



Oslo, 13 January 2006

Comments to letter from Don Staniford, European Representative for Pure Salmon, and e-mail from Rachel Hopkins, National Environmental Trust, both dated 10 January 2006 to the Norwegian Minister of Fisheries and Coastal Affairs from the Norwegian Scientific Committee for Food Safety

The Norwegian Scientific Committee for Food Safety (VKM) was in April 2005 asked to give a scientific opinion on “the consequences for fish health and food safety when farmed fish has been fed with feeds containing 11-17 mg of cadmium per kg of feed for a limited time period”. The Committee’s Panel on animal feed concluded that feeding Atlantic salmon or rainbow trout with feeds containing 11-17 mg of cadmium per kg of feed for a limited time period (up to four months) is unlikely to cause significant fillet contamination. Read the opinion “Cadmium in feed to farmed salmon” from 13 April 2005 here <http://www.vkm.no/eway/get.aspx?id=15980>

There are three statements in the letter from Don Staniford dated 10 January 2006 that need to be clarified:

- 1) “The area of dispute centers on the failure of VKM to issue any official warning about potential contamination of farmed salmon”.

It is not the responsibility of the Norwegian Scientific Committee for Food Safety (VKM) to issue official warnings. The mandate of VKM is to do independent scientific risk assessments in an open and transparent manner. Official warnings are risk management measures and are as such the responsibility of the Norwegian Food Safety Authority.

- 2) “In its opinion of 13 April 2005, the Panel on Animal Feed of the VKM acknowledged that feed containing high levels of cadmium was provided to farmed salmon for as long as four months but determined that the feed could not have led to elevated fish tissue concentrations”.

The panel of animal feed (VKM) did not **acknowledge** feed contamination for as long as four months. As can be read from the text in the opinion, the Panel cites a scientific paper on a study concerning dietary cadmium exposure of Atlantic salmon. It is this study that lasts for four months.

- 3) “As we understand it, Dr. Claudette Bethune of NIFES, has expressed the concern that VKM’s contention of minimal potential contamination was in error given the properties of cadmium, and several other studies that showed the possibility of significantly greater accumulation of cadmium in fish muscle tissue beyond those suggested by VKM. Dr. Bethune cites six studies that show fish tissue concentrations above 0.1 mg Cd kg⁻¹ under a range of conditions”.

VKM notes the criticism of the opinion “Cadmium in feed to farmed salmon”. As is customary when documented scientific doubt is raised regarding our work, VKM will take into consideration the studies mentioned. A brief look at the studies, has however not revealed any relevant new information. Any questions about the criteria used in the selection of literature, on which the opinion is based, can be addressed to VKM.

There also seems to be some misunderstanding as to the input of data to the opinion. The opinion is not based on analytical data of contaminated fish but on results from relevant published research on feeding of salmon. As mentioned above, VKM is purely a risk assessment body. We have neither the authority nor the means to take samples or to perform analytical work as claimed by Claudette Bethune: “the same Norwegian scientific committee then collected 20 more salmon to test cadmium and lead”. (E-mail to FKD dated 23rd of December 2005)

In an e-mail (10.01.06) from Rachel Hopkins, National Environmental Trust a person called Even Thoen is mentioned in connection with VKM. This person is unknown to VKM. He is not employed in the secretariat, not a member of the Norwegian Scientific Committee for Food Safety (VKM) and has never been engaged in any ad hoc work for VKM.

Ugradert

Ministry of Fisheries and Coastal Affairs
Po. box 8118 dep.
N-0032 Oslo

Deres ref:
Vår ref: 2005/45504
Dato: 17.01 2006
Org.nr: 986 399 077

Statens tilsyn for planter, fisk, dyr og næringsmidler

Mattilsynet

CADMIUM CONTAMINATION - LETTER TO HELGA PEDERSEN

In reference to Pure Salmon's inquiry from its director Andrea Kavanagh of the 10th of January 2006, the Norwegian Food Safety Authority has the following evaluation and answers to the issues and specific questions raised.

WTO notification - 3 indent

In March 2005, analysis performed according to the national surveillance program on feeding stuffs showed levels of Cadmium above the maximum level in force (0,5 mg/kg for compound feeding stuffs for fish). Further investigations indicated zinc sulphate from China as the most probable source for contamination.

A national Regulation of 5 April 2005 stopped further use of contaminated feed and required withdrawal of delivered compounds. Analysis of farmed fish showed all values below the maximum level of 0,05mg/kg wet weight, Cf. Regulation 221/2002/EC, which is implemented in Norwegian legislation. Therefore, further restrictions on marketing and use of slaughtered salmon and trout was not considered as necessary.

A RASFF notification on high levels of Cadmium in zinc sulphate used in premixture, was notified to the EU Commission 6 April 2006, with further notification on premixture for fish 7 April (2005AXC). Minor amounts of compound fish feed containing contaminated premixture was exported to Scotland (9 tons), Canada (30 tons) and Faeroe Islands (538 tons). Both the authorities and importers in these countries were informed without further delay. The national regulation of 5 April 2006 was notified to WTO 29 April.

Further answers to the questions raised

The total quantity of contaminated feed used in fish is estimated to be up to 20 000 tons. 8 000 tons were withdrawn from the market and delivered to destruction by incineration. Analyses of 457 samples of contaminated compound feed revealed an average cadmium content of 4 mg/kg. Only one fish feed producing company has produced Cadmium contaminated feed. The name of the company is EWOS

Mattilsynet
100042 - Seksjon fremmedstoffer og
tilsetningsstoffer

Saksbehandler: Ingunn Middtun
Systad/Anders Flatø
Tlf:
Besøksadresse: Ullevålsveien 78
E-post: postmottak@mattilsynet.no
(Husk mottakers navn)

www.mattilsynet.no
Postadresse: 100042 - Seksjon
fremmedstoffer og tilsetningsstoffer
Felles postmottak, Postboks 383
2381 Brumunddal
Telefaks: 23 21 68 01

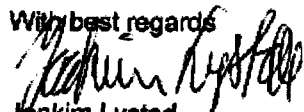
All fish farms that used contaminated feed were informed immediately. Feeding stuffs remaining in storage were returned to EWOS and delivered for destruction. The contaminated feed was only produced in Norway. Minor amounts of contaminated compound feeding stuffs were also sent to Scotland, Canada and The Faeroe Islands.

Three of the sea farms producing salmon for export to Russia used feeding stuffs from other companies than EWOS. The fourth company had minor quantities supplied by EWOS.

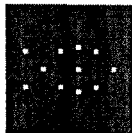
Therefore there is no link between the Russian import ban and the former use of contaminated feed.

We hope that the Norwegian Food Safety Authority's reply answers Pure Salmon's questions to the Minister.

With best regards



Joakim Lystad
Director General



N I F E S

NATIONAL INSTITUTE
OF NUTRITION AND
SEAFOOD RESEARCH

Our date
17.01.06
Your date

Our reference
Your reference

Inquiries to:

Fiskeri- og kystdepartementet
Postboks 8118 Dep.
0032 Oslo

Cadmium – transfer (accumulation), from feed to Norwegian farmed fish

Ref.: E-mail (11.01.06) from Don Standiford. European Representative for Pure Salmon

Comments on the six studies cited:

Kraal, et. al. "Uptake and Tissue Distribution of Dietary and Aqueous Cadmium by Carp." *Ecotoxicology and Environmental Safety* 31, 179-183 (1995)

Carp (*Cyprinus carpio*), weight 0.9 – 1.1 grams, were fed Cd contaminated feed (260 mg Cd/kg dm) for about 1 month. Concentrations of Cd in muscle were found to be 0.4 mg/kg dry muscle weight (max value found was 0.6 mg/kg dry weight). This translates into wet weight (given that the muscle of this fish held 75% water), that means 0.1 mg/kg wet weight in average, with maximum levels of 0.15 mg/kg wet muscle weight.

1. Carp is not a farmed fish in Norway, and it is a very different species than farmed Atlantic salmon and rainbow trout. The results on carp are therefore not relevant to compare with any expected Cd levels in salmon or trout.
2. The carps in this study has a muscle concentration 5.1 times lower than levels found by Russia for Norwegian salmon (from above mentioned case 2).
3. The concentration in the carp diet is 260 mg Cd/ kg dm, which exceeds by 15 times the level of Cd in the contaminated fish feeds (from above mentioned case 1.).

Cinier, et. al. "Cadmium Biocumulation in Carp Tissues During Long-Term Exposure." *Ecotoxicology and Environmental Safety* 38, 137-143 (1997)

Cinier, et. al. "Kinetics of Cadmium Accumulation and Elimination in Carp Tissues." *Comparative Biochemistry and Physiology Part C* 122, 345-352 (1999)

Carp (*Cyprinus carpio*), weight 230 ± 42 grams, were water borne exposed to Cd levels up to 443 µ/L, for 127 days in paper 1999, and up to 450 Cd/L, for 140 days in paper 1997.

Results from water exposure papers:

Paper 1999: Concentrations of Cd in muscle in control groups were around 0.5 mg/kg dry weight (which will be 0.13 mg / kg wet muscle weight). Exposed fish showed levels around 2 mg / kg muscle dry weight (and 0.5 mg / kg muscle wet weight).

Paper 1997: Concentrations of Cd in muscle in control groups were around 0.5 mg/kg dry weight (which will be 0.13 mg / kg wet muscle weight). In exposed fish (140 days) muscle dry weight levels were 9 mg/kg, and wet weight Cd levels were 2.25 mg/kg.

1. Carp is not a farmed fish in Norway, and it is a very different species than farmed Atlantic salmon and rainbow trout. The results on carp are therefore not relevant to compare with any expected Cd levels in salmon or trout.
2. Background levels in muscle (control group) exceed the current EU upper limit of 0.05 mg/kg wet weight for food human consumption.
3. Exposure was from water and not from the feed.

Postal address
NIFES
P.O. box 2029 NORDNES
N-5817 BERGEN
NORWAY

Office address
NIFES
Strandgaten 229
N-5004 BERGEN
NORWAY

Delivery address
NIFES
Nordnesboder 2
N-5005 BERGEN
NORWAY

Telephone: +47 55 905100
Telefax: +47 55 905299

Internet: www.nifes.no
E-mail: postmottak@nifes.no
Org.no. NO 979529783

Szebedinszky, et. al. "Effects of Chronic Cd Exposure via the Diet or Water on Internal Organ-Specific Distribution and Subsequent Gill Cd Uptake Kinetics in Juvenile Rainbow Trout." *Environmental Toxicology and Chemistry* 20(3), 597-607 (2001).

Rainbow trout, *Onchorhynchus mykiss*, weight 2-7 grams (juveniles), exposed for 36 days, diet Cd levels, control (1.5 Cd mg/kg diet), 3.9 Cd mg/kg diet, 21.8 Cd mg/kg diet, 117 Cd mg/kg diet, 1419 Cd mg/kg diet. Carcass levels in Control group varies from 0.25 to 0.46 mg/kg tissue. No significant accumulation compared to control, was found for groups exposed to 3.9 – 117 mg/kg Cd in diet. The highest level (1419 mg Cd in diet) resulted in 1.80 mg Cd / kg carcass tissue.

1. Carcass is not muscle, and can not be used for human food safety assessment
2. Background levels in carcass (control group) exceed the current EU upper limit of 0.05 mg / kg wet weight for food human consumption.

Chowdhury, et. al. "Gastrointestinal Uptake and Fate of Cadmium in Rainbow Trout Acclimated to Sublethal Dietary Cadmium." *Aquatic Toxicology* 69, 149-163 (2004).

Rainbow trout, *Onchorhynchus mykiss*, weight 190 – 280 grams, were fed for one month 419 mg Cd / kg feed, and thereafter infused with radiolabelled Cd, one dose 276 µg, in the stomach. Muscle levels of Cd after diet exposure was 0.025 mg / kg muscle wet weight. The Cd exposed fish infused with an extra dose Cd showed muscle Cd levels of 0.03 mg / kg.

1. EU feed maximum limit (0,5 mg cadmium /kg feed) is far exceeded in this trial, however, the concentration in fish muscle was below the EU-upper limit (0.05 mg/kg wet weight) for food after diet exposure, and also after an extra infusion with Cd. As also discussed by the authors "As muscle is the tissue that is most likely to be consumed by humans, the risks to human health of consumption of fish subject to dietary Cd exposure are likely to be negligible".

Hattink, et. al. "The Toxicokinetics of Cadmium in Carp under Normoxic and Hypoxic Conditions." *Aquatic Toxicology* 75, 1-15 (2005).

Carp, *Cyprinus carpio*, weight $2,5 \pm 1$ grams, were water borne exposed, under normoxic and hypoxic conditions. First the fish were acclimatized to the experimental conditions for 3 weeks to 730 µg Cd / L water, under hypoxic and normoxic conditions. Then Cd concentrations in fish were monitored for 3 weeks (first run) or 5 weeks (second run), by adding radiotracer ^{109}Cd to the water. During the elimination period (6 weeks, first run, or 4 weeks second run), the water borne Cd concentration was remained at 730 µg Cd/L water. Results showed a Cd concentration in muscle after 63 days (total) for normoxic exposed fish of 25 nmol/g muscle dry weight, that is 0.7 mg/kg muscle wet weight. Hypoxic exposed fish showed muscle concentrations around 80 nmol/g dry muscle weight after 63 days, which is 2,1 mg/kg wet muscle weight.

1. Carp is not a farmed fish in Norway, and it is a very different species than farmed Atlantic salmon and rainbow trout. The results on carp are therefore not relevant to compare with any expected Cd levels in salmon or trout.
2. Exposure was from water not the feed.
3. At the beginning of the experiment (day 0), the initial concentrations in fish were 0.7 mg / kg muscle wet weight. This background level in muscle exceeds the current EU upper limit of 0.05 mg / kg wet weight for food human consumption.

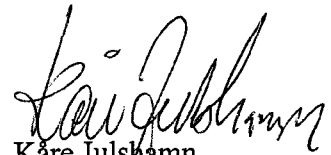
In reference to studies that “show fish tissue concentrations above 0,1 mg Cd kg⁻¹”. Levels referred to by NIFES only include the edible part of farmed fish, which is muscle tissue. Other tissues that might have concentrations above 0,1 mg kg⁻¹ are not included with regards to food safety issues.

Summary of six above mentioned articles

- 1) Rainbow trout fed levels of 500 mg/kg for 1 month showed no exceeding of the current upper limit for cadmium in fish muscle as food product.
- 2) NIFES only refers to feedborn studies, not waterborn (see case 1 above).
- 3) Carp is not a farmed fish in Norway, and it is a very different species than farmed Atlantic salmon and rainbow trout. The results on carp are therefore not relevant to compare with any expected Cd levels in salmon or trout.



Øyvind Lie
Director



Kåre Julshamn
Head of Research