Contents

Foreword

The Philippine National Standard (PNS) for the General Standard for Contaminants and Toxins in Food and Feed (GSTCFF) intends to provide guidance on the maximum levels of contaminants and natural toxicants in food and feed applicable in trade. It includes sections on the maximum and guideline levels for contaminants and toxins per commodity and the methods of sampling and analysis.

With the initiative of the Bureau of Agricultural and Fisheries Standards (BAFS), a Technical Working Group (TWG) authorized under Special Order No. 316 Series of 2016 was created and composed of the following regulatory agencies: Bureau of Animal Industry (BAI), Bureau of Fisheries and Aquatic Resources (BFAR), Bureau of Plant Industry (BPI), Fertilizer and Pesticides Authority (FPA) National Food Authority – Food Development Center (NFA-FDC), National Dairy Authority (NDA), National Meat Inspection Service (NMIS), Philippine Coconut Authority (PCA), and Sugar Regulatory Administration (SRA). The TWG was tasked to create the PNS GSTCFF by adopting the levels set by the Codex Alimentarius Commision (CAC) stated on the similar standard: *CODEX STAN 193-1995: General Standard for Contaminants and Toxins in Food and Feed.*

To achieve the aim of finalizing the PNS, the Bureau, in collaboration with the members of the TWG, conducted a series of technical reviews and a public consultation was held in the National Capital Region (NCR). Comments/suggestions from stakeholder sin the said public consultation were taken into consideration, carefully assessed, and deliberated by the TWG prior to the standard's finalization and approval.

1 Scope

This Standard contains the main principles in dealing with the contaminants and toxins in food and feed and the lists of maximum levels which are recommended by the Codex Alimentarius and adopted by the Philippines to be applied in all primary and postharvest agriculture and fishery commodities applicable in trade.

This Standard includes only maximum levels of contaminants and natural toxins in feed in cases where the contaminant in feed can be transferred to food of animal origin and can be relevant for public health.

2 References

The titles of the publication referred to in this standard are listed on the inside back cover.

3 Definition

For the purpose of this Standard, the following terms should apply:

3.1
acute reference dose (ARfD)
estimate of the amount of a substance in food and/or drinking-water, normally expressed on a body-weight basis, which can be ingested in a period of 24 hours or less without appreciable health risk to the consumer on the basis of all known facts at the time of the evaluation.

3.2
benchmark dose
dose of a substance associated with a specified low incidence of risk, generally in the range of 1-10%, of a health effect; the dose associated with a specified measure or change of a biological effect.

3.3
benchmark dose lower confidence limit (BMDL)
lower boundary of the confidence interval on the benchmark dose. The BDML accounts for the uncertainty in the estimate of the dose-response that is due to characteristics of the experimental design, such as sample size. The BMDL can be used as the point of departure for derivation of a health-based guidance value or a margin of exposure.

3.4
contaminant
Any substance not intentionally added to food, which is present in such food as a result of the production (including operations carried out in crop husbandry, animal husbandry and veterinary medicine), manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food or as a result of environmental contamination. The term does not include insect fragments, rodent hairs and other extraneous matter.

Note 1 to entry: The definition of a contaminant implicitly includes naturally occurring toxicants including toxic metabolites of certain microfungi that are not intentionally added to food and feed (mycotoxins).

Note 2 to entry: Toxins that are produced by algae and that may be accumulated in edible aquatic organisms such as shellfish (phycotoxins) are included in this Standard.

Note 3 to entry: Endogenous natural toxicants (e.g. solanine in potatoes) that are implicit constituents of food and feed resulting from a genus, species or strain ordinarily producing hazardous levels of a toxic metabolite(s), i.e. phytotoxins, are not generally considered within the scope of the Standard.

3.5
guideline level (**GL)**
maximum level of a substance in a food or feed commodity which is recommended by the Codex Alimentarius Commission to be acceptable for commodities moving in international trade. When the GL is exceeded, the government should decide whether and under what circumstances the food should be distributed within their territory or jurisdiction.

3.6
maximum level (ML)
maximum concentration of that substance recommended by the Codex Alimentarius Commission to be legally permitted in that commodity.

3.7
Provisional Maximum Tolerable Daily Intake (PMTDI)
endpoint used for contaminants with no cumulative properties. Its value represents permissible human exposure as a result of the natural occurrence of the substance in food and in drinking-water. In the case of trace elements that are both essential nutrients and unavoidable constituents of food, a range is expressed, the lower value representing the level of essentiality and the upper value the PMTDI.

3.8
Provisional Tolerable Weekly Intake (PTWI)
endpoint used for food contaminants such as heavy metals with cumulative properties. Its value represents permissible human weekly exposure to those contaminants unavoidably associated with the consumption of otherwise wholesome and nutritious foods.

3.9
Provisional Tolerable Monthly Intake (PTMI)
endpoint used for a food contaminant with cumulative properties that has a very long half-life in the human body. Its value represents permissible human monthly exposure to a contaminant unavoidably associated with otherwise wholesome and nutritious foods.

3.10
ready to eat
not intended to undergo an additional processing/treatment that has proven to reduce levels of aflatoxins before being used as ingredient in foodstuffs, otherwise processed or offered for human consumption.

4 Maximum and guideline levels for contaminants and toxins in food and feed

4.1 Contaminants and toxins in food and feed

Table 1 – Index of contaminants and toxins in food and feed

Contaminants	Toxicological guidance value	Contaminant definition	Synonyms
Aflatoxin, Total	Carcinogenic potency estimates for aflatoxins B, G, M (1997, Intake should be reduced to levels as low as reasonably possible)	Aflatoxins total (B1 + B2 + G1 + G2)	Abbreviations, AFB, AFG, with numbers, to designate specific compounds
Aflatoxin M1	Cancer potency estimates at specified residue levels (2001, Using worst-case assumptions, the additional risks for liver cancer predicted with use of proposed maximum levels of aflatoxin M1 of 0.05 and 0.5 µg/kg are very small. The potency of aflatoxin M1 appears to be so low in HBsAg-individuals that a carcinogenic effect of M1 intake in those who consume large quantities of milk and milk products in comparison with non-consumers of these products would be impossible to demonstrate. Hepatitis B virus carriers might benefit from a reduction in the aflatoxin concentration in their diet, and the reduction might also offer some protection in hepatitis C virus	Aflatoxin M1	AFM1

Contaminants	Toxicological guidance value	Contaminant definition	Synonyms
	carriers).		
Deoxynivalenol (DON)	Group PMTDI 0.001 mg/kg bw (2010, for DON and its acetylated derivates) Group ARfD 0.008 mg/kg bw (2010, for DON and its acetylated derivates)	Deoxynivalenol	Vomitoxin; Abbreviation, DON
Fumonisins (B1+ B2)	PMTDI 0.002 mg/kg bw (2001, 2011)	Fumonisins (B1+ B2)	Several related compounds have been described, notably fumonisin B1, B2 and B3 (abbreviation: FB1 etc.)
Ochratoxin A	PTWI 0.0001 mg/kg bw (2001)	Ochratoxin A	(The term "ochratoxins" includes a number of related mycotoxins (A, B, C and their esters and metabolites), the most important one being ochratoxin A)
Arsenic	At the 72nd meeting of Joint FAO/WHO Expert Committee on Food Additives (JECFA) (2010), the inorganic arsenic lower limit on the benchmark dose for a 0.5% increased incidence of lung cancer (BMDL 0.5) was determined from epidemiological studies to be 3.0 µg/kg bw/day (2–7 µg/kg bw/day based on the range of estimated total dietary exposure) using a range of assumptions to estimate total dietary exposure to inorganic arsenic from drinking-water and food.	Arsenic: total (As-tot) when not otherwise mentioned; inorganic arsenic (As-in); or other specification	As

Contaminants	Toxicological guidance value	Contaminant definition	Synonyms
	The JECFA noted that the provisional tolerable weekly intake (PTWI) of 15 µg/kg bw (equivalent to 2.1 µg/kg bw/day) is in the region of the BMDL 0.5 and therefore was no longer appropriate. The JECFA withdrew the previous PTWI.		
Cadmium	In view of the long half-life of cadmium, daily ingestion in food has a small or even a negligible effect on overall exposure. In order to assess long- or short-term risks to health due to cadmium exposure, dietary intake should be assessed over months, and tolerable intake should be assessed over a period of at least 1 month. To encourage this view, at the 73rd meeting (2010) the JECFA decided to express the tolerable intake as a monthly value in the form of a provisional tolerable monthly intake (PTMI) and established a PTMI of 25 µg/kg bw.	Cadmium, total	Cd
Lead	Based on the dose–response analyses, at the 73rd meeting (2010), JECFA estimated that the previously established PTWI of 25 µg/kg bw is associated with a decrease of at least 3 intelligence quotient (IQ) points in children and an increase in systolic blood pressure of approximately 3 mmHg (0.4 kPa) in adults. While	Lead, total	Pb

Contaminants	Toxicological guidance value	Contaminant definition	Synonyms
	such effects may be insignificant at the individual level, these changes are important when viewed as a shift in the distribution of IQ or blood pressure within a population. The JECFA therefore concluded that the PTWI could no longer be considered health protective and withdrew it.		
Methylmercury	PTWI 0.0016 mg/kg bw (2003, confirmed in 2006)	Methylmercury	
Hydrocyanic Acid	ARfD 0.09 mg/kg bw as cyanide (2011, this cyanide-equivalent ARfD applies only to foods containing cyanogenic glycosides as the main source of cyanide) PMTDI 0.02 mg/kg bw as cyanide (2011)		HCN

4.2 Maximum level (ML) of contaminants and toxins per commodity

Table 2 – Maximum Level (ML) of Aflatoxin per commodity

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks	Reference
Almonds	10	Whole commodity after removal of shell.	The ML applies to almonds "ready-to-eat".	Codex Stan 193-1995
Almonds	15	Whole commodity after removal of shell.	The ML applies to almonds intended for further processing.	Codex Stan 193-1995
Brazil nuts	10	Whole commodity	The ML applies to shelled Brazil nuts "ready-to-eat".	Codex Stan 193-1995
Brazil nuts	15	Whole commodity	The ML applies to shelled Brazil nuts intended for further	Codex Stan 193-1995

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks	Reference
			processing.	
Hazelnuts	10	Whole commodity after removal of shell.	The ML applies to hazelnuts, also known as filberts, "ready-to-eat".	Codex Stan 193-1995
Hazelnuts	15	Whole commodity after removal of shell.	The ML applies to hazelnuts, also known as filberts, intended for further processing.	Codex Stan 193-1995
Peanuts	10	Unless specified, seed or kernels, after removal of shell or husk.	The ML applies for peanuts "ready-to-eat".	Codex Stan 193-1995
Peanuts	15	Unless specified, seed or kernels, after removal of shell or husk.	The ML applies for peanuts, also known as groundnuts, intended for further processing.	Codex Stan 193-1995
Pistachios	10	Whole commodity after removal of shell.	The ML applies to pistachios "ready-to-eat".	Codex Stan 193-1995
Pistachios	15	Whole commodity after removal of shell.	The ML applies to pistachios intended for further processing.	Codex Stan 193-1995
Dried figs	10	Whole commodity	The ML applies to dried figs "ready-to-eat".	Codex Stan 193-1995
Coconut meal	20	Whole commodity after removal of shell and paring.	The ML applies to dried coconut meal.	EU Directive 2002/32/EC
Dried coconut meat (copra)	20	Whole commodity	The ML applies to dried coconut meat, for further processing to coconut oil.	PNS/BAFPS 43:2009; PCA AO No. 02 Series of 2003
Corn and peanut				U.S. FDA CPG Sec. 683.100

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks	Reference
products (animal feed)				
• Breeding beef cattle, breeding swine, or mature poultry	100		The ML applies to corn and peanut products intended for breeding beef cattle, breeding swine, or mature poultry.	
• Finishing swine of 100 pounds or greater	200		The ML applies to corn or peanut products intended for finishing swine of 100 pounds or greater.	
• Finishing beef cattle	300		The ML applies to corn and peanut products intended for finishing (i.e. feedlot) beef cattle.	
Cottonseed meal (animal feed)				U.S. FDA CPG Sec. 683.100
• Beef cattle, swine, poultry	300		The ML applies to cottonseed meal intended for beef cattle, swine, or poultry (regardless of age or breeding status).	
Corn, peanut products, and other animal feeds and feed ingredients	20		The ML applies to corn, peanut products, and other animal feeds and feed ingredient, but excluding cottonseed meal, intended for immature animals.	U.S. FDA CPG Sec. 683.100
Corn, peanut	20		The ML applies to	U.S. FDA CPG

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks	Reference
products, cottonseed meal, and other animal feeds and feed ingredients			corn, peanut products, cottonseed meal, and other animal feeds and feed ingredients intended for dairy animals, for animal species or uses not specified above, or when the intended use is not known.	Sec. 683.100

Table 3 – Maximum Level (ML) of Aflatoxin M1 per commodity

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Milk	0.5	Whole commodity	Milk is the normal mammary secretion of milking animals obtained from one or more milkings without either addition to it or extraction from it, intended for consumption as liquid milk or for further processing. A concentration factor applies to partially or wholly dehydrated milks.

Table 4 – Maximum Level (ML) of Deoxynivalenol (DON) per commodity

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Meal derived from wheat or maize	1,000		
Cereal grains (wheat, maize and barley) destined for	2,000	"Destined for further processing" means intended to undergo an additional	Cereal grains (wheat, maize and barley) destined for further processing

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
further processing		processing/treatment that has proven to reduce levels of DON before being used as an ingredient in foodstuffs, otherwise processed or offered for human consumption. Codex members may define the processes that have been shown to reduce levels	

Table 5 – Maximum Level (ML) of Fumonisin (B_1 + B_2) per commodity

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Raw maize grain	4,000	Whole commodity	
Maize meal	2,000	Whole commodity	

Table 6 – Maximum Level (ML) of Ochratoxin A per commodity

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Wheat	5	Whole commodity	The ML applies to raw common wheat, raw durum wheat, raw spelt and raw emmer.
Barley	5	Whole commodity	The ML applies to raw barley.
Rye	5	Whole commodity	The ML applies to raw rye.

Table 7– Maximum Level (ML) of Arsenic per commodity

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Rice, polished	0.35	Whole commodity	The ML is for inorganic arsenic (As-in). Countries or importers may decide to use their own

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
			screening when applying the ML for As-in in rice by analyzing total arsenic (As-tot) in rice. If the As-tot concentration is below the ML for As-in, no further testing is required and the sample is determined to be compliant with the ML. If the As-tot concentration is above the ML for As-in, follow-up testing shall be conducted to determine if the As-in concentration is above the ML.

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161 **Table 8 – Maximum Level (ML) of Cadmium per commodity**

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Brassica vegetables	0.05	Head cabbages and kohlrabi: whole commodity as marketed, after removal of obviously decomposed or withered leaves. Cauliflower and broccoli: flower heads (immature inflorescence only). Brussels sprouts: "buttons" only.	The ML does not apply to Brassica leafy vegetables.
Bulb vegetables	0.05	Bulb/dry onions and garlic: whole commodity after removal of roots and adhering soil and whatever parchment skin is easily detached.	
Fruiting vegetables	0.05	Whole commodity after removal of stems.	The ML does not apply to tomatoes and edible fungi.

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
		Sweet corn and fresh corn: kernels plus cob without husk.	
Leafy vegetables	0.2	Whole commodity as usually marketed, after removal of obviously decomposed or withered leaves.	The ML also applies to Brassica leafy vegetables.
Legume vegetables	0.1	Whole commodity as consumed. The succulent forms may be consumed as whole pods or as the shelled product.	
Pulses	0.1	Whole commodity	The ML does not apply to soya bean (dry)
Root and tuber vegetables	0.1	Whole commodity after removing tops. Remove adhering soil (e.g. by rinsing in running water or by gentle brushing of the dry commodity). Potato: peeled potato.	The ML does not apply to celeriac.
Stalk and stem vegetables	0.1	Whole commodity as marketed after removal of obviously decomposed or withered leaves. Rhubarb: leaf stems only. Globe artichoke: flower head only. Celery and asparagus	
Cereal grains	0.1	Whole commodity	The ML does not apply to buckwheat, cañihua, quinoa, wheat and rice.
Rice, polished	0.4	Whole commodity	
Wheat	0.2	Whole commodity	The ML applies to common wheat, durum wheat, spelt and emmer.
Marine bivalve	2	Whole commodity	The ML applies to clams, cockles

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
molluscs		after removal of shell.	and mussels but not to oysters and scallops.
Cephalopods	2	Whole commodity after removal of shell.	The ML applies to cuttlefishes, octopuses and squids without viscera

Table 9 - Maximum Level (ML) of Lead per commodity

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Berries and other small fruits	0.1	Whole commodity after removal of caps and stems.	The ML does not apply to cranberry, currant and elderberry.
Cranberry	0.2	Whole commodity after removal of caps and stems.	
Currants	0.2	Fruit with stem.	
Elderberry	0.2	Whole commodity after	
Fruits with the exception of berries and other small fruits	0.1	Whole commodity. Pome fruits: whole commodity after removal of stems. Stone fruits, dates and olives: whole commodity after removal of stems and stones, but the level calculated and expressed on the whole commodity without stem. Pineapple: whole commodity after removal of crown. Avocado, mangos and similar fruit with hard seeds: whole commodity after removal of stone	
Brassica vegetables	0.1	Head cabbages and kohlrabi: whole	The ML does not apply to kale and leafy Brassica vegetables.

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
		commodity as marketed, after removal of obviously decomposed or withered leaves. Cauliflower and broccoli: flower heads (immature inflorescence only). Brussels sprouts: "buttons" only.	
Bulb vegetables	0.1	Bulb/dry onions and garlic: whole commodity after removal of roots and adhering soil and whatever parchment skin is easily detached.	
Fruiting vegetables	0.05	Whole commodity after removal of stems Sweet corn and fresh corn: kernels plus cob without husk.	The ML does not apply to fungi and mushrooms.
Leafy vegetables	0.3	Whole commodity as usually marketed, after removal of obviously decomposed or withered leaves.	The ML applies to leafy Brassica vegetables but does not apply to spinach.
Legume vegetables	0.1	Whole commodity as consumed. The succulent forms may be consumed as whole pods or as the shelled product.	
Pulses	0.2	Whole commodity	
Root and tuber vegetables	0.1	Whole commodity after removing tops. Remove adhering soil (e.g. by rinsing in running water or by gentle brushing of the	

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
		dry commodity). Potato: peeled potato.	
Cereal grains	0.2	Whole commodity	The ML does not apply to buckwheat cañihua and quinoa.
Meat of cattle, pigs and sheep	0.1	Whole commodity (without bones)	The ML also applies to fat from the meat.
Meat and fat of poultry	0.1	Whole commodity (without bones)	
Cattle, edible offal of	0.5	Whole commodity	
Pig, edible offal of	0.5	Whole commodity	
Poultry, edible offal of	0.5	Whole commodity	
Milk	0.02	Whole commodity	Milk is the normal mammary secretion of milking animals obtained from one or more milkings without either addition to it or extraction from it, intended for consumption as liquid milk or for further processing. A concentration factor applies to partially or wholly dehydrated milks
Fish	0.3	Whole commodity (in general after removing the digestive tract)	

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165 **Table 10– Maximum Level (ML) of Methylmercury per commodity**

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Fish	0.5	Whole commodity (in general after removing the digestive tract)	The GL does not apply to predatory fish. The guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Predatory fish	1	Whole commodity (in general after removing the digestive tract)	Predatory fish such as shark, swordfish, tuna, pike and others. The guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade

Table 11– Maximum Level (ML) of Hydrocyanic acid per commodity

Commodity/ Product Name	Maximum Level (ML) µg/kg	Portion of the Commodity/Product to which the ML applies	Notes/Remarks
Gari	2	Whole commodity	The ML is expressed as free hydrocyanic acid.

5 Methods of analysis and sampling

The methods of analysis and sampling of contaminants and toxins stated in this Standard per commodity should conform with the provisions recommended by the Codex Alimentarius Commission (CAC). 1995. Codex Stan 193-1995. *Codex General Standard for Contaminants and Toxins in Food and Feed.*

References

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