

PLANET FOOD

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SALMON ON THE MENU What's the future of fish farming?

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I have just got back from a family holiday in Brittany. We had a lovely time, particularly enjoying all the delicious food. The Saturday food market at Rennes was a real treat, with a vast array of fruit, vegetables, cheese, bread, meat and fish, as well as stalls serving crepes, coffee and freshly roasted chickens.

Amongst the tempting array of fish laid out on ice, and entwined with seaweed, was the striking pink flesh of salmon. Salmon was also on the menu in many of the restaurants we went to, as well as on the ferry, where a smoked salmon salad was the same price as a mozzarella salad!

So where, you might wonder, does all this salmon come from? Most of the French, by all accounts, assume that it is wild salmon flown in from Scotland. But this is not the case. As in the UK, the proliferation of salmon on offer in France, is down to the burgeoning fish farming industry. In Scotland and Norway, many of the sea lochs and lakes are now littered with circular pens erupting with fish. And these are packed up and sent all over the world.

This month *Planet Food* is focusing on salmon. We will be looking at some of the health issues, the impacts of fish farming, the status of organic standards and why wild salmon is no longer on the menu.

Whether we are in France, Britain or elsewhere, salmon – almost certainly farmed salmon – is going to continue to be prominent. But it is clear that there are lots of improvements to be made in this industry. And we, as consumers, need to push for these to happen.

GOOD OILS

Salmon are amongst the oiliest of fatty fishes along with herring (not kippered or pickled), mackerel, tuna and sardines, to name but a few.

Not so long ago, people used to be forced (it tastes revolting) to swallow a spoonful of cod liver oil, as a healthy start to the day. Nowadays, fish oils are recommended for a large number of conditions, including arthritis, brain development in infancy, pregnancy, breast cancer, depression, male infertility, migraines, blood clots, bone mass problems and pre-menstrual tension. And recent studies seem to indicate it may even help with dyslexia!

Omega-3 is a fatty acid found in fish oil, and it is one of the new ingredients, that is attracting attention and being added to or boosted in new foods. It comes in two main forms: eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

There is evidence that for unborn and infant children DHA is very important¹. A foetus will draw DHA from its mother's body and brain during the last three months of pregnancy when the brain is developing. Studies carried out in Australia showed that breast-fed babies, whose mothers have enough DHA in their diet may have a 10-point IQ advantage in later childhood. DHA in the breast milk of Japanese mothers is three times higher than in the UK², because they have such a high fish diet. This is thought to be a key factor in the lower rates of coronary heart disease in Japan. It might also be why they are all so brainy!

¹ *Effective? DHA fortified foods*, Hokkaido Shimbum, April 28 1995

² Clover Healthcare

All this might lead one to make sure that salmon and other oily fish was on the menu several times a week, especially if you are pregnant or feeding children. But a note of caution is required – beware chemicals such as PCBs <see below>.

*Much of the article above is drawn from 'The New Foods Guide',
written by John Elkington and Julia Hailes, 1999*

THE SALMON'S SHADOW

Salmon, once the 'king of fish', is becoming one of the most popular fish dishes. Indeed, it is even appearing on the menu in fish and chip shops (although it shouldn't be confused with rock salmon). It's leap in popularity is almost entirely a reflection of the success of fish farming, which has made it more affordable, whilst the stocks of other fish are crashing and their prices rocketing.

But many barriers need to be overcome for this to be a sound solution to the problem of over-fishing. Here is an alphabetical list of some of the issues raised by fish-farming:

Antibiotics

The use of antibiotics in fish-farming has been yet another way in which we were undermining the effectiveness of medicines. However, its use in fish-farming has been substantially reduced and much of Scotland's farmed salmon receive no antibiotic treatment.

Anti-fouling

Fish cages - like boats and other off-shore structures - are treated with anti-fouling, such as copper and zinc, which are potential pollutants.

Disease

Farmed fish are more prone to disease because of the conditions they are kept in. One problem is that they can become immune to treatments, leading to more powerful remedies being used.

Escapees

Not only are escaped farmed fish transferring sea-lice to wild salmon but they are upsetting the natural balance and threatening to oust wild fish populations. Over 400,000 fish were reported as escapees in 2000, and this figure does not include the general seepage of fish that goes unreported. On the western Scottish seaboard escaped farmed salmon now outnumber catches of wild salmon by 7 to 1 and several rivers have now been declared extinct of their indigenous sea trout populations³.

Fish feed

Salmon are carnivorous and need a high protein diet – 60-70% of what they eat is composed of fish-meal and fish oil. Much of this is sourced from industrially caught fish, which in some parts of the world is threatening marine food chains, as smaller fish are scooped up leaving the bigger fish with insufficient food. It takes between three and five kilos of fish-meal and oil to create one kilo of farmed salmon.

GM

US companies are experimenting with GM salmon that can grow 10 times faster than normal salmon. Whether it is fast-growing fish or giant specimens, it is not clear that the public will be willing to eat GM fish, even if it does come to market – and European salmon farmers have stated that they do not believe there is a place for it in Europe. Salmon farmers claim to be the first in the livestock sector to eliminate GM from all diets, a couple of years ago.

PCBs and dioxins

PCBs (polychlorinated biphenyls) and dioxins are now commonly found in northern hemisphere seas. By feeding salmon fish meal derived from industrially caught fish, these contaminants can be concentrated in the fish – they are bio-accumulative, which means they get more concentrated as they go further up the food chain. There is a difference of opinion amongst scientists about whether PCBs are more of a problem for farmed salmon than wild. What is clear is that PCBs are a real problem in

³ *Sunday Herald*, 6 May 2001

many fish and there is no easy solution – removing the PCBs apparently removes the benefits of the fish oil.

By eating more than one portion of farmed salmon a week we are in danger of exceeding safety guidelines for dietary exposure to PCBs.⁴

Scenery

Fish farms tend to be found in otherwise unspoiled landscapes because this is where fish do best and often, regional grants are available to encourage rural employment.

Sea-lice

Sea-lice start by eating the slime coating the fish – then pretty much eats the fish alive. It is a real menace for fish-farmers and the range of chemicals used to protect the salmon, which include organo-phosphates, are causing concern.

Wastes

Waste food and fish faeces from the moored cages fall through the cages into the lochs or sea often leaving the seabed near the cages virtually devoid of life. There is also controversy about the impact of fertilisers because they can create toxic algal blooms and impact on marine life. Shell-fish farmers on the West coast of Scotland are particularly affected.

Wildlife

Salmon predators, such as seals, cormorants and herons are a pest to salmon farmers. In the past many were shot, but now passive methods of control are used – essentially predator net systems.

Much of the article above is drawn from 'Manual 2000, written by John Elkington and Julia Hailes, 1998

ORGANIC FISH FARMING

In the EU, member states have begun to set their own organic standards for aquaculture and those in the UK, developed by the Soil Association, have been ratified since August 2000. At present these standards have only been developed for salmonid species (salmon and trout) but the Soil Association are planning to extend them to other fish, including crustaceans.

The basic principle of organic fish farming is as follows:

To produce prime quality fish, using only natural ingredients and minimising any environmental impact, whilst promoting health and minimising stress to reduce the incidence and therefore the need for treatment of disease.

So how do they deal with some of the thorny issues faced by fish-farmers?

The Soil Association point out that one thing that makes infestation of sea-lice so difficult is large stocking densities – basically too many fish in too small a space. The standards are quite specific on how many fish can be stocked, as well as the quality of the water coming in and going out of the farm. When sea-lice do occur, they recommend salt flushes, hydrogen peroxide and using wrasse, a cleaner fish, which eats the lice.

Fish feed is another important area for organic standards. They require that all the cereal part of the fish diet should be organically sourced (so no GM feed, of course!), whilst, at least half of the aquatic portion of their diet should be a bi-product from wild caught fish, for human consumption. The other fishy half needs to come from a source certified by a body such as the Marine Stewardship Council. In practise this means that most of it comes from fish- processing waste.

⁴ The Food Standards Agency states: *The independent expert Committee on the Medical Aspects of Food Policy (COMA) has advised that people should eat an average of one portion of oily fish each week. On the basis of the results of this survey, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has recommended that adults should continue to follow the COMA advice, as it is likely to provide health benefits for most adults without exceeding safety guidelines for dietary exposure to dioxins and PCBs.*

As with organic standards for agriculture, growth regulators, growth hormones and appetite stimulants are not allowed under organic standards and antibiotic use is regulated. Artificial colour in the form of castaxanthin is widely used, but organic standards only allow shrimp shells to make the flesh pinker - and organic salmon is generally a lighter pink than other farmed salmon. Shrimp shells in the feed are also thought to make the salmon taste sweeter.

The committee responsible for organic standards are currently investigating what can be done about dioxins and PCBs in farmed salmon. One idea is to specify where the fish used in fish-meal is caught, because pollution in some areas is much worse than in others.

Given that wild salmon has effectively been wiped off the menu, if we are going to go on eating this delicious, highly nutritious fish, organic produce is what we should be going for.

ORGANIC IN THE ORKNEYS *Interview with organic fish farmer – Dennis Overton*

Demand far outstrips supply

The main issue with organic fish farms is where they are sited, says Dennis Overton of Aqua Scot. For this reason there are unlikely to be many on the West coast of Scotland.

In looking for an appropriate site he had to find a place with a strong current, avoid rivers with migratory salmon, and make sure they could work with local communities. "The Orkneys", he says, "are a remarkable place for farming".

Sea lice are not an issue in the Orkneys, except for a small amount brought in by the wild fish in the summer months, which the farmed salmon are well able to cope with - Dennis's organic farms do not use any treatments for sea-lice. He points out that sea-lice have raised a lot of questions for fish farmers. Clearly the survival of wild salmon and sea trout stock is crucial, so farmers, as a whole, have to look at reducing the links between salmon farming and the health of these stocks.

Dennis is a big player in fish-farming. He employs about 420 people and his company provides 95% of UK organic salmon, although this is less than 10% of his total production. He is working closely with retailers, in the UK and Europe, on improving production methods. And, he says, this process, along with the strong consumer demand for organic fish, is leading to closing the gap between the organic and the conventional approach. But Dennis feels that there is still a need for a well-defined high standard, even though some of the organic principles will rub off onto conventional standards.

Interestingly, the principles of crop rotation, apply to aquaculture as well as agriculture. In the Orkneys the strong tides mean 'high flushing rates', but organic standards also require fallowing between generations, to reduce the impact of wastes. Dennis's farms carry out a census and a visual assessment of life on the sea-bed to make sure that there is not a deteriorating condition, as a result of a build up of waste material.

Dennis says that they have had to make their own organic fish-feed<[link to organic standards box](#)>. More than 50% comes from white fish filleting operations. For the remaining part, they use inedible species such as horse mackerel and blue whiting, which even the West Africans – who will eat most fish – find bony and unpalatable. The Icelandic waters where this comes from are apparently one of the best managed in the world. The second area they go to is the coast of Chile and Peru, where there are a couple of businesses who have gone about establishing the sustainability of their fisheries, although this needs to be off-set by the distance it has to be transported.

Sustainable fishing, however, is not the only issue to consider when sourcing protein for fish-meal. PCBs is a problem for all fish coming out of the Northern Hemisphere and that is a result of what happened in the 1950s. Levels are now falling as society is waking up to the problem. And the benefits of eating oily fish still out-weigh the negatives of PCBs. Another issue that Dennis points out is a real concern is that of flame-retardants, used on fabrics and furniture, as well as in computer equipment. PBDEs (poly brominated diphenyl ethers) <[check spelling and include in Glossary](#)> is just as serious as PCBs and levels are rising.

Dennis feels that the fish-farming sector has not been communicating very effectively. "The image", he says, "of stinking fish full of ecological disasters is far from what is happening in the water." And he points out that "the various issues surrounding salmon farming are not intractable" and that "progress has been made in recent years to deal with them". The remaining issues, he feels should be tackled one by one in an objective way.

A good starting point for consumers is to support organic aquaculture, even if the 40% extra cost means reducing the amount of fish you eat. Unfortunately, however converting all the fish-farms to organic is not possible, not least because there is never going to be enough 'waste fish' to feed them. As with many 'sustainability issues, this is not an easy one!'

WILD ABOUT FISH *Interview with Mark Vincent, Lock Maree Hotel*

"We are a fishing hotel without any fish"

Mark Vincent took over the Loch Maree Hotel in 1988. At first he thought the decline in fish – particularly sea trout – was just a 'bad year'. But the decline continued and today the catch has reduced from an average of 1,000 fish per year down to 70. Eight ghillies are out of a job and six hotel staff have been cut as they now concentrate on walkers, who tend to stay for shorter periods.

Mark is quite clear what the problem is. Sea lice. "The sea trout that do come back return with no fins, just a little spike", he says. With millions of farmed fish intensively stocked in pens, he points out that even if each fish had only one sea louse, each of those would produce 600 larvae. The multiplication factor is huge.

Sea trout are particularly vulnerable because they do not travel far from the river mouths and so remain in close contact with the fish farms. Local brown trout, on the other hand are thriving - sea lice are not a problem in fresh water. And the fresh water pens were closed in Loch Maree in 1988 because of a fungal disease.



Mark says that he has not eaten wild salmon for about 8 years. Local netting stations have virtually closed down – it doesn't make sense selling a wild salmon for food for about £20, when you can net around £1,000 per fish through angling and tourism revenues. He says that fly-fishing for salmon is in its last death throes, on the West coast of Scotland.

Amongst others, Mark is involved in the **Fishery Trust**, which tries to preserve wild salmon, by keeping brood stock. At the moment there is no point returning these salmon to the locks because they will get infected by sea-lice.

The Scottish Environmental Protection Agency (SEPA) focuses on waste faeces and chemicals rather than sea-lice. The fish-farmers are caught in a Catch 22 situation. If they used enough chemicals to kill the sea-lice they would be causing unacceptable pollution, killing lobster and shell fish, as well as breaching limits imposed by SEPA.

Escapees are also a huge problem. Farmed fish have developed to be fast growing, so they are quite likely to displace wild fish and certainly interbreed with them. They will also not be treated for sea-lice so this will spread the parasite further. Mark points out that if adverse weather leads to escapees, then the pens are in the wrong place. In any case they should reduce the risk by have a safety net around the perimeter (even though this decreases the flow of water through the system).

So where does Mark point the finger of blame? He says the biggest culprits are Crown Estates who rake in £2 million per year by renting the sea-bed to fish farms, whilst only contributing 5% of that revenue in research, which does not even look at the issue of sea-lice.

The Government are no better. They keep hoping that the industry will find a solution whilst putting money into research into how to deal with the problems through chemicals. And of course the fish-

farmers themselves are to blame. They should, amongst other things, be siting their pens away from the river mouths, reducing the sea-trout's exposure to sea-lice.

For the moment, at least, visitors to the Loch Maree Hotel, will have to content themselves with fishing and eating *brown trout* - or just going for walks.

<<<<< NEWS >>>>>

Calls for an independent enquiry into the environmental impact of salmon farming have been rejected by the Government.

A public petition was submitted to parliament in February 2000 requesting that "parliament hold an independent public enquiry into the adverse and environmental effects of sea cage fish farming, and the regulatory failure to both recognise and prevent significant damage to our natural heritage, the environment, and other interests dependent on the integrity of our Scottish coastal waters".

The petition was supported by both the RSPB and WWF Scotland and the fish farming industry. Amongst others the Salmon & Trout Association, who represent the interests of over 100,000 game fishermen in the UK, are incensed that the enquiry will not take place.

Source: The Sunday Herald, 6th May, 2001, The reel thing

Poly brominated diphenal ethers (PBDEs) are used as flame retardants in fabric and furniture, as well as in most computer equipment. They are emitted into the atmosphere, being jettisoned into the sea and work their way back to us through the food chain. Their used is growing exponentially – a Swedish study has found that they have increased 12 fold in mothers milk between 1972 and 1997.

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