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OMEGA-3 AND HEALTH RESEARCH

Changes in our eating habits have created an imbalance between the levels of Omega-3 in our diet and Omega-6 – both of which are polyunsaturated fatty acids – and this imbalance is gradually being recognised as a major contributor to health problems¹.

While the amount of Omega-6 that we eat has risen, Omega-3 levels have fallen. Ideally, intake of Omega-6 should be no more than four or five times more than Omega-3s. Today in Britain, it is seven or eight times more, while in some countries such as America and Australia, it can be 10 or 12 times more¹.

Changes in the popularity of different foods are to blame. Our consumption of oil rich fish, which are high in Omega-3 has decreased over the last century, while our intake of white fish such as cod and haddock, which are very low in Omega-3, has increased. At the same time our consumption of foods rich in Omega-6, such as polyunsaturated margarine, sunflower and corn oils, has increased¹.

The Department of Health, through its Committee on the Medical Aspects of Food Policy (COMA) says we should all be eating one to two portions of fish a week – one of which should be an oil rich fish such as trout to boost our levels of Omega-3 fatty acids.

A weekly intake of 1.5g a week is advised. An average portion of grilled trout (flesh only) is 155g, which provides 1.83g of Omega-3¹.

Oil rich fish, which have an abundance of Omega-3 long chain fatty acids include trout, herring, mackerel, kippers, pilchards, sardines, salmon (tinned tuna is not a good source). White fish, such as cod, haddock, plaice and shell fish contain very low levels of Omega-3.

OMEGA-3 AND CORONARY HEART DISEASE

Oil rich fish such as trout provides the Omega-3 polyunsaturated fatty acids which are believed to help provide protection against coronary heart disease.

Research indicates that they may lower plasma triglyceride (blood fat) levels. Raised triglyceride levels are of particular importance when associated with high cholesterol levels².

They are also thought to reduce blood clotting by preventing the blood platelets from sticking together².

Studies carried out on Eskimos, who traditionally eat large amounts of oil rich fish, demonstrated that they have a low blood clotting tendency, longer bleeding times (in response to a cut) and a low incidence of coronary heart disease. Other big fish eating communities, such as Japanese fishing villages, also show a reduced tendency for blood to clot¹.

A two-year study was carried out in Wales (Burr et al., 1989) of over 2000 men who had just recovered from their first heart attack and who were therefore at risk of a second attack. The men were randomly allocated to a number of dietary groups, one of which was asked to eat at least two portions per week of oil rich fish. At the end of the two year period, it was found that although there was a similar number of heart attacks in each group, there were 29 per cent fewer deaths in the fish eating group. Hence, eating oil-rich fish regularly seems to reduce the risk of death after a heart attack rather than preventing a second heart attack occurring¹.

The Importance of Omega-3 in Infant Development

Recognition that the long chain DHA derivatives of Omega-3 fatty acids are a major constituent of the human brain and retina has resulted in considerable research in the past decade, particularly in relation to the needs of new born babies¹.

There is accumulating evidence to demonstrate the importance of Omega-3 in the development of the unborn child in the womb and the newly born infant. Required throughout pregnancy, Omega-3 is particularly important during the last three months and during early infancy for the proper development of the eyes, the brain and nerves.

A large part of the baby's brain growth takes place during the last three months of pregnancy. Babies born too early run the risk of not getting all the Omega-3 needed to complete this process. Scientists stress the value of breast-feeding as breast milk naturally contains a good supply of Omega-3s.

Children who were breast-fed have often been shown to perform better in tests of development or cognition, verbal ability or school performance (Morley 1998). However, some of these studies did not take contributory factors into consideration.

OMEGA-3 AND RHEUMATOID ARTHRITIS

The main long-term problem in rheumatoid arthritis is progressive erosion of the cartilage in joints, leading to irreversible destruction.

Oil rich supplements have been shown to alleviate some of the symptoms, producing beneficial changes in levels of fatigue, swollen and tender joints, grip strength and mobility.

The most valuable effects could be to enable sufferers to reduce their use of pain-relieving drugs, which sometimes have severe side effects¹.

OMEGA-3 AND DEPRESSION, SCHIZOPHRENIA AND ALZHEIMER'S

There is a limited amount of data upon which it has been hypothesised that either a poor intake of Omega-3 or an imbalance in the Omega-3 and Omega-6 ratio might be associated with the incidence of various manifestations of abnormal cognitive function.

Much of this speculation is based on findings of low levels of Omega-3 acids in cell membranes of subjects with depression, schizophrenia and Alzheimer's disease. It remains to be shown, however, whether this finding is causal or whether it is associated with changes in dietary patterns that have resulted from illness¹.

1. British Nutrition Foundation

2. British Heart Foundation

TROUT COOKING TIPS

Trout is available all year round from supermarkets, individual shops, fishmongers or direct from fish-farm shops. It can be purchased fresh or frozen, as fillets, steaks or whole fish and also comes in hot and cold smoked varieties. Trout is low in both fat (a third of the fat of salmon) and calories (just 135kcal per 100g), with high levels of A and B vitamins, calcium, selenium and the vital Omega-3. It is also quick and easy to cook, as well as being very versatile:

BAKED

Whole fish, steaks and fillets can be oven-baked in a greased dish or wrapped in individual foil parcels and baked in a medium oven. In each case, top with a knob of butter and moisten with a little fruit juice, wine or cider. Allow 20/30 mins for portion-size fish and steaks

FRIED/SAUTEED

Use whole or boned fish, steaks or fillets. Dust with seasoned flour and fry in a little oil or butter for 5 minutes each side. Serve simply with a squeeze of lemon, herb butter or mayonnaise.

GRILLED

When cooking whole trout, slash thickest part 3 times on each side and brush lightly with oil. Alternatively, brush steaks with oil on both sides. Lay in pan and grill 5/8 minutes each side depending on thickness. Serve with a squeeze of lemon.

MICROWAVED

Trout cooks perfectly in a microwave oven, either fresh or frozen. As cooking times vary for each make of microwave, refer to the instruction manual for

cooking fish. As a general rule, trout take from 4/6 mins cooking time when simply prepared, stuffed trout take a little longer. Slash thickest part several times on each side of whole fish for even cooking.

POACHED/STEAMED

Use whole fish or steaks and enough boiling, lighted salted water to cover. Poach gently for 10/12 minutes and drain. Serve hot and cold with butter sauce or mayonnaise. Steam steaks or fillets after seasoning lightly, using a steamer or by placing between two plates over boiling water.

THE BRITISH TROUT ASSOCIATION - BACKGROUND

History:

The British Trout Association was founded in 1983 and represents approximately 80% of trout production in the UK. The Association membership is principally comprised of trout farmers but also includes processors, feed suppliers and aquacultural academics. The Association is funded by its membership and feed suppliers and receives no direct funding from the Government.

Objectives:

The BTA plays a pivotal role in the continuing development of the industry on three fronts:

- **Ensuring that the UK trout industry has a reasonable legislative framework within which to operate**
- **Co-ordinating a structured and relevant R&D programme**
- **Orchestrating a generic promotion campaign to underpin the marketing activities ongoing within the industry**

In addition the BTA retains the services of Professor Niall Bromage of the Institute of Aquaculture, University of Stirling to advise on technical issues. The British trout industry maintains a high profile in Europe with a seat on the EU Aquaculture Working Group, the Federation of European Aquaculture Producers (FEAP) and COPA/COGECA a grouping of European farmer's unions and co-operatives.

BREEDS OF TROUT

Trout is a member of the Salmon (Salmonidae) family of freshwater fish, which also includes salmon, char and grayling. Salmonids are the only freshwater fish to have an adipose fin, a small extra fin between the dorsal and tail-fins.

Rainbow Trout (*Oncorhynchus mykiss* – until recently known as *Salmo gairdneri*)

- Although native to lakes and streams of North-West America, Rainbow Trout has been introduced to regions throughout the world, including Australasia, South America and South Africa. It is now the main breed of trout to be farmed commercially.
- Rainbow trout can be distinguished by the broad purple or violet band along its flanks and the black spots on the tail fin.
- There is a migratory breed of Rainbow Trout known as the Steelhead. Steelheads are anadromous, which means they only visit freshwater from the sea to spawn.
- Rainbow trout are also highly prized as game fish, not only because of their taste, but because they fight hard to free themselves, leaping high out of the water.

Brown Trout : (*Salmo Trutta*)

- Also known as the River or Lake Trout, Brown Trout is indigenous to many European countries, including Britain.
- The species displays a widely varied appearance, with colouring and shape depending on where it is found. Most commonly, adult fish are brownish with numerous black and rusty red spots on its upper sides and its adipose fin is edged with orange.
- The freshwater Brown Trout is found from small brooks to large rivers and lakes. A saltwater variety found typically in coastal waters of northern Europe, is known as the sea trout.
- Brown trout in small rivers grow to about 30 cm long, while the sea trout has been known to reach 1.4m.

Golden Trout : (*Oncorhynchis Mykiss Aguabonita*)

- Originating in the high altitudes of the northern Rocky Mountains of the United States, the Golden Trout has been called the “fish from heaven” by the Americans.
- The distinctive sandy gold colouring of the fish means it is particularly conspicuous to predators like herons and farming conditions are carefully designed to offer maximum protection.
- Only two producers in the UK currently farm this unusual variety of trout for consumption.

Other species of Trout include; American Brook Trout (*Salvelinus fontinalis*), and hybrid varieties such as Tiger, Zebra and Leopard

FISH FARMING - A BRIEF HISTORY

BRITISH TROUT FARMING

Prior to the 20th century most trout eaten in Europe were caught direct from the wild and the few large-scale trout hatcheries that existed were used to re-stock rivers for fishing. Until the end of the Second World War the UK's trout industry consisted of less than 20 such re-stocking farms.

In the early 1900's a Danish trout farmer developed a pioneering water supply system which meant that fresh water passed only once through each fishpond, radically improving fish yield and reducing disease. This breakthrough signified the beginning of the commercial trout-for-table farming industry.

A Danish entrepreneur opened the first "table trout" farm in Lincolnshire in 1950 and in the following 50 years the industry has grown to its current size of almost 360 trout farms, producing around 16,000 tonnes per annum*.

While Brown Trout (*Salmo trutta*) is indigenous to the UK and were the first fish farmed the majority of today's farmers produce Rainbow Trout (*Oncorhynchus mykiss*) which were introduced from North America. Rainbow Trout are more tolerant of warm water than the Brown variety, grow faster and are often slightly larger in size.

ANCIENT FISH FARMING

The artificial propagation of fish was established by the ancient Chinese who collected fish eggs by placing mats in streams or ponds and allowing the fish to spawn on them. The mats with the fertilised eggs were then removed and sold for use in ponds and flooded rice fields.

A wealthy Roman General called, Lucullus practised another form of fish culture in the first century BC. He dug canals from his fishponds to the sea into which freshwater streams were led. When spawning, sea-fish that need to breed in

freshwater passed through the canals into his ponds and stocked them with their young. Floodgates prevented their return to the sea.

In the 14th century, a French monk, Dom Pinchon, discovered the art of artificially fertilising trout eggs and then hatching them by burying them in the sand in wooden boxes.

* Source: The Produce Studies Group, March 1999

FISH FARMING EXPLAINED

Trout farms are often situated in the most picturesque of areas, ranging from the chalk streams of Southern England to the lochs of Scotland. Trout require the cleanest of waters and so water quality control is very important. The effluent is strictly monitored with regular testing by the environmental agencies ensuring the environment is unharmed.

Cultivation of trout is commonly carried out in ponds or tanks with the water flowing through the farm under gravity. Oxygen levels are monitored and the necessary concentration is maintained by special equipment.

In some cases trout are farmed in cages suspended by flotation collars in the water of lakes, lochs or reservoirs. This is particularly common in angling waters where fish are grown for re-stocking as it allows a natural acclimatisation.

Trout fry are reared from eggs in hatcheries and are introduced to growing facilities at around 4.5 g each. They may be fed by machine or hand feeders. Although trout can be bred to different sizes they generally reach their harvesting size of 300-400g in approximately seven-and-a-half months, building muscle by swimming against the current of water as it passes through the farm.

Once harvested trout are sold for the table. Farms often have processing facilities on site in order to gut, fillet, smoke and pack the fish depending on what is required. The trout may then be sold direct to customers at farm shops or sent to farmers' markets, wholesale markets, caterers or retailers.

UK TROUT INDUSTRY

Trout have been farmed for over 100 years in fresh water and sea water

The UK trout farming industry is geographically more widely based than the salmon industry with a range of farm sizes from a few tonnes per year up to 1,000 tonnes per year.

(Source: MAFF, 1998)

Total UK production of rainbow trout was 17,185 tonnes in 1999 compared to 16,109 tonnes in 1998 showing an increase of 6.7%.

(Source: CEFAS, Jan 2001)

12,916 tonnes of rainbow trout were grown for table consumption and 4,269 tonnes for re-stocking market and fisheries in 1999.

(Source: CEFAS, Jan 2001)

Scotland produced around 5,834 tonnes of rainbow trout in 1999 compared to 4,913 tonnes in 1998.

(Source: CEFAS, Jan 2001)

311 tonnes of brown trout were produced in England and Wales for re-stocking in 1999 with 0.5 tonnes produced in Scotland.

(Source: CEFAS, Jan 1999 and 2001)

Of the 262 registered salmonid farms in England and Wales that produced fish in 1999, 90 sites produced brown trout. 64 of these were mixed trout sites with 17 producing only brown trout.

(Source: CEFAS, July 1999)

Approximately 5 million fish meals are eaten daily in the UK a growing proportion of which are trout.

(ScotTrout, March 2000)

TROUT FACTS AND FIGURES

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... The UK trout farming industry is geographically more widely based than the salmon industry with a range of farm sizes from a few tonnes per year up to 1,000 tonnes per year

(source: MAFF, 1998)

... Sales of fresh trout week at the beginning of 2002 were £26.04 million which is a 3% increase year on year

(source: w/e 3 Feb 2002, Taylor Nelson Sofres, AGB SuperPanel)

... Sales of smoked trout at the beginning of 2002 were £5.87 million which is a 74% increase year on year

(source: w/e 3 Feb 2002, Taylor Nelson Sofres, AGB SuperPanel)

... Total fish sales (chilled, frozen and canned) at the beginning of 2002 were £1.8 billion

(source:w/e 3 Feb 2002, Taylor Nelson Sofres, AGB SuperPanel)

... Chilled fish sales at the beginning of 2002 were £719.4 million

(source: w/e 3 Feb 2002, Taylor Nelson Sofres, AGB SuperPanel)

TOTAL FISH STATISTICS

Total retail fish sales in Great Britain (excluding canned fish) totalled £1.056 billion in 1999, a staggering 200,967 tonnes.

Frozen fish is the largest market, accounting for £538.1 million in sales (115,830 tonnes), followed by fresh (wet/smoked) fish at £435 million (70,896 tonnes) and ready meals £83 million (14,241 tonnes).

Caterers in Britain cooked their way through 153,200 tonnes of fish during 1999.
(Source: Foodservice Intelligence Ltd)

FISHING – A GREAT DAY OUT

Fishing is one of the UK's most popular sports. Celebrity enthusiasts include Chris Tarrant, Jeremy Paxman, David Seaman and Eric Clapton.

Fishing offers a great day out for the whole family providing plenty of fun and fresh-air. Full-day bank fishing tickets for adults cost around £20 with children at half price. These prices usually include a quota of fish - which covers the price of your catch. Many fisheries also offer half day and evening rates and boat hire is often available in large waters.

Trout are commonly caught by fly fishing, which involves casting a hook attached to a synthetic 'fly' that floats through the water to attract the fish. On a warm summer evenings, fish can be caught using a dry fly on top of the water with the fish jumping out of the water. This is known as a "hatch" of fly. Virtually anyone can learn and tuition is strongly recommended for beginners - prices range from about £10 - £15 per hour. Equipment is also available for hire on site, at the cost of about £10 per rod per day.

Other than a steady arm and good co-ordination, essentials for fishing are warm and weather-proof clothing – including wellies, sunglasses to protect the eyes and a hat with a brim to shield the sun – or keep the head warm depending on the weather!

Anyone over the age of 12 must be in possession of a rod license for all freshwater fishing in England and Wales – a law enforced by the Environment Agency - and licenses can be purchases from the Post Office.**

Before fly-fishing began, one of the preferred ways to catch trout was by 'tickling' them. Trout ticklers would creep quietly up to a fish feeding in a slow part of the river and wiggle their fingers above or below it in the water. This wiggle simulates the movement of a weed bank, lulling the trout into a false sense of security. At the opportune moment the fish is then grabbed and scooped out of the water.

**2000/2001 prices were Full year £19 (concessions £9.50), Week (8 days), £6.50, Day £2.50.

(Source: Environment Agency)

TROUT TO GO.....PRODUCT AVAILABILITY

Most fish farmed in the UK are Rainbow trout, but Brown trout and rare varieties like Golden Trout are also available on a smaller scale.

WHOLE FISH

Most trout is bought as gutted whole fish, which usually weighs about 300-400g and is perfect to serve one person. Whole trout is available from supermarkets, farm shops, fishmongers.

STEAKS & FILLETS

Fillets and chunky fillets are becoming increasingly popular in the fast growing convenience markets. Fillets are available in most supermarkets. Chunky fillets are available at Tesco, M & S, Sainsbury and Waitrose.

ORGANIC

Organic trout is just starting to become available. Organic smoked trout is available at selected branches of Waitrose. It can also be bought direct from farm shops as whole gutted trout, trout fillets and hot smoked fillets.

HOT SMOKED TROUT

Whole small fish or fillets are cooked in an oven over hot wood-smoke. A whole trout takes approximately four-and-a-quarter hours while a fillet takes just over half that time. Best known as a traditional 'starter' served cold with lemon or horseradish, or formed into a pate, smoked trout can be used in a variety of hot and cold dishes. Many farms produce skinned and boned smoked fillets, vac-packed and ready to serve. Hot smoked trout is available from selected farm shops, Tesco, Sainsbury, Waitrose and M&S.

COLD SMOKED TROUT

The same process used for smoking salmon is now popular for curing large Pink Rainbow Trout. The fish are split and the sides brined and then slowly smoked over cool oak chippings. Cold smoked trout is a delicately flavoured product, available from selected farm shops, Tesco, M & S, Sainsbury.

BROWN TROUT

Available from selected Waitrose stores and selected farm shops.

GOLDEN TROUT

Available from selected branches of Tesco at certain times of the year.