codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

JOINT OFFICE: Viale delle Terme di Caracalla 00100 ROME Tel: 39 06 57051 www.codexalimentarius.net Email: codex@fao.org Facsimile: 39 06 5705 4593

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD ADDITIVES AND CONTAMINANTS

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PROPOSED DRAFT CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF DIOXIN AND DIOXIN-LIKE PCB CONTAMINATION IN FOODS

(At Step 3)

Governments and international organizations in Observer status with the Codex Alimentarius Commission wishing to submit comments on the following subject matter are invited to do so **no later than 28 February 2005** 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 - ***preferably***), with a copy to the Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy (Telefax: +39.06.5705.4593; E-mail: Codex@fao.org - ***preferably***).

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 (POPs), 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.

7. The 36th Session of CCFAC (2004) agreed to return the proposed draft document to Step 2 for revision led by Germany, with the assistance of Australia, Belgium, Canada, China, EC, Finland, Iceland, United States, IBFAN and IDF, for circulation, comments at Step 3, and further consideration at the next Session of the Committee. In this document comments of Australia, Belgium, Canada, Finland, Iceland, Japan, the United States, CEFIC and IBFAN have been included.

PROPOSED DRAFT CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF DIOXIN AND DIOXIN-LIKE PCB CONTAMINATION IN FOODS

(at Step 3)

INTRODUCTION

GENERAL REMARKS

1. Dioxins (PCDD/PCDF) together with a group of dioxin-like PCBs are pervasive in the environment (1). Although dioxins and dioxin-like PCBs show similarities in their toxicological and chemical behaviour, their sources are completely different.

2. Current sources of dioxins and dioxin-like PCBs entering the food supply include both new emissions and remobilisation of deposits in the environment. New emissions 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.

3. Today emissions of dioxin-like PCBs 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 dioxin-like PCBs from environmental reservoirs is similar to dioxins.

4. Dioxin-like PCBs are an integral part of total PCBs that 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.

5. Dioxins are mainly formed and released as unwanted by-products from industrial processes (e.g. production of chemicals, metal industry) (2) 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. Diffuse sources can be e.g. domestic heaters, agricultural and backyard burning of household wastes (3).

6. Emitted dioxins can deposit on local agricultural crop plants and on soil and contaminate food and feed. Dioxins can also be widely distributed by long-range atmospheric transport (4). The amount of deposition varies with proximity to the dioxin source, plant species, weather conditions and other specific conditions (e.g. altitude, latitude, temperature).

7. Sources of dioxins in soil include deposition from atmospheric dioxins, application of sewage sludge to farm land (5), flooding of pastures with contaminated sludge, and 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).

8. Dioxins and dioxin-like PCBs are poorly soluble in water. However, they are adsorbed onto mineral and organic particles suspended 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 (6; 7). The uptake of dioxin-like PCBs by fish occurs via gills and diet. Fish can accumulate dioxins and dioxin-like PCBs in their fatty tissue and liver. Bottom dwelling fishes and bottom feeders are more exposed to contaminated sediments than pelagic fish species. However, levels of dioxins and dioxin-like PCBs in bottom dwelling fishes are not always higher than those in pelagic fish depending on the size, feed and physiological characteristics of fish. In general, fish with high fat content and greater age have the highest concentrations of dioxins.

9. Foods of animal origin are 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 fish, meat, and dairy products. The load of dioxins and dioxin-like PCBs of production animals, including farmed fish, is directly related to feed contamination (e.g. fish oil and fish meal), 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.

10. JECFA (8; 9) and EU SCF (10) derived tolerable intakes and compared these with calculated intakes. They concluded that a considerable proportion of the population exceeds the tolerable intake of dioxins and PCBs. Therefore, in order to reduce the contamination of food, control measures at the feed level (including feed additives) are necessary. These may involve developing Good Agricultural Practice, Good Animal Feeding Practice, and Good Manufacturing Practice guidance and measures to effectively reduce dioxins and PCBs in feed, including:

- Setting limit/guidance values to prevent contaminated feed including materials from mineral origin (e.g. clay minerals and limestone) and additives (e.g. binders, trace elements) from 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 feed and feed ingredients derived from these areas,
- Setting guidance values for soil and recommendation for special agricultural use (e.g. limitation of grazing),
- Identification of possibly contaminated feed and feed ingredients,
- Monitoring compliance with these limit/guidance values and phasing-out or decontamination (e.g., refining of fish oil) non-complying feed or or feed ingredients, and
- Identification and control of critical feed manufacturing processes (e.g., artificial drying by direct heating).

11. Similar measures may be necessary for reducing dioxins and dioxin-like PCBs in food:

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

SOURCE DIRECTED MEASURES

12. Elimination of sources of dioxins and dioxin-like PCBs is an essential prerequisite for a further reduction of contamination The measures to reduce dioxin-like PCBs emission sources are directed to minimizing losses from existing equipments, prevention of accidents and better control of the disposal of dioxin-like 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. Since source-reduction measures will take many years to show effects because of the diffuse global background contamination, all countries worldwide have a responsibility to enact source directed measures as soon as possible to reduce human exposure to dioxins and PCBs.

13. The Stockholm Convention on Persistent Organic Pollutants (POPs Convention) (11) entered into force on 17th May 2004. Meanwhile there are 152 signatories and 76 parties to the POPs Convention. Supporting the POPs Convention is one of the most important activities of all Codex Alimentarius Member States to reduce the contamination of the environment in affected areas.

14. The Convention text provides for a continuous reduction with the goal of a long-term elimination of these pollutants, wherever feasible. In order to achieve this ambitious goal, countries should develop an action plan designed to identify, characterize and address the releases of dioxins and dioxin-like PCBs, including the development and maintenance of source inventories and release estimates. They should also employ the best-available techniques for new plants and facilities. In the case of existing plants, best-available techniques and best environmental practices should be striven for. Article 6 provides for environmentally sound management of POPs stockpiles and POPs containing waste, i.e. in general destruction or irreversible transformation of POPs content. Although not obligatory, article 6 endeavours parties to develop appropriate strategies for identifying site contaminated by POPs chemicals. If remediation is undertaken it should be performed in an environmentally sound manner.

15. The POPs Convention describes the following most important 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 to reduce and where feasible ultimate 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. Production 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 utility and industrial boilers,

h. Firing installations for wood and other biomass fuels,

i. Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil,

j. Crematoria,

k. Motor vehicles, particularly those burning leaded gasoline,

l. Destruction of animal carcasses by burning/incineration,

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

n. Shredder plants for the treatment of end of life vehicles,

o. Smouldering of copper cables,

p. Waste of oil refineries.

Elimination or reduction of these sources should be considered by governments and national authorities when developing national measures to reduce dioxins and dioxin-like PCBs.

16. National food control authorities and the Codex Alimentarius Commission (CAC) should inform all relevant national and international institutions or organisations about potential or existing problems of food contamination and request them to take preventive measures.

SCOPE

17. This Code of Practice focuses on measures (e.g., Good Agricultural Practices, Good Manufacturing Practices, Laboratory Quality Assurance, HACCP) farmers, food processors, traders of foods and feeds can take to prevent or reduce dioxin and dioxin-like PCB contamination in foods.

18. 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.

RECOMMENDED PRACTICES

BASED ON GOOD AGRICULTURAL PRACTICES (GAP), GOOD MANUFACTURING PRACTICES (GMP), GOOD STORAGE PRACTICES (GSP) AND GOOD ANIMAL FEEDING PRACTICES (GAFP)

1. CONTROL MEASURES

1.1 Air, Soil, Water

19. To achieve a decline of dioxins in the air, national authorities should consider taking measures to install best available technology for incinerators and industrial processes, prevent uncontrolled burning of wastes, including the burning of landfill sites and the use of PCB treated wood for domestic heaters.

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

21. Where possible, national authorities should consider monitoring suspected areas for contaminant levels in soil, aerial deposits and agricultural products. Agricultural production on those contaminated areas should be restricted if a significant transfer of dioxins and dioxin-like PCBs into food produced on these areas can be anticipated.

22. Contaminated soil should be treated and detoxified or removed and stored under environmentally sound conditions. Livestock, game, cattle, free-range chicken and other poultry which graze on contaminated soil, may accumulate dioxins and dioxin like PCBs by direct consumption of soil or by eating contaminated plants. 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 which can increase livestock exposure (12). 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

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

1.2 Feed

24. The bulk of the dietary intake of dioxins and dioxin-like PCBs is due to the deposition of these substances in animal fats of poultry, relevant fish species, eggs, meat and milk. In lactating animals dioxins and dioxin-like PCBs are excreted partly with milk fat, and in laying hens the contaminants are concentrated in fat content of the yolk in laid eggs. To reduce this transfer, control measures at the feed ingredients level and compound feed level should be considered. These measures involve developing Codes of Good Agricultural Practices, Good Animal Feeding Practices, Good Manufacturing Practices Good Storage Practices, and other control measures (HACCP-like principles) which are proven to be capable of reducing the content of dioxins and dioxin-like PCBs. Such measures may include:

- identification of areas in the feed supply ecosystem (farmland, natural sites) with excessive dioxin and dioxin-like PCB contamination due to local emissions, depositions or accidental or illegal disposal of contaminated materials and monitoring of the feed ingredients and compound feed originating from these areas;
- identification of commercial source of frequently contaminated feed or feed ingredients; and
- monitoring the compliance with nationally-established guideline levels or maximum limits, if available, with consequent exclusion of threshold violating commodities from further feeding.

1.2.1 Feed of animal origin

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

26. Competent national authorities should sample and analyse, using recognized international methods, suspected feeds to verify dioxin and dioxin-like PCB levels. This information will determine actions needed to minimize dioxin and dioxin-like PCB levels and allow alternative feed ingredients be located if necessary.

27. The purchaser and user should pay attention to:

- product origin of feed materials to ensure that producers and/or companies have certified production facilities, production processes and quality assurance programmes (e.g. HACCP);
- accompanying documents confirming compliance with nationally-established maximum limits and/or action levels; if available.

28. In order to prevent accumulation of dioxins and dioxin-like PCBs in adipose tissues of livestock, with possible resultant violations of nationally-established maximum limits for meat and milk or their derived products, milk that exceeds nationally-established maximum limits, if available, or contains elevated levels of dioxins or dioxin-like PCBs should not be fed to suckling animals unless the fat has been removed.

29. If intended for use in feed, fish oil and other products derived from fish, milk and milk substitutes, refined animal and plant fats should be monitored to the extent practicable for dioxins and dioxin-like PCBs on a regular basis. If there are maximum limits, guideline levels or action levels, the feed or food manufacturer should ensure that their product is in conformance with these provisions.

1.2.2 Feed of plant origin

30. Cultivating feeds on soil contaminated with dioxins and dioxin-like PCBs should be avoided.

31. If potential sources of dioxins and dioxin-like PCBs are in the vicinity of fields, special attention should be paid to providing sufficient distance so that fields are not in the emission plume deposition area.

32. Cultivation sites irrigated with water from sewers or treated with sewage sludge or municipal compost should frequently be monitored for a possible contamination with dioxins and dioxin-like PCBs.

33. Prior treatment of crops with herbicides from the chlorinated phenoxyalkanoic acid type or chlorinated products like pentachlorophenol should be considered as a potential source for dioxin contamination. Monitoring 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.

34. Straw from lodged grain might be contaminated with soil and thus more likely to contain highly contaminated with dioxins and dioxin-like PCBs than from the atmospheric pathway. When possible these sources of straw should be excluded from use as harvesting straw for feeding or bedding.

35. Typically, oilseeds and vegetable oil are not significantly contaminated with dioxins and dioxin-like PCBs. This also applies to the oilseed cakes used as protein rich feed ingredient. Raw vegetable oils are usually refined before they are used as food. A part of the oil used for animal feed is also refined. It is possible to decontaminate thereby, if special refining techniques are used. On the other hand, oil refining by-products like fatty acid distillates may contain increased levels of dioxins and dioxin-like PCBs and should be analyzed if used for feed.

36. Used bleaching earth should not be used as feed ingredient.

1.2.3 Minerals and Trace Elements

37. Minerals used as feed ingredient and binders or trace elements used as additives are in their most simple form ground minerals (sediments, limestone, salts) from natural sources. However, experience has shown, that geogenic dioxins may be present in prehistoric sediments in high concentrations. Therefore, dioxin and dioxin-like PCB levels in minerals added to feed should be monitored.

38. Reclaimed mineral products from industrial pre-use, or residues from industrial processes used as soil conditioners, can often be heavily contaminated with dioxins and dioxin-like PCBs. As they originate from extra-farm sources, the actual dioxin and dioxin-like PCB content should be monitored.

39. Special attention should be paid to binders, anticaking substances (e.g. bentonite, montmorillonite, kaolinitic clay) from the vegetable oil refining process, even as certain carriers (e.g. calciumcarbonate, sawdust from wood treated with pentachlorophenols) used in feed additives or premixtures. As assurance to the user that these substances do not contain minerals with critical amounts (e.g. exceeding nationally-established maximum limits, if available) of dioxins and dioxin-like PCBs, the distributor should provide appropriate certification to the end user.

40. 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 or zinc 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 enter the food or feed chain.

41. Producers of iron supplements with grass sods for piglets should ensure that the material comes from uncontaminated areas.

42. Many other additives like vitamins, amino acids, colourings and so on are used as feed ingredients, 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 dioxins and dioxin-like PCBs and should be monitored.

1.2.4 Drying Processes

43. Artificial drying of grains and forage and heating of hothouses for vegetable or flower growing 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 keep the drying time within reasonable limits. The choice of fuel is critical. Fuels used in drying processes should have a low chlorine content. Treated wood, cane straw, 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 hothouses and should not be used in direct drying installations.

44. The quality of commercial green fodder meals depends on the selection of the raw material and the drying process. The purchaser should consider requiring 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 nationally-established maximum limits, if available, for dioxins and dioxin-like PCBs in feed.

45. 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. If there should be any risk for contamination of soil by dioxins and dioxin-like PCBs hay turn over, sweeping and bailing should be done with sufficient distance to the ground, in order to avoid contamination with polluted soil particles.

1.3 Special Conditions of Processing

46. Smoking and grilling can be critical processing steps for increased dioxin content in foods, especially if the products show a very dark surface with particles of soot.

47. If there is any risk for contamination, food and feed should not be dried using flue gas based open fire systems.

1.4 Substances added to Feed and Food

48. Ingredients in food (e.g. spices, colorants, preservatives, antioxidants, flavours etc.) should have lowest possible dioxin and PCB levels to reduce possible secondary contamination. Attention should be paid to the minimization of soil and dust particles, especially on the surface of low growing spices with expanded leave surfaces.

49. Producers of feed and food should ensure that substances added comply with nationally-established maximum limits, guidelines or action levels, if available. They also should ensure that undesirable materials such as lubricants and hydraulic oils used for technical equipments do not contaminate food and feed.

1.5 Harvesting, Transport, Storage of Feed and Food

50. To the extent feasible, it should be ensured that no additional contamination with dioxins and dioxin-like PCBs occurs in harvesting commodities. This can be achieved in suspected areas by preventing soil uptake during the harvest of above ground plant parts by a sufficient stubble height. Commodities intended for silage should be harvested and removed from the field only under dry weather conditions and the sweeping forks should not be adjusted too low. Sediment-stained greens after flooding periods should be monitored for their dioxin and dioxin-like PCB content. Roots and tubers should be washed prior to feeding to reduce soil contamination.

51. To avoid cross-contamination, transportation of food, compound feed or feed ingredients should only be performed in vehicles (including ships) or in containers that have never been used for the transportation or storage of dioxin and dioxin-like PCB contaminated wastes or other contaminated products. Storage containers of food or feed should be painted only with PCDD/PCDF- and PCB-free colours.

52. Storage sites of food or feed components should 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 that come in contact with smoke and soot from fires always bear a risk of contamination with dioxins and furans. These sites should be analyzed for undue high contamination before use as storage compartments. Even paper bags may lead to a contamination with dioxins and PCBs to their contents when the paper pulp, printing colours, or glues contain traces of dioxins and PCBs. Bags from natural fibres may contain undue high amounts of PCBs or pentachlorophenols 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 and dioxin-like PCB assessment should be available.

53. Bailed straw may be contaminated through dioxin-like PCB polluted string. The user of such string should verify the absence of these contaminants through either assessment or certification by the manufacturer or supplier.

1.6 Special Problems of Animal Keeping (Housing)

54. Housed animals for food production may be contaminated by buildings and barn materials and equipment, especially if treated wood is used as building material. Special attention should be paid to saw dust used in poultry farming and egg production on contamination free poultry runs, laying houses and beddings. Eggs of free living hens (e.g. organic farming) may have increased concentrations of dioxin compounds as compared to eggs of hens farmed in pens and should be monitored.

55. Special care should be taken with older barns as they may have building materials or water resistant varnishes containing PCBs. If they have caught fire, a thorough cleaning of soot layers with lipid soluble solvents is necessary. Removal of ashes and pits of extinguishing water and flushing with fresh water should reduce the risk of high PCB levels.

56. 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 determined and controlled as necessary.

57. Wood (e.g. railroad ties) treated with chemicals such as pentachlorophenol or other unsuitable materials should not be used as fence posts for enclosures of free-range animals or feed lines. Hay racks should not be constructed from such treated wood. Preservation with worn oils should be avoided.

1.7 Disposal of Contaminated Milling Fractions

58. 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 the milling process and before the final grinding process. Most particle-bound contamination is removed in the loading chute with the remaining dust. Further external contaminations are significantly reduced during aspiration and sieving. All these grain fractions should be monitored to determine if they have elevated dioxin and dioxin-like PCB levels, and if so, they should not be used in food or feed and treated as waste.

1.8 Monitoring by Producers

59. Feed manufacturers, farmers and food operators have the primary responsibility for food safety. Therefore, they should test susceptible products from areas which are known to be contaminated with dioxins and dioxin-like PCBs at elevated levels. Competent authorities should monitor and enforce this responsibility through the operation of surveillance and control systems.

60. As analyses for dioxins are quite expensive in comparison to determination of other chemical contaminants, periodic tests should be performed to the extent feasible at least by industrial manufacturers and operators of food or feed including both incoming raw materials and final products and data should be kept. Farmers and producers should be informed about the contamination and the source should be identified. In addition, products should be more intensively monitored if analytical results or other circumstances give indications of a possible contamination.

1.9 Monitoring

61. Comprehensive monitoring programmes dealing with contaminations originating from the environment, accidents or illegal disposals should be organized by feed manufacturers, farmers, food operators and competent authorities in order to widen the current limited geographical basis of the information on food and feed contamination. Monitoring programmes should also include major fish species intended for human consumption. Regarding the huge amounts of feed being produced and sold worldwide, feed materials (including certain feed additives at risk, e.g. trace elements) should be analyzed as necessary for their content of dioxins and dioxin-like PCBs. The results of monitoring programmes should be made available to all interested parties.

2. Sampling, Analytical Methods and Laboratories

62. Important advice concerning analytical requirements and qualification of laboratories is given in the literature (13; 14). These recommendations and conclusions form the basis of the evaluation by JECFA (15; 16) and others (17; 18; 19). Furthermore, consideration of methods of analysis of dioxins and dioxin-like PCBs is currently being addressed by the Codex Committee of Methods and Sampling (Methods of Analysis for the Determination of Dioxins and PCBs – CX/MAS 04/11).

Sampling

63. Important aspects of sampling for dioxin and dioxin-like PCB analysis are collecting representative samples, avoiding cross contamination and deterioration of samples and unambiguously identifying and tracing back samples (17). All relevant information on sampling, sample preparation and sample description (e.g. age/size of fish) should be available.

Analytical methods

64. Analytical methods should be applied only if they are sufficiently sensitive.

65. If regulatory limits are set, 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 (see next para.) should not exceed 20 % for food with a dioxin contamination of about 1 pg.

Laboratories

66. The following requirements should be adopted by laboratories involved in the analysis of dioxins and dioxin-like PCBs:

- The continuous participation in interlaboratory studies or proficiency tests for the determination of dioxins and dioxin-like PCBs in the relevant feed/food matrices should be 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 "General requirements for the competence of testing and calibration laboratories".
- Reporting of results: The concentrations of the individual substances in a given sample are multiplied by their respective WHO Toxic Equivalency Factors (TEF) (20). Three TEQ values should be generated for each PCDD, PCDF and dioxin-like PCB congener, reflecting assignment of zero (lower bound), half the limit of detection (LOD) (medium bound), or LOD (upper bound) values to congener non-detects.
- The report referred to in the above indent should also include the lipid content or dry matter content of the sample as well as the method used for lipid extraction or for determination of dry matter.

3. Quality management and education

67. 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 dioxin-like PCB contamination in the food chain. In this respect, manufacturers and farmer should educate their workers on how to prevent contamination and control the implementation of these measures.

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INTRODUCTION

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