codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

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Agenda Item 15 (f) **CX/FAC 04/36/31**
December 2003

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD ADDITIVES AND CONTAMINANTS

Thirty-sixth Session
Rotterdam, The Netherlands, 22 – 26 March 2004

PROPOSED DRAFT CODE OF PRACTICE FOR SOURCE DIRECTED MEASURES TO REDUCE DIOXIN AND DIOXIN-LIKE PCB CONTAMINATION OF FOODS

(At Step 3)

Governments and international organizations wishing to submit comments at Step 3 on the following subject matter are invited to do so **no later than 16 February 2004** as follows: Netherlands Codex Contact Point, Ministry of Agriculture, Nature and Food Quality, P.O. Box 20401, 2500 E.K., The Hague, The Netherlands (Telefax: +31.70.378.6141; E-mail: info@codexalimentarius.nl, with a copy to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, Viale delle Terme di Caracalla, 00100 Rome, Italy (Telefax: +39.06.5705.4593; E-mail: Codex@fao.org).

BACKGROUND

1. The 32nd Session of the Codex Committee on Food Additives and Contaminants (CCFAC 2000) agreed that Germany, in collaboration with Belgium, Japan, the Netherlands and the United States, would develop a proposed draft Code of Practice for Source Directed Measures to Reduce Dioxin Contamination of Foods for circulation, comment and consideration at its next meeting. The 47th Session of the Executive Committee approved the development of the Code as new work, and confirmed that the matter fell within the terms of reference of the CCFAC.

2. The 33rd Session of CCFAC (2001) agreed that the Code of Practice, following a proposal of Norway, should also address dioxin-like PCBs and that the title should be amended accordingly.

3. The Committee agreed further to return the proposed draft Code of Practice to Step 2 and that the drafting group led by Germany, with the assistance of Belgium, Japan, the Netherlands and the United States, would revise it on the basis of comments submitted for circulation, comment and further consideration at the 34th Session of CCFAC.

4. The 34th Session of CCFAC (2002) agreed to request comments on the proposed draft Code of Practice for Source Directed Measures to Reduce Dioxin and Dioxin-Like PCB Contamination of Foods. Furthermore it agreed that the drafting group led by Germany, with the assistance of Canada, Finland, Japan, the Netherlands, the United States and CEFIC would revise the Code of Practice on the basis of the comments submitted for circulation, additional comments and further consideration at the 35th Session of CCFAC.

5. The 35th Session of CCFAC (2003) agreed that the document should be revised in the format of a code of practice on the basis of the current text and written comments submitted, in particular, Annex C of the Stockholm Convention on Persistent Organic Pollutants (POP), which contains useful information with regard to sources and measures to reduce emissions of dioxins and dioxin-like PCBs.

6. The Committee agreed also that the document should be elaborated by a drafting group led by Germany, with the assistance of Belgium, China, Finland, Japan, the Netherlands, EC, FEFAC and WHO, for circulation, additional comments and further consideration at the 36th Session of CCFAC. In this document comments of Belgium, Canada, Finland, Japan, the Netherlands, the United States, EC and FEFAC have been included.

INTRODUCTION

7. Dioxins (PCDD/PCDF) together with a group of dioxin-like PCBs and PCBs are pervasive in the environment. Although PCDD/PCDF and dioxin-like PCBs show similarities in their toxicological and chemical behaviour, their sources are completely different. PCBs of which dioxin-like PCBs are an integral part have been produced intentionally in considerable amounts since the 1930's and were used in a wide range of applications. They are still in use in existing closed systems and contained in solid matrices e.g. in sealing materials. Certain commercial PCBs are known to be contaminated with PCDFs and therefore could be regarded as a source for PCDFs.

8. In contrast to PCBs, PCDD/PCDF are formed as unwanted by-products especially in thermal processes like incinerations, combustions etc. or in chemical processes like manufacturing of chlorinated pesticides and fungicides. Sources of emission, the emission routes and their distribution in the environment are therefore different for dioxins and PCBs.

9. More than 90 % of the dioxin and PCB exposure of man in industrialized countries is due to consumption of food.

10. Food of animal origin is the predominant route of human exposure to dioxins and dioxin-like PCBs (ca. 80 - 90 % of the total exposure). In most countries, the bulk of the dietary intake of dioxins and dioxin-like PCBs is due to the contamination of animal fats in some fish and fish products, meat and meat products, and milk and dairy products. The load of dioxins and dioxin-like PCBs of production animals including farmed fish is directly related to their feed contamination, or to contamination of the local environment (free-range animals). Thus an integrated approach to reduce these contaminants in the whole chain of food production should be established.

11. JECFA [1,2] and EU SCF [3] derived tolerable intakes and compared these with calculated intakes. They concluded that a considerable proportion of the population exceeds the tolerable intake. Therefore, in order to reduce the contamination of food, control measures at the feed material and compound feedingstuff level are necessary. These may involve developing Good Agricultural Practice, Good Animal Feeding Practice, and Good Manufacturing Practice guidance and measures to effectively reduce the content of dioxins and PCBs in feedingstuffs such as:

- Setting limit/guidance values to prevent contaminated feed materials including materials from mineral origin (e.g. clay minerals and limestone) entering the food chain.
- Identification of agricultural areas with unacceptable dioxin/PCB contamination due to local emission or accidents or illegal disposal of contaminated materials, and monitoring of compound feedingstuffs and feed materials derived from these areas.
- Identification of possibly contaminated feedingstuffs and feed materials.
- Monitoring compliance with these limit/guidance values and phase-out or decontamination (e.g. refining of fish oil) of the non-complying feed materials or compound feedingstuffs
- Identification of critical feed manufacturing processes (e.g. drying).

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1 Canady R, Crump K, Feeley M, Freijer J, Kogevinas M, Malisch R, Verger P, Wilson J and Zeilmaker M (2002) WHO Food Additives Series 48 "Safety evaluation of certain food additives and contaminants", prepared by the fifty-seventh meeting of the Joint FAO/WHO Expert Committee on Food Additives (JECFA), p. 451 - 664

2 Evaluation of certain food additives and contaminants, WHO Technical Report Series 909, fifty-seventh report of the Joint FAO/WHO Expert Committee on Food Additives

3 European Commission, Health and Consumer Protection Directorate-General, Scientific Committee on Food (2001) Opinion of the SCF on the risk assessment of dioxins and dioxin-like PCBs in food, SC/CNTM/DIOXIN/20 final

12. Similar measures are necessary at the level of foodstuffs:

- Setting limit/guidance values to exclude unacceptable high contaminated foodstuffs
- Identification of agricultural areas with unacceptable dioxin/PCB contamination due to local emission or accidents or illegal disposal of contaminated materials, and monitoring of foodstuffs derived from these areas.
- Identification of possibly contaminated foodstuffs.
- Monitoring compliance with these limit/guidance values and phase-out or decontamination (e.g. refining of fish oil) of the non-complying foodstuffs.

13. In respect to dioxins and PCBs, statements on risk assessment and risk management measures are given in the "Position Paper on Dioxins and Dioxin-Like PCBs" prepared by the Netherlands (35th Session of CCFAC, 2003).

14. Broad-range usage of PCBs in the past and industrial emissions resulting in the uncontrolled deposition in soil and sediments (global contamination) are the most important sources of contamination by dioxins and PCBs. Insofar, elimination of sources of PCDD/PCDF compounds and PCBs is an essential prerequisite for a further reduction of contamination. In this respect, all countries worldwide have a responsibility to enact measures to reduce human exposure to dioxins and PCBs. Nevertheless, these measures cannot be considered in this Code of Practice and are not relevant for Codex work within CCFAC. In addition to this, several other programmes like the POP convention are addressing the reduction of global and industrial dioxin contamination so that it is not the intention of this Codex document to refer to these important items again.

15. In comparison with global contamination and industrial emission relatively small contributions can be expected from measures directed to the food chain. Nevertheless, the contamination of the food chain and, in this consequence, the consumers´ exposure can be reduced, if high concentrations of dioxins and dioxin-like PCBs can be detected taking measures at an early stage of production.

16. Feedingstuffs are the material and energetic basis for the production of food of animal origin. They are either industrially manufactured, farm-grown, procured, or taken from the environment, and of either plant, animal or mineral origin. The contamination with dioxins and dioxin-like PCBs can originate from the environment, processing sites, fraudulent actions or even prehistoric emissions and depositions. Due to the chemical nature of dioxins and dioxin-like PCBs, all food producing animal organisms, regardless their habitat (terrestric, aquatic, wild living, domestic) and their anatomic peculiarities (warm-blooded, cold-blooded, vertebrates, invertebrates, monogastric, ruminant), retain dioxins and dioxin-like PCBs in their tissues to a certain extent, and thus contaminate the food derived from them. This phenomenon is denoted as carry over and has a key function in the food chain. Due to their resistance against biological or chemical degradation, and their insolubility in aqueous media, dioxins and dioxin-like PCBs are stored and accumulated in fatty tissues and media like milk fat, meat fat and egg yolk.

17. This document focuses to measures only that can be enacted by farmers, producers, traders of foods and feedingstuffs to guarantee a low contamination level. In this respect Good Agricultural Practices, Good Manufacturing Practices, Quality Assurance in control laboratories and HACCP measures are most valuable systems for further progress in reduction of dioxin and PCB contamination of the food chain.

18. Considering the fact, that unsatisfactory process management measures, accidents or even illegal disposals cannot be excluded completely, this Code of Practice should compile as many measures as possible which can contribute to a further reduction of dioxin and PCB contamination of the food chain.

GLOBAL SOURCE DIRECTED MEASURES

19. In order to reduce dioxin and PCBs contamination of food, additional measures to controls on animal feeding may be necessary. These may include identifying highly contaminated areas (e.g. grazing grounds and water areas that could lead to dioxin and PCB contaminated wild fish or game as well as free-range production animals) that may lead to dioxin contamination in foods. Source directed measures are effective means to reduce local contamination of animal feed and food.

20. Measures to reduce the contamination from these sources may lie outside the responsibility of national food control authorities and the Codex. Therefore it is indispensable that national food control authorities and the Codex Alimentarius Commission (CAC) inform all relevant national and international institutions or organisations about potential or existing problems of food contamination and request them to take preventive measures.

21. Current sources of dioxins and PCBs entering the food supply include both new emissions and remobilisation of deposits in the environment. New emissions of PCDD/PCDF are mainly via the air route due to their main sources. Emissions from environmental reservoirs (sediment/soil) include the water path, plants and the food chain in addition to the contributions from emissions to air. Today emissions of PCBs, amongst them the dioxin-like congeners, primarily occur from leakages, accidental spillages and illegal waste disposal. Emissions via air through thermal processes and migration from sealants and other old matrix applications are of minor importance, but they should be minimized whenever possible. The remobilisation of PCBs from environmental reservoirs is similar to the PCDD/PCDF case. The measures to reduce PCBs-emission sources are directed to minimizing losses from existing equipments, prevention of accidents and better control of the disposal of PCBs-containing oils and wastes. Source-directed emission reductions of dioxins concentrate on the improvement of technologies of the thermal processes with dioxin formation as well as the application of destruction techniques such as end-of-pipe measure. However, for certain food, for example wild fish, source-reduction measures will take many years to show effects because of the diffuse global background contamination.

22. Negotiations on an internationally binding instrument for implementing international measures regarding certain persistent organic substances were concluded in Johannesburg from 2nd to 10th December 2000. The Stockholm Convention on Persistent Organic Pollutants (so-called POP Convention; http://www.pops.int/documents/convtext/convtext_en.pdf) was signed by almost 100 countries on 22nd May 2001. At the heart of this Convention is Article 3, which deals with the ban on the production and use of 12 persistent organic pollutants, including PCBs. Article 5 of the Convention, which addresses measures for reduction and elimination the release of unintentional by-products including PCDD/PCDF specifies requirements for new and existing sources. The Convention text provides for a continuous reduction with the goal of a long-term elimination of these pollutants. In order to achieve this ambitious goal, countries are to develop an action plan designed to identify, characterize and address the releases of dioxin and PCBs, including the development and maintenance of source inventories and release estimates. They are also to employ the best-available techniques for new plants and facilities. In the case of existing plants, best-available techniques and best environmental practices are to be striven for.

23. The POP Convention, Annex C, Parts II and III, describes the following most important industrial source categories, which have the potential for high formation and release of dioxins, dioxin-like PCB`s and non-dioxin-like PCB`s to the environment. The primary measures have to be directed towards elimination of these sources:

a. Waste incinerators including co-incinerators of municipal, hazardous or medical waste or of sewage sludge,

b. Cement kilns firing hazardous waste,

c. Bleaching of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching,

d. Thermal processes in the metallurgical industry i.e. secondary copper production; sinter plants in the iron and steel industry; secondary aluminium production; secondary zinc production.

e. Open burning of waste including burning of landfill sites,

f. Residential combustion sources

g. Fossil fuel-fired and industrial boilers

h. Firing installations for wood and other biomass fuels,

i. Crematoria,

j. Destruction of animal carcasses by burning/incineration,

k. Motor vehicles, particularly those burning leaded gasoline,

l. Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction),

m. Shredder plants for the treatment of end of life vehicles

n. Smouldering of copper cables,

o. Waste of oil refineries.

24. The POP Convention enters into force when 50 ratification instruments have been deposited. 151 countries have signed and 35 countries (to be updated) have ratified the POP Convention so far. The Codex Alimentarius Commission calls on the remaining signatory states to ratify the POP Convention to enable entry into force as swiftly as possible. Supporting the POP Convention is one of the most important activities of all Codex Alimentarius Member States to reduce the contamination of the environment in affected areas.

25. The Codex Alimentarius Commission proposes implementing specific action programmes within the framework of the POP Convention, that are geared towards a global reduction in dioxins and dioxin-like PCB in animal feed and food.

26. Since the global limitation and reduction of dioxins and PCBs from industrial and environmental sources may lie outside of the responsibility of CCFAC, these measures will not be considered within this Code of Practice.

27. The proposal of the drafting group is annexed to this document. In view of the short time period between the submission of comments and the 36th Session of the Committee, comments received will be kept in original language.

28. Governments and interested international organizations are invited to comment **at Step 3** on the attached ***Proposed draft Code of Practice for Source Directed Measures to Reduce Dioxin and Dioxin-Like PCB Contamination of Foods*** as directed above.

Annex

PROPOSED DRAFT CODE OF PRACTICE FOR SOURCE DIRECTED MEASURES TO REDUCE DIOXIN AND DIOXINE-LIKE PCB CONTAMINATION OF FOODS

(at Step 3)

1. PARAMETERS INFLUENCING CONCENTRATION OF PCDD/PCDF- AND PCB-COMPOUNDS IN FOODSTUFFS AND FEEDINGSTUFFS

1.1 Air, Soil, Water

1. Dioxin and dioxin like PCB contamination of food arises from numerous sources, including air, soil and water. Environmental levels in air and water are generally very low. Highest levels of these compounds are found in some soils and sediments.

2. Atmospheric dioxin is mainly released as unwanted by-product from industrial processes (e.g. production of chemicals, metal industry) (Anderson and Fisher, 2002) and solid waste incinerators, but can also result from natural processes such as volcanic eruptions and forest fires (e.g. clay minerals and limestone). Accidents at chemical factories or fires from PCB-filled equipment can cause high emissions and contamination of local areas. The release of dioxin at a chemical factory in Seveso, Italy in 1976 contaminated an area of 15 square kilometres with a population of 37.000 people. Diffuse sources are domestic heaters, agricultural and backyard burning of house hold wastes (Lemieux et al., 2000). Emitted dioxin can deposit on local agricultural crop plants and on soil and contaminate food and feeding stuff, but can also be widely distributed by long-range atmospheric transport. (Lorber et al., 1998) The amount of deposition varies with proximity to the dioxin source, plant species, weather conditions and other specific conditions (height, temperature). Measures to achieve a decline of dioxin in the air must focus on the installation of best available technology for incinerators and industrial processes but also on the prevention of uncontrolled burning of wastes, including the burning of landfill sites and the use of PCP treated wood for domestic heaters.

3. New emissions of PCBs via air through thermal processes are of minor importance.

4. Sources of dioxins in soil include deposition from atmospheric dioxins, application of sewage sludge to farm land (Mc Lachlan et al.,1994), flooding of pastures (only when deposited sludge is contaminated) as well as prior use of pesticides (e.g. 2,4,5-trichlorophenoxy acetic acid) containing PCDD/PCDF-compounds as impurities and contaminated fertilizers (e.g. certain compost).

5. PCB contamination of soils, amongst them the dioxin like congeners primarily occur from accidental spillages, illegal disposal of PCBs-containing oils and wastes and leakages from existing equipments. Agricultural lands near industrial facilities and waste incinerators may have increased contamination levels of dioxins. In order to reduce the contamination of food, the identification of agricultural areas with unacceptable dioxin/PCB contamination due to local emission or accidents or illegal disposal of contaminated materials is necessary.

6. Where possible, suspected areas should be tested for contaminant levels in soil, aerial deposits and agricultural products by local authorities. Agricultural production on these contaminated areas should be restricted.

7. Contaminated soil should either be treated and detoxified or removed and stored under environmental sound conditions. Livestock, game and free-range chicken which graze on contaminated soil, may accumulate dioxins and dioxin like PCBs by direct consumption of soil or by eating plants contaminated by aerial deposition of dioxins and dioxin-like PCBs. Direct transfer from soil to plant, except zucchini (*Cucurbita pepo*), is very limited. The spreading of sewage sludge can lead to adhering of contaminants on the vegetation and can increase the exposure of livestock (European Commission, 1999).

8. Dioxins and dioxin-like PCBs are poorly soluble in water. However, they are adsorbed onto mineral or organic particles in suspension in water. The surface of oceans and seas is exposed to aerial distribution of these compounds which are consequently concentrated along the aquatic food chain. The entry of waste water or contaminated effluents from certain processes, such as paper pulp bleaching or metal processing, can lead to high contamination of water and sediment of coastal ocean areas, lakes and rivers (Foster, E.P. et al., 1999, Knutzen and Oehme, 1989). The uptake of fishes occurs via gills and diet. Fishes can accumulate dioxins and dioxin-like PCBs in the fat tissue and liver. Bottom dwelling flatfishes and bottom feeders are more exposed to contaminated sediments than pelagic fish species. In general, fish with high fat content has highest concentrations of PCDD/PCDF.

9. However, source-reduction measures will take many years to show effects on the contamination levels of fish because of the long half-lives of dioxins and dioxin-like PCBs in the environment and the diffuse global background contamination.

10. In order to reduce exposure to dioxins and dioxin-like PCBs, and PCBs, highly contaminated areas (e.g. streams and lakes) and relevant fish species thereof have to be identified and fishing in these areas should be controlled and, if necessary, restricted.

1.2 Feedingstuffs

11. In lactating animals dioxins and dioxin-like PCBs are excreted partly with milk fat, in laying birds with the eggs, concentrated in the fat content of the egg yolk. In order to reduce this transfer, control measures at the feed material level and compound feed level are necessary. These measures involve developing Codes of Good Agricultural Practice, Good Animal Feeding Practice and Good Manufacturing Practice Guidance (e.g. HACCP) and other control measures which are capable to reduce the content of dioxins and dioxin-like PCBs in feed such as

- setting maximum limits, guidance values, action values to exclude contaminated feed material of either origin from the further food production;
- identification of areas in the food supplying ecosystem (farmland, natural sites) with unacceptable dioxin and dioxin-like PCBs contamination due to local emissions, depositions or accidental or illegal disposal of contaminated materials and monitoring of the feed materials and compound feedingstuffs originating from these areas;
- identification of possibly or frequently contaminated feedingstuffs or feed materials;
- monitoring the compliance with guideline levels or maximum levels with consequent exclusion of threshold violating commodities from further feeding.

1.2.1. Feedingstuff of animal origin

12. Due to the position of their precursors in the food chain in either the aquatic or terrestric ecosystem, animal derived feedingstuffs bear principally a considerable risk of high contamination with dioxins and dioxin-like PCBs.

13. Due to the TSE/BSE legislation of the European Union, use of proteins of terrestrial animal origin (e.g. meat meal) is prohibited for animals in food production. Feed of fish origin may be used for other animals than ruminants.

14. Animal fats and oils from maritime or terrestric organisms as well as (protein rich) meals from carcasses, feathers and hoofs are industrially manufactured. They are practically no farm produced feedingstuffs.

15. The purchaser and user should pay attention to:

- origin from reputable producers and/or companies with certified production facilities, production processes and quality assurance programmes (e.g. HACCP);
- accompanying documents which confirm the compliance of the product with safe maximum or action levels set for the product;
- keeping records of procurement and product safety in order to get not in charge for liabilities for contaminated food of animal origin;

- a content of animal fat as low as possible for the feeding purpose to reduce the freight of dioxins and dioxin-like PCBs to livestock.

16. Milk that exceeds already adopted maximum limits for dioxins and dioxin-like PCBs is not marketable. It should never be fed to suckling live stock animals in order to prevent the build-up of an accumulation in the adipose tissues with probable future violation of maximum limits for meat (on fat base) or milk fat in the future lactation.

17. Milk substitutes consist of skimmed milk products (milk powder, whey powder, casein powder) and are fattened with refined fats or fat refining products like fatty acid distillates from either animal or plant origin. If maximum limits, action levels or guideline levels have been adopted the user should request the manufacturer's guarantee that the product is in conformity with these provisions.

18. Fish oil and other fish products intended for production of feedingstuffs and derived from fish species originating from areas with increased contamination levels may be contaminated with higher levels of dioxins and dioxin-like PCB. Therefore, those products should be checked consequently.

1.2.2. Feedingstuffs of plant origin

19. The cultivation of farm produced feedingstuffs and other plants yielding products for animal feeding should only be performed on sites with an insignificant background contamination with dioxins and dioxin-like PCBs.

20. In the case of dioxins and PCBs emitting industrial enterprises in the vicinity of fields, special attention should be paid to sufficient distance to these sources on the weather side and especially leeward.

21. Cultivation sites irrigated with water from sewers or treated with sewage sludge or municipal compost must frequently be controlled for a possibly elevated contamination with dioxins and dioxin-like PCBs.

22. Former treatment of cultures with herbicides from the chlorinated phenoxyalkanoic acid type or chlorinated products like pentachlorophenol must be considered as a source for dioxin contamination from impurities in these plant protection agents. Precautionary assessments of the dioxin content in soil as well as forage plants from treated sites can prevent the transfer of dioxins (and probably dioxin-like PCBs) into the food chain.

23. Cereals and their direct by-products like straw and chaff are normally low in the air borne contamination with dioxins and dioxin-like PCBs. Bailed straw may be contaminated through PCBs-polluted string. The user of such string should verify the absence of these contaminants through either assessment or certification by the manufacturer or supplier.

24. Straw from lodged grain might be polluted with soil and thus more highly contaminated with dioxins and dioxin-like PCBs than from the atmospheric pathway. When possible these areas should be excluded from harvesting feed straw or bedding.

25. Oilseeds and the vegetable oil derived from them have proven to be not significantly contaminated with dioxins and dioxin-like PCBs. This also applies to the oilseed cakes used as protein rich supplementary feed. Raw vegetable oils are usually refined and hereby decontaminated before they are used as food or feed compounds. On the other hand, oil refining by-products like fatty acid distillates may contain increased levels of PCDD/PCDF and dioxin like PCB and have to be checked consequently if used for feedingstuffs.

26. Roughage must never be cultivated on polluted or exposed areas. Other fresh green fodder like grass from paddocks, glover, alfalfa, pulses, fodder beets, leaves from sugar beets, roots and tubers must be cultivated under the same preventive conditions as above. Special attention has to be paid to the avoidance of soil particles on the crops.

1.2.3. Minerals and Trace Elements

27. Minerals that are added to feedingstuffs are in their most simple form ground minerals (sediments, limestone, salts) from natural sources. However, the experience has shown, that geogenic dioxins may be present in prehistoric sediments in undue high concentrations. Therefore, the use of these materials is allowed only when their content of undesirable substances is below the maximum levels described in legislation.

28. Reclaimed mineral products from industrial pre-use can often be heavily contaminated with dioxins and dioxin-like PCBs. As they originate from extra-farm sources, they should only be procured and used with accompanying certification of the actual dioxin and dioxin-like PCBs content for the batch.

29. Special attention has to be paid to bleaching earths (e.g. bentonite, montmorillonite, kaolinitic clay) from the vegetable oil refining process. An assurance of the distributor, that these minerals do not contain critical amounts of dioxins and dioxin-like PCBs should be documented with the procurement of these binding agents.

30. The supplementation of farm animals with trace elements (e.g. copper, zinc or others) depends on the species, age and performance and is, if necessary, preferably done by compound feed from the feed industry. The supplementation of copper with metallurgic cinders might be a considerable source of dioxins despite their poor bioavailability from the copper containing matrix in the gastro intestinal tract. Products of doubtful origin should not be purchased for reasons of food safety.

31. The iron supplementation of piglets with grass sods must ensure that the material comes from uncontaminated sites of the farm.

32. Many other feed additives like vitamins, amino acids, colourings and so on are used as ingredients of feedingstuffs, too. These components are produced by chemical or enzymatic procedures or by extraction from biological material. Although the concentration of these compounds in the feedingstuff is low, these products might be a source for the contamination with PCDD/PCDF and dioxin-like PCB and should be checked in a total quality assurance system.

1.2.4. Drying Processes

33. Artificial drying of grains and forage requires a flow of heated gases, either a flue gas-air mix or heated air alone (indirect drying). The temperature at the inlet into the drying zone should not be below 350 °C to keep the drying time in reasonable limits. The choice of fuel is critical. Treated wood, cane straw, pit coal, brown coal, crude oil, tar derivatives or worn out engine oils or hydraulic oils may lead to excessive contamination with dioxins and dioxin-like PCBs in the direct drying facilities and should never be used in direct drying installations.

34. The use of light heating oil or gaseous fuels has proven to be of no adverse influence on the contamination of the greens with dioxins. In commercial drying plants the process parameters must be controlled. Monitoring the content of dioxin and dioxin-like PCBs in the final product is recommended.

35. The quality of commercial green fodder meals depends on the selection of the raw material and the drying process. The purchaser should insist on a certificate from the manufacturer/supplier, that the dried goods are produced according to Good Manufacturing Practice, especially in the choice of the fuel (by no means treated wood) and are in conformity with existing MLs for dioxins and dioxin-like PCBs in feedingstuffs.

36. Natural drying on the stubbles or on hay racks on the field normally bears no risk of contamination with dioxins and dioxin-like PCBs when the pollution with soil particles under tedding, raking and bailing is avoided by appropriate techniques and tools. To avoid contamination with soil particles, hay turn over, sweeping and bailing must be done with sufficient distance to the ground.

37. Hay racks should not be constructed from treated wood or be preserved with wood protectants to avoid possible contamination with PCP. Preservation with worn oils must strictly be avoided.

1.3 Special Conditions of Processing

38. PCDD/PCDF contamination of foodstuffs and feedingstuffs can occur by several methods of preparation and refining, especially if the flue gases of open fire systems contact directly these products.

39. Contamination of feedingstuffs is possible if the technology in question is used for drying and manufacturing feed (e.g. grain, grass and other plants, fruits, products and by-products from food industry etc.) for animal nutrition. Fuels for drying energy production should have a low chlorine content. Treated wood or waste wood should never be used as fuel for those drying techniques.

40. Deep-frying of food (e.g. meat) does not cause dioxin formation. Smoking and grilling can sometimes be critical processing steps for increased PCDD/PCDF content in foods, especially if the products show a very dark surface with particles of soot. This should be avoided strictly.

41. Spices, cereals and other materials used for human nutrition should not be dried using flue gas based open fire systems.

1.4 Processing Aids

42. All kind of food additives (e.g. spices, colorants, preservatives, antioxidants, flavours etc.) should have lowest possible dioxin and PCB levels to reduce secondary contamination by these ingredients. Attention should be paid to the avoidance of soil particles, especially on the surface of low growing spices with expanded leave surfaces.

43. Producers of feedingstuffs should know that anticaking agents should comply with maximum limits for PCB and PCDD/PCDF established by EU or national authorities or with existing action levels or guideline levels. They also should ensure that undesirable materials such as lubricants and hydraulic oils used for technical equipments do not get in contact with the produced feedingstuffs.

1.5 Harvesting, Transport, Storage of Feedingstuffs and Foodstuffs

44. Harvesting forage commodities of either kind must ensure that no additional contamination with dioxins and dioxin-like PCBs can occur. Especially in suspected areas, this can be achieved by prevention of any soil uptake during the harvest of above ground plant parts by a sufficient stubble height. Sugar beet leaves for silage making should be taken up from the field only under dry weather conditions and the sweeping forks should not adjusted too low. Sediment-stained greens after flooding periods are to be monitored for their dioxin and dioxin-like PCBs content. Roots and tubers should be washed prior to feeding when harvested with undue high adherence of soil.

45. In order to avoid cross-contamination, transportation of food, compound feedingstuff or feed materials should only be performed on vehicles (including ships) or in containers which have never been used before for the transportation or storage of dioxin and dioxin-like PCBs contaminated wastes or other contaminated products. Storage containers of food or feeding stuffs should be painted only with PCDD/PCDF- and PCB-free colours.

46. Storage sites of food or feed components must be free from contamination with dioxins and dioxin-like PCBs. Treatment of surfaces (walls, floors) with protective paintings may be a risk of contamination, when PCB-containing tar based coatings have been used. Surfaces which became in contact with smoke and soot from fires always bear a risk of contamination with dioxins and furans. These sites must be checked for undue high contamination before (re-) use as storage compartments. The past has shown, that even paper bags may lead to an appreciable contamination with dioxins and PCBs to their contents when either the paper pulp or the printing colours or even the glues contain traces of dioxins and PCBs. Bags from natural fibres may contain undue high amounts of PCBs or PCP from the pre-treatment of the crude fibre with a PCB-water emulsion as a lubricant under spinning. When the packaging materials mentioned are purchased, a certificate of a dioxin/PCBs-assessment should be available.

1.6 Special Problems of Animal Keeping (Housing)

47. Housed animals for food production may be contaminated through contaminated buildings and barn materials/equipment, especially if treated wood is used as building material. Special attention must be paid in poultry farming and egg production on contamination free poultry runs, laying houses and beddings from saw dust. Even in non-contaminated sites, eggs of free living hens (e.g. organic farming) may have increased concentrations of PCDD/PCDF-compounds as compared to eggs of hens farmed in pens.

48. In the barn older water resistant varnishes might contain PCBs. Burns may generate dioxins and furans from combustible construction elements. A thorough cleaning from soot layers and removal of ashes and pits of extinguishing water with subsequent flushing with fresh water can reduce the risk of an undue higher dioxin background in the barn.

49. In housings without a floor covering the animals normally will take up soil particle from the ground. In these cases the contamination of the soil should be controlled.

50. Treated wood like railroad ties should not be used as fence-posts for enclosures of free-range animals.

1.7 Disposal of Contaminated Milling Fractions

51. The air borne external deposition of dioxins and dioxin-like PCBs on the surface of all parts of the grain plants as well as the adherent dust fraction from the standing crop is widely removed during all stages of the milling process before the final grinding process. Most of the particle-bound contamination is removed in the loading chute with the remaining dust. Further external contaminations are significantly reduced during aspiration and sieving with the removed impurities. All these impurities contain the accumulated airborne dioxin and dioxin-like PCBs equivalents and should be treated as waste. Mixing these fractions with grain or bran for feeding purposes must be strictly avoided.

2 CONTROL MEASURES

2.1 Self-check by Producers

52. Feed manufacturers, farmers and food operators have the primary responsibility for food safety. Competent authorities monitor and enforce this responsibility through the operation of surveillance and control systems. Therefore, in general, farmers, manufacturers and operators should self-check their products. As analyses for dioxins are quite expensive in comparison to determination of other chemical contaminants, self-checks should be performed at least by industrial manufactures and operators of food or feed including both incoming raw materials and final products. In addition, products have to be more intensively self-checked if analytical results or other circumstances give hints on a possible contamination.

2.2 Monitoring

53. Comprehensive monitoring programmes including contaminations originating from the environment, accidents or illegal disposals should be organized in order to widen the current limited geographical basis of the information on food and feed materials contamination. Monitoring programmes should also include major fish species intended for human consumption. Regarding the huge amounts of feedingstuffs being produced and sold worldwide, feed materials (including certain feed additives at risk, e.g. trace elements) imported from countries with insufficient control capacities should be checked for their dioxin content. The results of monitoring programmes should be made available to all interested parties.

2.3 Sampling, Analytical Requirements and Qualification of Laboratories

54. An important orientation for analytical requirements and qualification of laboratories is given in the literature (4, 5). These recommendations and conclusions form the basis of the evaluation by JECFA (6, 7), of Commission Directive 2002/69/EC of 26 July 2002 laying down the sampling methods and the methods of analysis for the official control of dioxins and the determination of dioxin-like PCBs in foodstuffs (OJ L 209 of 6 August 2002, p.5) and of Commission Directive 2002/70/EC of 26 July 2002 establishing requirements for the determination of levels of dioxins and dioxin-like PCBs in feedingstuffs (OJ L 209 of 6 August 2002, p. 15).

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4 R. Malisch, B. Baumann, P.A. Behnisch, R. Canady, D. Fraisse, P. Fürst, D. Hayward, R. Hoogenboom, R. Hoogerbrugge, D. Liem, O. Päpke, W. Traag and T. Wiesmüller “Harmonized Quality Criteria for Chemical and Bioassays Analyses of PCDDs/PCDFs in Feed and Food. Part 1: General Considerations, GC/MS Methods” Organohalogen Compounds (2001) 50: 53 - 58

5 P.A. Behnisch, R. Allen, J. Anderson, A. Brouwer, D.J. Brown, T.C. Campbell, L. Goeyens, R.O. Harrison, R. Hoogenboom, I. Van Overmeire, W. Traag and R. Malisch “Harmonized Quality Criteria for Chemical and Bioassays Analyses of PCDDs/PCDFs in Feed and Food. Part 2: General Considerations, Bioassay Methods” Organohalogen Compounds (2001) 50: 59 - 63

6 R. Canady, K. Crump, M. Feeley, J. Freijer, M. Kogevinas, R. Malisch, P. Verger, J. Wilson and M. Zeilmaker “Polychlorinated dibenzodioxins, polychlorinated dibenzofurans, and coplanar biphenyls”; WHO Food Additives Series 48 “Safety evaluation of certain food additives and contaminants, prepared by the fifty-seventh meeting of the Joint FAO/WHO Expert Committee on Food Additives (JECFA), IPCS (International Programme on Chemical Safety), World Health Organization, Geneva, 2002, p. 451 – 664)

7 Evaluation of certain food additives and contaminants, WHO Technical Report Series 909, fifty-seventh report of the Joint FAO/WHO Expert Committee on Food Additives

Sampling

55. Important aspects of sampling for dioxin analysis are to collect representative samples, avoid cross contamination and deterioration of samples and unambiguously identify and trace back samples. These aspects are covered by several Community Directives such as First Commission Directive of 1 March 1976 establishing Community methods of sampling for the official control of feedingstuffs (76/371/EEC) - OJ L 201 of 15 April 1976, p. 1 and of the above mentioned Commission Directives 2002/69/EC and 2002/70/EC.

Analytical methods

56. Analytical methods should be applied only if they are sensitive enough as it is laid down in Commission Directives 2002/69/EC and 2002/70/EC.

57. If regulatory limits are set and to be controlled, the limit of quantification should be in the range of one fifth of this level of interest. For control of time trends of background contamination, the limit of determination should be clearly below the mean of the present background ranges for the different matrices. Performance of a method should be demonstrated in the range of the level of interest, e.g. 0.5 x, 1 x and 2 x level of regulatory limit with an acceptable coefficient of variation for repeated analysis. The difference between upper bound and lower bound levels should not exceed 20 % for foodstuffs with a dioxin contamination of about 1 pg WHO-PCDD/PCDF-TEQ/g fat (based on PCDD/PCDF, only).

Laboratories

58. For laboratories, the most important requirements are:

- The continuous participation in interlaboratory studies or proficiency tests for the determination of PCDD/PCDF, dioxin-like PCBs and PCBs in the relevant feed/food matrices is mandatory.
- Laboratories should be accredited by a recognised body operating in accordance with ISO Guide 58 to ensure that they are applying analytical quality assurance. Laboratories should be accredited following the ISO/IEC/17025:1999 standard.
- Reporting of results: The concentrations of the individual substances in a given sample are multiplied by their respective WHO Toxic Equivalency Factors (TEF) (Van den Berg et al., "Toxic Equivalency Factors [TEFs] for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environmental Health Perspectives, 106 (1998) 775-792) and subsequently summed to give the total concentration expressed as toxic equivalents (WHO - TEQ). If possible, the analytical results should contain the levels of the individual dioxins/furans and PCB congeners and be reported as lower bound, medium bound and upper bound in order to include a maximum of information and thereby enabling the interpretation of the results according to specific requirements.
- The report should also include the lipid content or dry matter of the sample as well as the method used for lipid extraction or for determination of dry matter.

References:

PARAMETERS INFLUENCING CONCENTRATION OF PCDD/PCDF- AND PCB-COMPOUNDS IN FOODSTUFFS AND FEEDINGSTUFFS

European commission 1999: Compilation of EU-Dioxin exposure and health data. Report produced for the European Commission Directorate General on Environment, Task 2-Environmental levels. Technical Annex.

Knutzen, J.; Oehme, M. Polychlorinated dibenzofuran (PCDF) and Dibenzo-p-dioxin (PCDD) levels in organisms and sediments from the Frierfjord, Norway. Chemosphere 1989, 19, 1897-1909.

Foster, E.P.; Drake, D.; Farlow, R. Polychlorinated Dibenzo-p-dioxin and polychlorinated dibenzofuran congener profiles in fish, crayfish, and sediment collected near a wood treating facility and a bleached kraft pulp mill. Bull. Environ. Contam. Toxicol. 1999, 62, 239-246.

Anderson, D.R.; Fisher, R. Sources of dioxins in the United Kingdom: the steel industry and other sources. Chemosphere 2002, 46, 371-381.

Lorber, M.; Pinsky, P.; Gehring, P.; Braverman, C.; Winters, D.; Sovocool, W. Relationships between dioxins in soil, air, ash, and emissions from a municipal solid waste incinerator emitting large amounts of dioxins. Chemosphere 1998, 37, 2173-2197.

Lemieux, P.M.; Lutes, C.C.; Abbott, J.A.; Aldous, K.M. Emissions of polychlorinated dibenz-p-dioxins and polychlorinated dibenzofurans from the open burning of household waste in barrels. Environ. Sci. Technol. 2000, 34, 377-384.

Mc Lachlin, M.S.; Hinkel, M.; Reissinger, M.; Hippelein, M.; Kaupp, H. A study of the influence of sewage sludge fertilization on the concentration of PCDD/F and PCB in soil and milk. Environ. Pollut. 1994, 85, 337-343.

FEEDINGSTUFFS; SPECIAL CONDITIONS OF PRTOCESSING; PROCESSING AIDS; HARVESTING, TRANSPORT STORAGE OF FEEDINGSTUFFS AND FOODSTUFFS; SPECIAL PROBLEMS OF ANIMAL KEEPING (HOUSING); DISPOSAL OF CONTAMINATED MILLING FRACTIONS

Codex Alimentarius: Food Hygiene and Basic Texts

FAO: Food Quality and Safety Systems-A training manual on food hygiene and the Hazard Analysis and Critical Control Point (HACCP) system

Codex: Recommended International Code of Practice – General Principles of Food Hygiene

Codex: Draft Code of Hygienic Practice for Milk and Milk Products

Codex Code of Practice on Good Animal Feeding

Codex: Proposed Draft Code of Practice for Source Directed Measures to reduce Dioxin and Dioxin-like PCB Contamination of Foods

Codex: Position Paper on Dioxins and Dioxin-like PCBs