



DRAFT TANZANIA STANDARD

Code of practice for the prevention and reduction of dioxins and polychlorinated biphenyls in food and feed

For STAKEHOLDERS' COMMENTS ONLY

TANZANIA BUREAU OF STANDARDS

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Foreword

This Tanzania Standard was approved under the authority of the Board of Director of Tanzania Bureau of Standards.

Tanzania Bureau of Standards (TBS) is the statutory national standards body for Tanzania established by the Standards Act Cap. 130.

Tanzania Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. The Technical Committees work under the supervision of Divisional (sectoral) Committees. The Standards are developed in accordance with the Guide and Procedure for Development of Tanzania Standards and TZS 0, *Guide for presentation of Tanzania Standards*.

Tanzania Standards are subject to review, to keep pace with science and technological advances. Users of the Tanzania Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

This Tanzania Standard was developed under the supervision of the Agriculture and Food Divisional Standards Committee [AFDC]. The Technical Committee responsible for the standard is AFDC 27- Contaminants.

The reporting of the result of a test or analysis made in accordance with this Tanzania Standard, if the final value, observed or calculated is to be rounded off, shall be done in accordance with TZS 4.

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Introduction

Dioxins and Polychlorinated biphenyls (PCBs) are among the persistent organic pollutants (POP) of toxicological concern. Dioxins are a group of persistent chemicals, which are not produced intentionally but are formed during combustion (burning) processes and as by-products of industrial processes. PCBs are similar chemically to the dioxins. They have been used in transformers, building materials, lubricants, coatings, plasticizers and inks, although their use has now largely been phased out. Both the dioxins and the PCBs are highly resistant to breakdown processes, and consequently persist in the environment, followed by uptake into the food chain, mainly foodstuffs of animal origin with a high fat content, since these contaminants accumulate in fatty tissues. Foodstuffs in which dioxins can occur include meat, fish, eggs and milk.

Dioxins and PCBs are toxic chemicals that can provoke serious health effects such as cancer, hormone disruption, reduced ability to reproduce, skin toxicity and immune system disorders, when exposure to them continues over an extended period. Short periods of exposure are not considered to have adverse effects on health, unless the levels are very high. Because of their potentially serious health effects and their persistence in the environment, it is essential to minimize their release into the environment, including the establishment of emission limits for dioxins into the air, prohibition of the use of PCBs, and safe collection, storage and environmentally compatible disposal or destruction of dioxin and PCB-contaminated devices and products.

Current sources of dioxins and PCBs entering the food chain include new emissions and remobilisation of deposits or reservoirs in the environment. New emissions are mainly via the air route. Dioxins and PCBs decompose very slowly in the environment and remain there for very long periods of time. Therefore, a large part of current exposure is due to releases of dioxins and PCBs that occurred in the past. Today, the release of PCBs occurs through leakages, accidental spills and illegal disposal and emissions via air from thermal processes. The emission of PCBs from paints and/or sealants into the environment e.g. during demolition and reconstruction of older buildings appears to be of some importance as a source.

Dioxins are formed as unwanted by-products from a number of human activities including certain industrial processes (e.g. production of chemicals, metallurgical industry) and combustion processes (e.g. waste incineration). Accidents at chemical factories have been shown to result in high emissions and contamination of local areas. Other dioxin sources include domestic furnaces as well as agricultural burning of harvest residues and backyard burning of household wastes. Natural processes such as volcanic eruptions and forest fires can also produce dioxins.

When released into the air, dioxins can deposit locally on plants and on soil, consequently contaminating both food and feed. Dioxins can also be widely distributed by long-range atmospheric transport. The amount of deposition varies with proximity to the source, plant species, weather conditions and other specific conditions (e.g. altitude, latitude, temperature). Sources of dioxins in soil include deposition from atmospheric dioxins, application of contaminated sewage sludge to farm land, flooding of pastures with contaminated sludge, and prior use of contaminated pesticides (e.g., 2,4,5-trichlorophenoxy acetic acid) and fertilizers (e.g. certain composts). Other sources of dioxins in soil may be of natural origin (e.g. ball clay).

Dioxins and PCBs are poorly soluble in water. However, they are adsorbed onto mineral and organic particles suspended in water. The surfaces of oceans, lakes and rivers are exposed to aerial deposition of these compounds, which are consequently concentrated along the aquatic food chain. The entry of wastewater or contaminated effluents from certain processes, such as chlorine bleaching of paper or pulp and metallurgical processes, can lead to contamination of water and sediment in coastal ocean areas, lakes and rivers.

Food of animal origin is the predominant route of human exposure to dioxins and PCBs with approximately 80–90% of the total exposure via fats in fish, meat and dairy products. Dioxins and PCBs accumulate in tissues of food-producing animals, including fish. In addition, they can be excreted in fat-containing products such as milk and eggs. There are clear differences in toxicokinetic behaviour between the various dioxin and PCB congeners. For most farm animal species existing studies have shown that dioxins and PCBs are accumulated in body fat and liver, but also excreted into eggs and milk. This excretion contributes to lower accumulation in the body, and decreased levels after termination of the exposure. In growing animals the increase in body fat mass is also an important factor in the tissue levels obtained during exposure, which decreases after termination of the exposure.

In order to reduce the contamination of food from animal origin, control measures at the feed level should be considered. These may involve developing Good Agricultural Practice, Good Animal Feeding Practice (see Code of Practice on Good Animal Feeding (CXC 54-2004)), and Good Manufacturing Practice guidance and measures to effectively reduce dioxins and PCBs in feed, including:

- Identification of agricultural areas with increased dioxin and PCB contamination due to local emission, accidents or illegal disposal of contaminated materials, and monitoring of feed and feed ingredients derived from these areas,

- Monitoring of dioxin and PCB content of sewage sludge and compost used as fertilizers in agriculture, as well as its compliance with nationally established guideline or maximum levels.
- Establishing recommendations for special agricultural use (e.g. limitation of grazing or use of appropriate agricultural techniques),
- Identification of possibly contaminated feed and feed ingredients,
- Monitoring compliance with nationally-established guideline levels or maximum levels, if available, and minimizing or decontaminating (e.g., refining of fish oil) non-complying feed and feed ingredients, and
- Identification and control of critical feed manufacturing processes (e.g. artificial drying by direct heating).

Similar control measures, where applicable, should be considered for reducing dioxins and PCBs in food.

Reducing sources of dioxins and PCBs is an essential prerequisite for reducing contamination. Measures to reduce dioxin emission sources should be directed toward reducing the formation of dioxin during thermal processes as well as the application of destruction techniques. Measures to reduce PCBs emission sources should be directed toward minimizing releases from existing equipment (e.g. transformers, capacitors), prevention of accidents and better control of the disposal and destruction of PCBs containing oils and wastes.

This code of practice is therefore aimed at guiding regulators, farmers, feed and food manufacturers as well as consumers to prevent or reduce dioxin and PCBs contamination in foods and feeds.

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1. Scope

This code of practice recommends Good Agricultural Practices, Good Manufacturing Practices, Good Storage Practices, Good Animal Feeding Practices to regulators, farmers, feed and food manufacturers as well as consumers to prevent or reduce dioxins and PCBs contamination in foods and feeds. This code applies to the production, use of all materials intended for feed (including grazing or free-range feeding, forage crop production and aquaculture), and food at all levels whether produced industrially, on farms or in households.

2. Normative references

There are no normative references in this document.

3. Terms and definitions

For the purposes of this Tanzania standard, the following terms and definitions apply:

3.1 food system

encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded.

3.2 anticaking agent

substance that reduces the tendency of particles of a feed or food to stick together

3.3 binder

substance that increases the tendency of individual particles of a feed or food to stick together

3.4 Congener

one of two or more compounds of similar chemical structures with respect to classification

3.5 dioxins (PCDD/PCDF)

include 7 polychlorinated dibenzo-p-dioxins (PCDDs) and 10 dibenzofurans (PCDFs) with similar toxicological properties and belong to a group of lipophilic and persistent organic substances. Depending on the degree of chlorination (1–8 chlorine atoms) and the substitution patterns, 75 different PCDDs and 135 different PCDFs (“congeners”), can be distinguished

3.6 feed

any single or multiple materials, whether processed, semi-processed or raw which is intended to be fed to food producing animals

3.7 food

any substance, whether processed, semi-processed or raw which is intended for human consumption, but does not include cosmetics, tobacco, medicinal products, narcotic or psychotropic substances, residues and contaminants

3.8 feed or food ingredient

component or constituent of any combination or mixture making up a feed or food, whether or not it has a nutritional value in the diet, including additives. Ingredients are of plant, animal or aquatic origin, or may originate from other organic or inorganic substances.

3.9 Hazard Analysis Critical Control Point (HACCP)

system that identifies, evaluates and controls hazards which are significant for food safety

3.10 maximum levels

legally binding maximum concentration of a substance in feed or food, established by a national or international authority

3.11 minerals

inorganic compounds used in food and feed being required for normal nutrition or used as processing aids

3.12 polychlorinated biphenyls

group of chlorinated hydrocarbons, formed by direct chlorination of biphenyl. Depending on the number of chlorine atoms (1 – 10) and their position at the two rings, 209 different compounds (“congeners”) are theoretically possible.

3.13 persistent organic pollutant

chemical substance that persists in the environment, bio-accumulates through the food web, and poses risks of causing adverse effects to human health and the environment

3.14 trace elements

chemical elements essential for plant, animal and/or human nutrition in small amounts

4. Recommended Good Agricultural Practices (GAPs), Good Manufacturing Practices (GMPs), Good Storage Practices (GSPs) and Good Animal Feeding Practices (GAFPs)

4.1 Control measures within the food and feed value chain

4.1.1 Air, Soil, Water

4.1.1.1 To reduce dioxin and PCB contamination in the air, food control authorities should recommend to the authority responsible for air pollution measures to restrict uncontrolled burning of wastes, including the burning of landfill sites or backyard and the use of Pentachlorophenol (PCP)treated wood for domestic heaters.

4.1.1.2 . To reduce possible contamination of feed or food, agricultural land with unacceptable dioxin and PCB levels due to local emission, accidents, or illegal disposal of contaminated materials should be identified by responsible regulators.

4.1.1.3 Agricultural production on contaminated areas should be avoided or restricted if a significant transfer of dioxins and PCBs to feed or food produced on these areas is anticipated.

4.1.1.4 The spreading of sewage sludge contaminated with dioxins and PCBs can lead to dioxins and PCBs adhering to vegetation which can increase animal and human exposure. Sewage sludge used in agriculture should be monitored, as necessary, for dioxins and PCBs and treated, as necessary.

4.1.1.5 Livestock exposed to contaminated soil may accumulate dioxins and PCBs by consumption of contaminated soil or plants. These areas should be identified and access by certain food producing animals controlled. If necessary, the outdoor production in these areas should be restricted.

4.1.1.6 Source-reduction measures may take many years to reduce contamination levels in wild fish due to the long half-lives of dioxins and PCBs in the environment. To reduce exposure to dioxins and PCBs, highly contaminated areas (e.g. lakes, rivers or contaminated marine catching areas) and relevant fish species should be identified and fishing in these areas should be controlled and, if necessary, restricted.

4.1.2 Feed

4.1.2.1 General

4.1.2.1.1 The bulk of human dietary intake of dioxins and PCBs is due to the accumulation of these substances in the lipid component of animal derived foods (e.g., poultry, fish, eggs, meat and milk). In lactating animals, dioxins and PCBs can be excreted in milk, and in laying hens they may concentrate in the fat content of the egg yolk. To reduce this transfer, control measures at the feed and feed ingredients level should be considered. Measures to reduce dioxin and PCB levels in feed would have a rapid effect on their concentrations in food of animal origin including farmed fish. Such measures may include:

- identification of possibly contaminated areas in the feed supply ecosystem,
- identification of the origin of frequently contaminated feed or feed ingredients, and
- monitoring the compliance of feed and feed ingredients with established maximum levels.

4.1.2.1.2 Regulators should periodically sample and analyse suspect feed and feed ingredients using standard methods to verify dioxin and PCB levels. This information will determine actions, if needed, to minimize dioxin and PCB levels and allow alternative feed and feed ingredients, if necessary.

4.1.2.1.3 The purchaser and user should pay attention to and request guarantees from their supplier as regards:

- origin of feed and feed ingredients to ensure that producers and/or companies have certified production facilities, production processes and quality assurance programmes (e.g. GMP and HACCP-like principles);
- accompanying documents confirming compliance with maximum levels, if available, according to national requirements.

4.1.2.1.4 Feed of animal origin

4.1.2.1.5 Animal derived feed has a higher risk for dioxin and PCB contamination compared to plant derived feed. Attention should be paid to avoiding dioxins and PCBs from entering the food system through the feeding of animal derived feed to food producing animals. Animal derived feed should be monitored, as necessary, for dioxins and PCBs. Feed of animal origin that exceeds maximum levels of dioxins or PCBs should not be fed to animals unless the fat has been removed.

4.1.2.1.6 If intended for use in feed, fish-oil and other products derived from fish or animal fats should be monitored for dioxins and PCBs. Animal feeds should be in compliance with their established maximum levels.

4.1.2.2 Feed of plant origin

4.1.2.2.1 If potential sources of dioxins and PCBs are anticipated in the vicinity of fields, attention should be paid to monitor these areas, as necessary.

4.1.2.2.2 Cultivation sites irrigated with water or treated with sewage sludge or municipal compost that may contain elevated dioxin and PCB levels should be monitored for contamination and take actions where necessary.

4.1.2.2.3 Prior treatment of fields with herbicides from chlorinated phenoxyalkanoic acid type or chlorinated products like pentachlorophenol should be considered as a potential source for dioxin contamination. Dioxin levels in soil and forage plants from sites treated previously with dioxin-contaminated herbicides should be regularly monitored to prevent the transfer of dioxins and PCBs to the food system.

4.1.2.2.4 Oilseeds and vegetable oil are not significantly contaminated with dioxins and PCBs. This also applies to other by-products of oilseed processing (e.g. oilseed cakes) used as feed ingredients. However, certain vegetable and animal oil refining by-products (e.g. fatty acid distillates and deodistillates) and spent products used in oil refining (e.g. bleaching clays) may contain increased levels of dioxins and PCBs and should be analysed, as necessary, if used for feed.

4.1.3 Feed and food processing

4.1.3.1 Drying processes

4.1.3.1.1 Certain processes for the artificial drying of Feed, food and feed or food ingredients and the heating of indoor growing facilities (e.g. greenhouses) require a flow of heated gases, either a flue gas-air mix (direct drying or heating) or heated air alone (indirect drying or heating). Accordingly, fuels not expected to generate dioxins should be used. Feed, food and feed or food ingredients that are dried or subjected to heated air should be monitored as necessary to ensure that drying or heating processes do not result in elevated levels of dioxins and PCBs.

4.1.3.1.2 The quality of commercial dried feed materials, in particular green fodder, and commercially dried foods depends on the selection of the raw material and the drying process. The purchaser should consider requiring a certificate from the manufacturer/supplier, confirming that the dried goods are produced applying Good Manufacturing Practices, particularly in the choice of the fuel used for drying or heating and are in compliance with nationally-established maximum levels.

4.1.3.2 Smoking

Depending on the technology used, smoking can be a critical processing step for increased dioxin content in foods, especially if the products show a very dark surface with particles of soot. Such processed products should be monitored for dioxins and PCBs, as necessary, by the manufacturer and regulators.

4.1.3.3 Milling / Disposal of contaminated milling fractions

Airborne external deposition of dioxins and 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. If present, most particle-bound contamination is removed in the loading chute with the remaining dust. Further external dioxins and PCB contaminations are significantly reduced during aspiration and sieving. Certain grain fractions, especially dust, chaff and mixed screenings including brans, can have increased dioxin and PCB levels and should be monitored, as necessary. If there is evidence of elevated contamination, such fractions should not be used in food or feed and should be treated as waste.

4.1.3.4 Food preparation

Food selection and preparation such as skinning, trimming the fat, in addition to the disposing of pan drippings and poaching/boiling liquids) are practical approaches to reduce exposure to dioxins and PCBs.

4.1.4 Substances added to feed and food

4.1.4.1 Minerals and trace elements

4.1.4.1.1 Some minerals and trace elements are obtained from natural sources. However, experience has shown that geogenic dioxins may be present in certain prehistoric sediments. Therefore, dioxin levels in minerals and trace elements added to feed or food should be monitored as necessary.

4.1.4.1.2 Reclaimed mineral products or by-products from certain industrial processes may contain elevated levels of dioxins and PCBs. The user of such feed ingredients should verify that dioxin and PCBs are within national and international established maximum levels, through certification by the manufacturer or supplier.

4.1.4.1.3 Elevated levels of dioxins have been found in ball clay used as an anticaking agent in soybean meal in feed. Attention should be paid to minerals used as binders or anticaking agents (e.g. bentonite, montmorillonite, kaolinitic clay, diatomaceous earth) and carriers (e.g. calcium carbonate) used as feed ingredients. As assurance to the user that these substances do not contain minerals with elevated levels (e.g. exceeding established maximum levels,) of dioxins and PCBs, the distributor should provide appropriate certification to the user of such feed ingredients.

4.1.4.1.4 Feed of some food producing animals is supplemented with trace elements (e.g. copper or zinc). Minerals, including trace elements, which are by-products or co-products of industrial metal production, may contain elevated levels of dioxins. Such products should be monitored for dioxins and PCBs, as necessary.

4.1.4.2 Ingredients

Feed and food manufacturers should ensure that all ingredients in feed and food comply with established maximum levels of dioxins and PCBs.

4.1.5 Harvesting, transport and storage of food and feed

4.1.5.1 Measures to control the risks to contamination with dioxins and PCBs during the harvest, transport and storage of feed and food should be established.

4.1.5.2 After flooding, crops harvested for food and feed should be monitored for dioxins and PCBs, if there is evidence of dioxin and/or PCB contamination in the flood water.

4.1.5.3 To avoid cross-contamination, the transport of feed and food should only be performed in vehicles (including ships) and in containers that are free of dioxins and PCBs. Storage containers for feed and food should be painted only with dioxin and PCB-free paint. The vehicles transporting feeds and foods should not transport dioxins and PCBs rich products at the same time.

4.1.5.4 Storage sites for food or feed should be free from dioxins and PCB contamination. Surfaces (e.g. walls, floors) treated with tar-based paints may result in transfer of dioxins and PCBs to food and feed. Surfaces that come in contact with smoke and soot from fires and diesel or gasoline engines always bear risks of contamination with dioxins and PCBs. These sites should be monitored as necessary for contamination before use for storage of feed and food.

4.1.5.5 Avoid using wood shaving during transport of frozen fish to prevent contamination by dioxin and PCBs.

4.1.6 Special considerations of animal keeping (Housing)

4.1.6.1 Food producing animals may be exposed to dioxins and PCBs found in certain treated wood used in buildings, farm equipment and bedding material. To reduce exposure, animal contact with treated wood containing dioxins and PCBs should be minimized. In addition, sawdust from treated wood containing dioxins and PCBs should not be used as bedding material.

4.1.6.2 Due to the potential for soil contamination, eggs from free living or free-range hens may have high levels of dioxins and PCBs, therefore should be monitored, as necessary.

4.1.6.3 Attention should be paid to older buildings as they may have building materials and varnishes that may contain dioxins and PCBs. If they have caught fire, measures should be taken to avoid contamination of the feed and feed chain by dioxins and PCBs.

4.1.6.4 In housing without a floor covering, the animals may take up soil particles from the ground. If there are indications of increased levels of dioxins and PCBs, contamination of the soil should be controlled as necessary. If needed, the soil should be exchanged.

4.1.6.5 Pentachlorophenol-treated wood in animal facilities is associated with elevated levels of dioxins in beef. Wood (e.g. railroad ties, utility poles) treated with chemicals such as pentachlorophenol or other unsuitable

substances should not be used as fence posts for enclosures of free-range animals. Hay racks and feeding boxes should not be constructed from such treated wood. The preservation of wood with waste oils should also be avoided.

Insert clauses of consumer practices to minimize dioxins and PCB (as covered in the scope)

4.2 Monitoring

4.2.1 Farmers and industrial food and feed manufacturers have the primary responsibility for food and feed safety. Testing could be conducted within the framework of a food safety program (e.g. Good Manufacturing Practices, On-Farm Safety programmes, Hazard Analysis and Critical Control Point programmes, etc.). Regulators should enforce the primary responsibility of farmers, feed and food manufacturers, distributors and retailers for feed and food safety through the operation of surveillance and control systems at appropriate points along food or feed system. In addition, regulators should establish their own monitoring programmes.

4.2.2 Monitoring programmes dealing with contaminations originating from the environment, accidents or illegal disposals should be organized by operators in the feed and food chain and by regulators in order to obtain additional information on food and feed contamination. Products or ingredients at risk or found with elevated concentrations should be monitored more intensively. For example, monitoring programmes may include major fish species used in food or feed that have been shown to contain elevated levels of dioxins and PCBs.

4.2.3 Periodic sampling and testing for dioxins and PCBs by using standard methods should be performed to the extent feasible by industrial feed and food manufacturers including both incoming raw materials and final product. If there are indications of elevated levels of dioxins and PCBs, farmers and other primary producers should be informed about the contamination and the source should be identified and the necessary measures taken to remediate the situation and reduce or prevent further contamination.

5. Training

Good Agricultural Practices, Good Manufacturing Practices, Good Storage Practices, and Good Animal Feeding Practices are valuable systems for further reduction of dioxin and PCB contamination in the food system. Farmers as well as feed and food manufacturers, distributors and retailers should implement and train their employees on control measures to prevent contamination.

Bibliography

CXC 62-2006 code of practice for the prevention and reduction of dioxins, dioxin-like PCBs and non-dioxin-like PCBs in food and feed.

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