

Dioxins in Fish and Fish Products

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The issue of high levels of dioxin contamination of fish has received considerable interest recently, especially in the industry press. This short note summarizes what is known about the levels of dioxins¹ in fish and fish products (food for human consumption as well as fish meal and fish oil used in animal foodstuffs). It concludes with a description of what the Commission is proposing to do about it.

Introduction

At present, there is no EU-wide legislation on contamination by dioxins. The only exceptions are for citrus pulp (following a contamination incident in Brazil) and for kaolinetic clay (apparently naturally contaminated in some places, including Germany). For both of these substances, limits of 0.5 nanogram/kg have been established.

Nonetheless, given the extreme toxicity of dioxins, the Member States monitor levels of contamination and the Commission is in the throes of establishing limits for dioxins in human food as well as in animal food. Given the potential economic consequences of any such limits, especially for the fishing industry, the Commission is acting very cautiously.

Contamination of Food

In June 2000, a report was published² which compiled the existing data on dioxin contamination of various types of food in the EU and estimated consumption rates in the different Member States. Of the six major categories of food, fish and fish products were found to have the highest levels of dioxins.

Food Type	Average (pg/g)	Range (pg/g)
Cereals	0.019	0.010 - 0.02
Fruit and vegetables	0.029	0.004 - 0.09
Meat and meat products	0.525	0.130 - 3.8
Milk and milk products	0.882	0.260 - 3.57
Eggs	1.19	0.460 - 7.32
<i>Fish and fish products</i>	<i>9.80</i>	<i>0.125 - 225</i>

Plant products were, as one would expect, less contaminated overall than different animal products, and were usually close to the levels which can be detected with current techniques. While the minimum levels of dioxin found in some fish samples were slightly lower than milk, eggs and meat, both the average and the maximum contamination levels were by far the highest in the fish category, from two to three orders of magnitude higher.

The report noted that the fish samples were extremely variable in their dioxin levels, which was attributed to the wide variety of species from many different parts of the world: fresh water and marine fish, as well as farmed fish, were included in the samples.

Data on diets in several Member States were used to describe the consumption patterns of dioxins in the Member States. The results varied from one Member State to another, but the estimates of weekly intake of dioxins ranged from 8.4 to 10.5 picograms per kilogram of body weight per week - or, in abbreviated form, a weekly intake of 8.4-10.5 pg/kg bw.

The sources of this level of dioxin consumption depend upon dietary habits. It was found that fish and fish products accounted for a highly variable portion of the estimated dioxin consumption in the Member States - the highest percentage was from a survey conducted in Finland (63% of total dioxin

¹ three distinct types of contaminants are here simply referred to as "dioxins" - dibenzodioxins, dibenzofurans and dioxin-like PCBs

² SCOOP Report: http://europa.eu.int/comm/dgs/health_consumer/library/pub/pub08_en.pdf

consumption came from fish products).

Food Type	Percent of Total Dioxin Intake
Meat products	6 -32%
Dairy products	16 -39%
Plant products (cereals, fruits, etc.)	6 -45%
<i>Fish and fish products</i>	<i>2 -63%</i>

It is for this reason that the fishing industry in the European Community is very concerned about the establishment of any tolerance limits for dioxins.

Human Risk Assessment

The Scientific Committee on Food was asked to advise the Commission on the scientific basis for establishing limits for dioxins in food; their report was published in November 2000³. Basing themselves on a recent World Health Organization Consultation, they recommended that an acceptable figure for consumption of dioxins would be 7 picograms of dioxins⁴ per kilogram of body weight per week.

Referring to the information on consumption patterns, the Committee noted, "it is evident that a considerable portion of the European population will exceed" the recommended weekly intake value of 7 pg/kg bw. They emphasized, however, that the figure of 7 pg/kg bw "is not a lower bound of toxicity, it is an estimate of a safe level of intake and is derived conservatively; ... exposure above this tolerable weekly intake leads to an erosion of the protection embedded in the limit".

The SC Food then discussed the consequences of establishing a cut-off level of dioxin contamination for human food. If only foods containing less than 2 pg/g were allowed on the market, then 95% of eggs, almost 95% of meat products and almost 95% of dairy products would remain on the market. For fish products, the situation would be quite different - very few of these products could be sold for consumption. The Committee did not explain the derivation of the limit of 2 pg/g.

Levels of dioxin contamination in food in some countries appear to have declined since the late 1980s.

Contamination of Animal Foodstuffs

Also appearing in November 2000 was a report on dioxin contamination of animal foodstuffs⁵. It concluded that fish meal and fish oil were the most contaminated feed materials used in the Community. Products from European fish stocks were 8 times more heavily contaminated than products from the southeast Pacific Ocean.

Product	Average (ng/kg dry matter)	Range (ng/kg dry matter)
<i>Fish meal - European waters</i>	<i>6.1</i>	<i>0.18 - 28.2</i>
<i>Fish meal - South Pacific</i>	<i>0.7</i>	<i>0.11 - 1.26</i>
Roughage	0.4	0.2 - 13.2
Vegetable oil	0.4	0.2 - 3.0
Meat and bone meal	0.4	0.2 - 1.0

Product	Average (ng/kg fat)	Range (ng/kg fat)
<i>Fish oil - European waters</i>	<i>24</i>	<i>3.50 - 100</i>

³ Opinion of the SCF on the Risk Assessment of Dioxins and Dioxin-like PCBs in Food.

http://www.europa.eu.int/comm/food/fs/sc/scf/out78_en.pdf

⁴ including dibenzofurans and dioxin-like PCBs

⁵ Opinion of the Scientific Committee on Animal Nutrition on the Dioxin Contamination of Feedingstuffs and their Contribution to the Contamination of Food of Animal Origin.

http://www.europa.eu.int/comm/food/fs/sc/scan/out55_en.pdf

<i>Fish oil - South Pacific</i>	<i>3</i>	<i>0.80 - 13</i>
Animal fat	2	1.0 - 6.6

The composition of several types of diet for different animal species was calculated. Ruminants, pigs and poultry all consume feed with either fish meal or fish oil and thus receive a significant portion of their dioxin intake from fish. Only rabbit feed apparently does not contain fish meal or fish oil.

Fish meal and fish oil contribute to the diets of farmed fish as well - the study concluded that farmed fish are more exposed to dioxins than any other food-producing species. Carnivorous species, such as trout and salmon, have a high intake of fish meal and oil (75% of the total diet) compared to other species such as carp (12% of the total diet). The industry is attempting to reduce the use of fish meal and oil by substituting plant seed oils (e.g. soy) but there are nutritional constraints on the extent to which this is possible.

The study noted that the dioxin content of the diets for these animals would vary depending on whether the fish meal or oil came from European fisheries (high dioxin content) or the southeast Pacific (Chile and Peru, low dioxin content). As the fish species which are used to produce fish meal and fish oil fluctuate in abundance due to, among other factors, the El Niño phenomenon, the composition of fish meals and oils can vary significantly from one year to the next. For example, in 1997 European fish contributed 30% to the composition of fish meal and oil compared to 70% from the Pacific, whereas the following year there was a much higher contribution by the European products. There are obvious consequences for dioxin content of animal feed.

The Legislative Procedure

The European Commission is about to propose limit values for the contamination of dioxins in food and in animal feed. The reports discussed above constitute the scientific advice upon which the Commission will base its proposals. It expects to submit a draft proposal in the form of a working document to the Standing Committee on Food sometime in March. This constitutes the first formal consultation of the Member States. Next, the proposal must go to the WTO for a comment period of two months; this is necessary under the Sanitary and Phyto-Sanitary Agreement. The Commission hopes to adopt the formal proposal in September. These are listed in the Commission workplan for 2001 as Programme Nos. 2001/399 (Commission Directive on measures to limit the presence of dioxins and PCBs in animal feed) and 2001/400 (Commission Regulation on measures to limit the presence of dioxins and PCBs in food). There will also be a "Communication on a Community dioxin and PCB strategy", scheduled to appear in the third quarter (No 2001/265 in the workplan)

Additionally, the Fisheries Committee has requested a STOA study on dioxins in fish. The terms of reference are in an annex.

Dioxin and Fisheries in the North Sea and the Baltic

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 - 1.1 Chemical characteristics
 - 1.2 Sources
 - 1.3 Effects on humans, other species and environment

- 2 Legal framework - limits and control measures
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- 3 Dioxin and marine environment - physical habitat (water and sediment) and species
 - 3.1 North Sea
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- 4 Dioxin in fish and fish products
 - 4.1 Human consumption, health effects
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- 5 How to solve the problem?
 - 5.1 Status quo - eventual problems
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- 6 Conclusions