nutrient Claims in Food Labels and in Advertisements*. Although this Code of Practice is not itself legally enforceable, any false or misleading claims could be subject to action under the Trade Practices Act. ANZFA is currently reviewing nutrient claims, particularly the advantages and disadvantages of regulation versus codes of practice.

Standard 1.2.8 and the Code of Practice should be reviewed for details of the nutrition claims that are possible.

OMEGA-3 SOURCE CLAIMS

Recognising the intrinsic presence of Omega-3 fatty acids in seafood, ANZFA allows certain 'Omega-3 source' claims to be made under specific conditions, as follows.

Claiming 'a natural source of Omega-3 fatty acids'

A 'natural source of Omega-3 fatty acids' claim may be made for seafood products with no added fat, such as fresh finfish fillets.

The claim can be made on a packaged or unpackaged seafood product without requiring a nutrition information panel or a specific minimum content of Omega-3 fatty acid.

Claiming 'a good source of Omega-3 fatty acids'

Three sets of conditions apply to 'good source' claims:

- *Unprocessed product*. A 'good source of Omega-3 fatty acids' claim may be made on fish or fish products with no added saturated fatty acids, such as a fresh finfish fillet, when the total level of EPA and DHA exceeds 60 mg per serve. Atlantic salmon, for example, has a total EPA and DHA level of more than 500 mg per 100 grams and less than 1% of saturated fat. Even one-eighth of a normal serve would therefore contain more than the 60 mg of EPA and DHA necessary to justify a 'good source' claim.
- *Packaged product*. If a 'good source' claim is made on a packaged product, the packaging must include a nutrition information panel and the panel must state the source of Omega-3 fatty acids, namely docosahexaenoic and eicosapentaenoic acids.
- *Unpackaged over the counter*. If the product is sold unpackaged at the deli counter, but with a notice or tag making a 'good source' claim, the nutrition information panel must be displayed near the food or 'provided to the purchaser on request'. Leaflets containing the information would satisfy this requirement.

A nutrition claim relates to the function, presence or absence of a nutrient in a food.

Extra conditions for claims on multi-component product

To make either a 'natural' or 'good' source claim for a multi-component seafood product, such as crumbed finfish, the food must contain not less than:

- 200 mg of alpha-linolenic acid per serving, or
- 30 mg of total eicosapentaenoic (EPA) and docosahexaenoic (DHA) acid per serving.

(Sources of information on fatty acid content are *Seafood the good food*, the *Australian Seafood Users Manual* and the *Australian Seafood Handbook*. Most seafood has a low total fat content, and generally the EPA and DHA levels far exceed 30 mg per serve.)

In addition, the food must contain less than:

- 28% of the total fatty acids as saturated and trans fatty acids, or
- less than 5 grams total of saturated and trans fatty acids per 100 grams of food.

To make a 'good source' claim on a multi-component seafood product, the product must meet these requirements *plus* the requirements for 'good source' claims outlined above. A 'good source' claim on a multi-component product that requires packaging must also meet the packaging and information requirements relating to 'good source' claims.

If a 'natural' or 'good' source claim is made for a multi-component food, a nutrition information panel is required on the package or, for an unpackaged product, must be available on request.

'Good practice' communication

The seafood industry generally enjoys a good reputation as a reliable source of information about the products it sells. Professionals involved in seafood promotions know they must maintain credibility with the general public and the scientific community. They know only too well that inaccurate claims about food may generate short-term sales, public interest and attention — but in the longer term the distrust generated in the community will take a great deal of time and money to win back. For an industry that is highly focused on its 'clean and green' image and invests heavily in food safety and other quality initiatives, following good practice about nutritional claims is extremely important.

Seafood marketers can enhance credibility, consumer welfare and the reputation of the seafood industry by:

- studying nutritional information very carefully so that they understand it thoroughly;
- not distorting it when passing it on to consumers;
- presenting information in a clear and easily understood way;
- linking nutritional messages to current consumer preferences;
- avoiding alarmist overtones;
- ensuring that staff are well-trained to provide information appropriate to their individual roles, and that they refer more complex inquiries to the right person; and
- using the recommended marketing names for seafood in accordance with the *Australian Seafood Handbook*.

The Food Standards Code's constraints on information about the potential health benefits in labelling and direct advertising apply to all types of food, and represent the Australian community's expectations in this area. At the same time, there is an increasing demand for factual nutrition information in the community. By basing information about seafood nutrition on this book and on other reputable sources, seafood marketers will be meeting some of that demand in a responsible way, to the benefit of consumers and the seafood industry.

Further information

For further information on the Food Standards Code contact:

- ANZFA Food Standards Hotline: 1300 652 166 or
- E-mail: advice@anzfa.gov.au

Glossary

ANZFA	The Australia–New Zealand Food Authority — an independent, bi-national statutory authority, responsible for administration of the Australian Food Standards Code.
Australia New Zealand Food Standards Code	A code that regulates the advertising and promotion of food in Australia. Only specific sections relate to seafood.
crustaceans	See *seafood*.
DHA	Docosahexaenoic acid, an Omega-3 oil found in seafood.
EPA	Eicosapentaenoic acid, an Omega-3 oil found in seafood and very low concentrations in plants.
essential fatty acids (EFAs)	Fats that play a crucial role in growth and reproduction. Like vitamins, the body cannot synthesise essential fatty acids: they must be ingested. Omega-3 and Omega-6 are essential fatty acids. The term "oil" is often used as an alternative to "fat" in this context.
fatty acid	See *essential fatty acid*.
finfish	See *seafood*.
fish	See *seafood*.
fish oil	Fish oils are Omega-3 oils that are found in seafood, especially finfish. They can be consumed as concentrated oil capsules or by eating finfish.
g	grams.
HDLs	High-density lipoproteins, blood particles consisting of thousands of cholesterol molecules and other lipids bound to a protein. HDLs reduce deposition of cholesterol in arterial plaques. Often referred to as 'good' cholesterol.
kg	kilogram(s).
LDLs	Low density lipoproteins, blood particles consisting of thousands of cholesterol molecules and other lipids bound to a protein. LDLs are the most harmful in coronary heart disease.

mg	milligram(s).
molluscs	See *seafood*.
Omega-3 fats	Polyunsaturated fats found in seafood and in minor amounts in plants.
Omega-6 fats	Polyunsaturated fats found in plants and seafood. Linoleic acid (an Omega-6 oil) consumption should be about 3 to 5% of total dietary fat.
seafood (and related terms)	The following related terms have been used in this book:

- Seafood: living aquatic vertebrate and invertebrate organisms, including marine mammals and reptiles, and such organisms after they have been harvested. *Note: in this book, "seafood" is used specifically to describe, collectively, finfish and other aquatic animals such as Crustacea and molluscs.*
- Finfish: aquatic vertebrates having gills, fins and typically an elongated body usually covered with scales. *Note: in this book, this more specific term has been used where appropriate to avoid the confusion that could result from the word "fish", which is often taken to include other aquatic animals such as crustaceans or molluscs. (Reference to "fish" has been retained when quoting legislation or research findings, and in very general contexts.)*
- Crustaceans: A large family of arthropod animals, characterised by a hard, close-fitting shell that is shed periodically. Includes prawns, crabs, lobsters, shrimps, bugs and freshwater crayfish.
- Molluscs: invertebrates characterised by a calcareous shell (sometimes lacking) of one, two or more pieces that wholly or partly encloses the soft unsegmented body — for example, abalone.

Trade Practices Act 1974	Legislation governing all retail sales to protect the public against false or misleading claims, including about food.

Select bibliography

FRDC Final Report 1996/340. 'Enhanced usage of contemporary scientific findings on health benefits of seafood to promote fresh seafood consumption'. FRDC, and the references contained within, is the main source of information used in the development of this book. The following sources are additional to those used in Final Report 1996/340.

Australia New Zealand Food Authority. *The Australian Food Standards Code* (Volume 1) — as amended until December 2000.

Australia New Zealand Food Authority. *The Joint Australia New Zealand Food Standards Code* (Volume 2) — December 2000 and as subsequently amended.

Australia New Zealand Food Authority. *Transitional Standard for the Operation of Volume 1 and Volume 2 of the Food Standards Code* — December 2000.

Bao, D.Q., Mori, T.A., Burke, V., Puddey, I.B. & Beilin, L.J. Effects of dietary fish and weight reduction on ambulatory blood pressure in overweight hypertensives. *Hypertension* 1998; 32: 710–7.

Charnock, J,S. The role of omega-3 polyunsaturated fatty acid-enriched diets in the prevention of ventricular fibrillation. *Asia Pacific Journal of Clinical Nutrition* 1999; 8: 226–30.

de Lorgeril, M., Salen, P., Martin, J-L., Monjaud, I., Delaye, J. & Mamelle, N. Mediterranean diet, traditional risk factors, and the rate of cardiovascular complications after myocardial infarction. Final report of the Lyon Diet Heart Study. *Circulation* 1999; 99: 779–85.

GISSI-Prevenzione Trial Investigators. Dietary supplementation with n-3 polyunsaturated fatty acids and vitamin E after myocardial infarction: results of the GISSI-Prevenzione trial. *Lancet* 1999; 354: 447–55.

Hibbeln, J.R., Salem, N. Jr. Dietary polyunsaturated fatty acids and depression: when cholesterol does not satisfy. *American Journal of Clinical Nutrition* 1995; 62: 1–9.

Hibbeln, J.R. Fish consumption and major depression. *Lancet* 1998; 352: 1213.

Horrocks, L.A. & Yeo, Y.K. Health benefits of docosahexaenoic acid (DHA). *Pharmacological Research* 1999; 40: 211–25.

Kamei, M., Fujita, T., Kanbe, T., Sasaki, K., Oshiba, K., Otani, S., Matsui-Yuasa, I. & Morisawa, S. The distribution and content of ubiquinone in foods. *International Journal for Vitamin and Nutrition Research* 1986; 56: 57–63.

Weber, C., Bysted, A. & Hølmer, G. The coenzyme Q10 content of the average Danish diet. *International Journal for Vitamin and Nutrition Research* 1997; 67: 123–9.

Weisinger, H.S., Armitage, J.A., Sinclair, A.J., Vingrys, A.J., Burns, P.L. & Weisinger, R.S. Perinatal Omega-3 fatty acid deficiency affects blood pressure later in life. *Nature Medicine* 2001; 7: 258–9.

The Fisheries Research and Development Corporation is a statutory authority of the Commonwealth Government's Department of Agriculture Fisheries and Forestry – Australia

This book is available electronically on the web at http://www.frdc.com.au/bookshop/index.htm