IPCS

INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY

WHO ILO UNEP

Environmental Health Criteria 240

Principles and Methods for the Risk Assessment of Chemicals in Food

Annex 1
GLOSSARY OF TERMS

A joint publication of the Food and Agriculture Organization of the United Nations and the World Health Organization

Food and Agriculture Organization of the United Nations

World Health Organization

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PRINCIPLES AND METHODS FOR THE RISK ASSESSMENT OF CHEMICALS IN FOOD

A joint publication of the Food and Agriculture Organization of the United Nations and the World Health Organization

Published under the joint sponsorship of the United Nations Environment Programme, the International Labour Organization and the World Health Organization, and produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals.

Food and Agriculture Organization of the United Nations

World Health Organization

The **International Programme on Chemical Safety (IPCS)**, established in 1980, is a joint venture of the United Nations Environment Programme (UNEP), the International Labour Organization (ILO) and the World Health Organization (WHO). The overall objectives of the IPCS are to establish the scientific basis for assessment of the risk to human health and the environment from exposure to chemicals, through international peer review processes, as a prerequisite for the promotion of chemical safety, and to provide technical assistance in strengthening national capacities for the sound management of chemicals.

The **Inter-Organization Programme for the Sound Management of Chemicals (IOMC)** was established in 1995 by UNEP, ILO, the Food and Agriculture Organization of the United Nations, WHO, the United Nations Industrial Development Organization, the United Nations Institute for Training and Research and the Organisation for Economic Co-operation and Development (Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen cooperation and increase coordination in the field of chemical safety. The purpose of the IOMC is to promote coordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

WHO Library Cataloguing-in-Publication Data

Principles and methods for the risk assessment of chemicals in food.

(Environmental health criteria ; 240)

1. Risk assessment. 2. Hazard assessment. 3. Exposure assessment. 4. Dose-response assessment. 5. Chemicals. 6. Food safety. 7. Food additives. 8. Contaminants. 9. Pesticide residues. 10. Veterinary drug residues. I.World Health Organization. II.Food and Agriculture Organization of the United Nations.

ISBN 978 92 4 157240 8 (NLM classification: WA 712)
ISSN 0250-863X

This document was technically and linguistically edited by Marla Sheffer, Ottawa, Canada.

Printed by Wissenchaftliche Verlagsgesellschaft mbH, Stuttgart, Germany.

ANNEX 1: GLOSSARY OF TERMS

Note: The primary sources of the definitions found in this glossary of terms are listed at the end of the glossary. Some definitions have been taken directly from the original source, whereas others have been modified for the purposes of this document. Still others derive from the text of this monograph. Not all terms provided in the glossary are used in this monograph, but they are included here to help the reader understand previous evaluations of the Joint FAO/WHO Expert Committee on Food Additives and the Joint FAO/WHO Meeting on Pesticide Residues.

Absorption
The process by which a substance is transferred from the site of administration into the circulation. For chemicals in food, absorption usually refers to passage across the gut wall into the circulation, although for some chemicals, uptake may be only as far as the epithelium of the gastrointestinal tract.

Acceptable
A term previously used as the outcome of the safety assessment of food additives. Now replaced mainly by the term "not specified" or "no safety concern at current estimated levels of intake".

Enzyme preparations: Used to describe enzymes that are obtained from edible tissues of animals or plants commonly used as foods or are derived from microorganisms that are traditionally accepted as constituents of foods or are normally used in the preparation of foods. Such enzyme preparations are considered to be acceptable provided that satisfactory chemical and microbiological specifications can be established.

Flavouring agents: Used to describe flavouring agents that are of no safety concern at current levels of intake. If an acceptable daily intake has been allocated to the agent, it is maintained unless otherwise indicated.

Food additives: Used on some occasions when present uses are not of toxicological concern or when intake is self-limiting for technological or organoleptic reasons.

Acceptable daily intake (ADI)
The estimate of the amount of a chemical in food or drinking-water, expressed on a body weight basis, that can be ingested daily over a lifetime without appreciable health risk to the consumer. It is derived on the basis of all the known facts at the time of the evaluation. The ADI is expressed in milligrams of the chemical per kilogram of body weight (a standard adult person weighs 60 kg). It is applied to food additives, residues of pesticides and residues of veterinary drugs in food.

Acceptable daily intake (ADI) "not limited"
A term no longer used by the Joint FAO/WHO Expert Committee on Food Additives that has the same meaning as ADI "not specified".

Acceptable daily intake (ADI) "not specified"
Food additives: A term applicable to a food substance of very low toxicity that, on the basis of the available chemical, biochemical and toxicological data as well as the total dietary intake of the substance (from its use at the levels necessary to achieve the desired effect and from its acceptable background in food), does not, in the opinion of the Joint FAO/WHO Expert Committee on Food Additives, represent a hazard to health. For that reason, and for reasons stated in individual evaluations, the establishment of an ADI expressed in numerical form is not deemed necessary. An additive meeting this criterion must be used within the bounds of Good Manufacturing Practice: that is, it should be technologically efficacious and should be used at the lowest level necessary to achieve this effect, it should not conceal inferior food quality or adulteration, and it should not create a nutritional imbalance.

Veterinary drugs: A term applicable to a veterinary drug for which available data on its toxicity and intake indicate a large margin of safety for consumption of residues in food when the drug is used according to Good Practice in the Use of Veterinary Drugs. For that reason, and for the reasons stated in the individual evaluation, the Committee has concluded that use of the veterinary drug does not represent a dietary hazard to human health and that there is no need to specify a numerical ADI.

Acceptable level of treatment
Acceptable daily intakes (ADIs) are expressed in terms of milligrams per kilogram of body weight. In certain cases, however, food additives

are more appropriately limited by their levels of treatment. This situation occurs most frequently with flour treatment agents. It should be noted that the acceptable level of treatment is expressed as milligrams per kilogram of the commodity. This should not be confused with an ADI.

Acceptable risk
A risk management term. The acceptability of the risk depends on scientific data, social, economic and political factors, and the perceived benefits arising from exposure to an agent.

Accuracy
Degree of agreement between average predictions of a model or the average of measurements and the true value of the quantity being predicted or measured.

Acute exposure
A short-term exposure to a chemical, usually consisting of a single exposure or dose administered for a period of 24 h or less.

Acute reference dose (ARfD)
The estimate of the amount of a substance in food or drinking-water, expressed on a body weight basis, that can be ingested in a period of 24 h or less without appreciable health risk to the consumer. It is derived on the basis of all the known facts at the time of evaluation. The ARfD is expressed in milligrams of the chemical per kilogram of body weight.

Adverse effect
Change in the morphology, physiology, growth, development, reproduction or lifespan of an organism, system or (sub)population that results in an impairment of functional capacity, an impairment of the capacity to compensate for additional stress or an increase in susceptibility to other influences.

Aggregate exposure
The combined exposures to a single chemical across multiple routes (oral, dermal, inhalation) and across multiple pathways (food, drinking-water, residential). *Related term*: Cumulative exposure.

Allergy
See Food allergy.

Assessment factor
Numerical adjustment used to extrapolate from experimentally determined (dose–response) relationships to estimate the exposure to an agent below which an adverse effect is not likely to occur. *Related terms*: Safety factor, Uncertainty factor.

Benchmark dose (BMD)
A 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.

Benchmark dose lower confidence limit (BMDL)
The lower boundary of the confidence interval on the benchmark dose. The BMDL 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.

Benchmark intake (BI)
The intake of a substance that is expected to result in a prespecified level of effect. *Related term*: Benchmark dose.

Benchmark intake lower confidence limit (BIL)
The lower boundary of the confidence interval on the benchmark intake. *Related term*: Benchmark dose lower confidence limit.

Benchmark response (BMR)
The response for which the benchmark dose is to be calculated.

Bias
The sum of all the systematic errors in an experiment. *Related term*: Error.

Bioavailability
For food additives, contaminants and pesticide residues, a term referring to the proportion of a substance that reaches the systemic circulation unchanged after a particular route of administration. For veterinary drug residues in food, it is used to reflect the fraction that can be released from the food matrix and is available for absorption.

Biomarkers
Indicators of changes or events in human biological systems. *Biomarkers of exposure* refer to cellular, biochemical or molecular measures that are obtained from biological media such as human tissues, cells or fluids and are indicative of exposure to a substance. *Biomarkers of effect* refer to biological changes that represent an alteration in endogenous body constituents (e.g. depression of cholinesterase levels as an indicator of exposure to pesticides).

Budget method
A screening method used for estimating dietary exposure to a food additive that is based on default maximum consumption amounts of solid food and liquids derived from physiological consumption limits and the maximum use levels of the additive.

Central tendency
The central tendency of a probability distribution typically refers to the mean (arithmetic average) or median (50th percentile) value estimated from the distribution. For some very highly skewed distributions, the mean might not represent central tendency, and some analysts prefer to use the median as a central tendency estimate.

Chemical-specific adjustment factor (CSAF)
A modified default 10-fold uncertainty factor that incorporates appropriate data on species differences or human variability in either toxicokinetics (fate of the chemical in the body) or toxicodynamics (actions of the chemical on the body).

Chronic exposure
A continuous or intermittent long-term contact between an agent and a target.

Clastogenicity
The condition of causing structural chromosomal aberrations in populations of cells or organisms.

Codex Alimentarius Commission (CAC)
CAC was formed in 1962 to implement the Joint FAO/WHO Food Standards Programme. It is an intergovernmental body made up of more than 170 member nations, the delegates of which represent their

own countries. CAC's work of harmonizing food standards is carried out through various committees, such as the Codex Committee on Food Additives (CCFA), the Codex Committee on Contaminants in Food (CCCF), the Codex Committee on Residues of Veterinary Drugs in Foods (CCRVDF) and the Codex Committee on Pesticide Residues (CCPR). The Joint FAO/WHO Expert Committee on Food Additives serves as the advisory body to CAC on all scientific matters concerning food additives, food contaminants, naturally occurring toxicants and residues of veterinary drugs in food. The Joint FAO/WHO Meeting on Pesticide Residues serves as the advisory body to CAC on all scientific matters concerning pesticide residues.

Composite sample
Often prepared as a representative mixture of several different (usually bulk) samples, from which the laboratory sample is taken.

Concentration
The amount of one substance (e.g. milligrams of pesticide residue) contained in a given amount of another substance (e.g. kilograms of food).

Concentration–effect relationship
Relationship between the exposure, expressed in concentration, of a given organism, system or (sub)population to an agent in a specific pattern during a given time and the magnitude of a continuously graded effect to that organism, system or (sub)population. *Related terms*: Dose–effect relationship, Dose–response relationship.

Conditional acceptable daily intake (ADI)
A term no longer used by JECFA to signify a range above the "unconditional ADI", which may signify an acceptable intake when special problems, different patterns of dietary intake, and special groups of the population that may require consideration are taken into account.

Confidence interval
An estimated two-sided interval from the lower to upper confidence limit of a statistical parameter. This interval is expected to enclose the true value of the parameter with a specified confidence. For example, 95% confidence intervals are expected to enclose the true values of estimated parameters with a frequency of 95%.

Conservative estimate
An estimate that tends to err on the side of caution. A conservative estimate of dietary exposure, for example, assigns the "worst case" food chemical concentrations and/or food consumption levels to maximize (or minimize, in the case of nutrients, when assessing nutrient deficiency) the estimated food chemical exposure.

Consumer days
From the total number of records in a food consumption survey (i.e. total survey days), those days on which individuals reported consuming the food or foods of interest.

Consumer loyalty
The tendency of consumers to repeatedly purchase and consume the same processed food products.

Consumption cluster diets
See GEMS/Food consumption cluster diets.

Contaminant
Any substance not intentionally added to food that 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, 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.

Cumulative exposure
The sum of exposures to two or more food chemicals that have a common mechanism of toxicity. *Related term*: Aggregate exposure.

Deterministic estimate
In exposure assessment, an estimate that is based on a single value for each model input and a corresponding individual value for a model output, without quantification of the cumulative probability or, in some cases, plausibility of the estimate with respect to the real-world system being modelled. This term is also used to refer to a model for which the output is uniquely specified based on selected single values for each of its inputs.

Developmental toxicity
Any adverse effects induced prior to attainment of adult life, including effects induced or manifested in the embryonic or fetal period and those induced or manifested postnatally (before sexual maturity). These may include prenatal or early postnatal death, structural abnormalities, altered growth and functional deficits. *Related terms*: Reproductive toxicity, Teratogenicity.

Dietary exposure
See Intake.

Dietary exposure assessment
The qualitative and/or quantitative evaluation of the likely intake of chemicals (including nutrients) via food, beverages, drinking-water and food supplements. *Synonymous with*: Intake assessment.

Dietary recall (24 h dietary recall)
A retrospective assessment method in which an interviewer prompts a respondent to recall and describe all foods and beverages consumed in the preceding 24 h or the preceding day. The interview may be conducted in person or by telephone and may be recorded by paper and pencil or computer assisted. Portion size estimating aids assist the respondent to recall amounts consumed.

Dietary record
See Food record.

Dietary supplement
See Food supplement.

Diet history questionnaire
A retrospective assessment method ascertaining a respondent's "usual" food intake by collecting descriptive detail and amount information about each food. Questionnaires may include questions on meal patterns, lists of common foods and groups of generic food. They are typically administered by a trained interviewer either in person or by telephone, but they can also be self-reported.

Distribution
See Probability distribution.

Dose
Total amount of an agent administered to, taken up by or absorbed by an organism, system or (sub)population.

Dose–effect relationship
Relationship between the total amount of an agent administered to, taken up by or absorbed by an organism, system or (sub)population and the magnitude of a continuously graded effect to that organism, system or (sub)population. *Related terms*: Concentration–effect relationship, Dose–response relationship.

Dose-related effect
Any effect to an organism, system or (sub)population as a result of the quantity of an agent administered to, taken up by or absorbed by that organism, system or (sub)population.

Dose–response
Relationship between the amount of an agent administered to, taken up by or absorbed by an organism, system or (sub)population and the change developed in that organism, system or (sub)population in reaction to the agent.

Dose–response assessment
Analysis of the relationship between the total amount of an agent administered to, taken up by or absorbed by an organism, system or (sub)population and the changes developed in that organism, system or (sub)population in reaction to that agent, and inferences derived from such an analysis with respect to the entire population. Dose–response assessment is the second of four steps in risk assessment.

Dose–response curve
Graphical presentation of a dose–response relationship.

Dose–response relationship
Relationship between the amount of an agent administered to, taken up by or absorbed by an organism, system or (sub)population and the change developed in that organism, system or (sub)population in reaction to the agent. *Related terms*: Concentration–effect relationship, Dose–effect relationship.

Double-blind placebo-controlled food challenge
A study in which neither the patient nor the test administrator is aware of the food or placebo being tested. In the test, the patient ingests a food that has been disguised so that neither the patient nor the observer is aware of the contents of the challenge. This type of challenge is designed to reduce the subjective attitudes of both participants during the challenge. *Related term*: Single-blind placebo-controlled food challenge.

Duplicate diets/Duplicate portion study
A method for estimating dietary intakes that involves collection and analysis of identical portions of foods and beverages consumed by an individual.

Effect
A change in the state or dynamics of an organism, system or (sub)-population caused by the exposure to an agent.

Effect assessment
Combination of analysis and inference of possible consequences of the exposure to a particular agent based on knowledge of the dose–effect relationship associated with that agent in a specific target organism, system or (sub)population.

Elimination
The expelling of a substance or other material from the body (or a defined part thereof), usually by a process of extrusion or exclusion, but sometimes through metabolic transformation.

Embryo/fetotoxicity
Any toxic effect on the embryo or fetus resulting from prenatal exposure, including structural or functional abnormalities or postnatal manifestation of such effects.

Endogenous substances
Intermediary metabolites normally present in human tissues and fluids, whether free or conjugated. Hormones and other substances with biochemical or physiological regulatory functions are not included.

End-point
Qualitative or quantitative expression of a specific factor with which a risk may be associated as determined through an appropriate risk assessment.

Enterohepatic circulation
Intestinal reabsorption of material that has been excreted through the bile followed by transfer back to the liver, making it available for biliary excretion again.

Epigenetic event
Any heritable influence in the progeny of cells or of individuals on chromosome or gene function that is not accompanied by a change in deoxyribonucleic acid nucleotide sequence.

Error (gross, random, systematic)
Any discrepancy between a computed, observed or measured quantity and the true, specified or theoretically correct value of that quantity. *Gross errors* refer to unintentional or unpredictable errors while generating the analytical result. Errors of this type invalidate the measurement. It is not possible or desirable to statistically evaluate and include the gross errors in the estimation of uncertainty. *Random errors* are present in all measurements and cause replicate results to fall on either side of the mean value. The random error of a measurement cannot be compensated for, but increasing the number of observations and training of the analyst may reduce the effects. *Systematic errors* are those resulting from some bias in the measurement process and are not due to chance. Systematic errors occur in most experiments, but their effects are quite different. The sum of all the systematic errors in an experiment is referred to as the *bias*.

Expert judgement
Opinion of an authoritative person on a particular subject.

Exposure
Concentration or amount of a particular agent that reaches a target organism, system or (sub)population in a specific frequency for a defined duration.

Exposure assessment
Evaluation of the exposure of an organism, system or (sub)population to an agent (and its derivatives). Exposure assessment is one of the steps in the process of risk assessment.

Exposure route
The way in which an agent enters a target after contact (e.g. by ingestion, inhalation or dermal absorption).

Exposure scenario
A set of conditions or assumptions about sources, exposure pathways, amounts or concentrations of agents involved and exposed organisms, systems or (sub)populations (i.e. numbers, characteristics, habits) used to aid in the evaluation and quantification of exposures in a given situation.

Extraneous maximum residue limit (EMRL)
Refers to a pesticide residue or a contaminant arising from environmental sources (including former agricultural uses) other than the use of the pesticide or contaminant directly or indirectly on the commodity. It is the maximum concentration of a pesticide residue that is recommended by the Codex Alimentarius Commission to be legally permitted or recognized as acceptable in or on a food, agricultural commodity or animal feed. The concentration is expressed in milligrams of pesticide residue or contaminant per kilogram of the commodity.

Fate
Pattern of distribution of an agent, its derivatives or metabolites in an organism, system, compartment or (sub)population of concern as a result of transport, partitioning, transformation or degradation.

First-pass metabolism
A phenomenon of metabolism (especially in the liver) whereby the concentration of a substance is greatly reduced before it reaches the systemic circulation.

Food
In the Codex Alimentarius Commission context, any substance, whether processed, semiprocessed or raw, that is intended for human

consumption. It includes drink, chewing gum and any substance that has been used in the manufacture, preparation or treatment of food, but it does not include cosmetics or tobacco or substances used only as drugs.

Food additive
In the Codex Alimentarius Commission context, any substance not normally consumed as a food by itself and not normally used as a typical ingredient of the food, whether or not it has nutritive value, the intentional addition of which to food for a technological (including organoleptic) purpose in the manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food results, or may be reasonably expected to result, (directly or indirectly) in it or its by-products becoming a component of or otherwise affecting the characteristics of such foods. The term does not include contaminants or substances added to food for maintaining or improving nutritional qualities.

Food allergy
A form of food intolerance in which there is evidence of an abnormal immunological reaction to the food. "Immediate allergic reactions" are those that occur within minutes to hours after ingestion of the offending food, whereas reactions beginning several hours to days after food exposure are characterized as "delayed allergic reactions".

Food balance sheet
Gross estimates of national per capita availability of food commodities derived from a country's annual food production plus imports minus exports. Food waste, refuse, losses from spoilage and other sources of waste are not taken into account.

Food composition data
Data on the composition of foods, mainly on nutrients but also on non-nutrients (e.g. phytochemicals) and contaminants (e.g. acrylamides).

Food consumption
For assessing dietary chemical hazards, an estimate of the quantity of a food or group of foods (including beverages and drinking-water) consumed by a specified population or individual. Food consumption is expressed in grams of food per person per day.

Food diary
See Food record.

Foods for special dietary uses
Foods that are specially processed or formulated to satisfy particular dietary requirements that exist because of a particular physical or physiological condition or specific diseases and disorders and that are presented as such. The composition of these foodstuffs must differ significantly from the composition of ordinary foods of comparable nature, if such ordinary foods exist.

Food frequency questionnaire (FFQ)
A retrospective method asking respondents to report their usual frequency of consumption of each food from a list of foods for a specific period (several months or a year). Food lists vary by the purpose of the study and study population. Frequency of consumption categories also vary by questionnaire, but usually include per day, week or month. In a *semiquantitative FFQ*, portion size information is collected; portion sizes are specified as standardized portions or choice (range of portions). In a *non-quantitative FFQ*, portion size information is not collected.

Food habit questionnaire
A method for collecting information about an individual's beliefs or practices related to food and beverage consumption (e.g. perceptions about foods, food likes and dislikes, methods of preparation).

Food intolerance
A reproducible, unpleasant reaction to a food or food ingredient, including reactions due to immunological effects, biochemical factors such as enzyme deficiencies and anaphylactic reactions that often include histamine release.

Food record (food diary)
Food records are used to record food intake at the time of consumption over a number of days that are not necessarily sequential. Most studies ask respondents to enter the information in hard copy form, although tape recording, bar coding and electronic weighing have also been used to collect descriptive and quantity information. In a *weighed food record*, the respondent weighs all food and beverages consumed on a

small scale. In an *estimated food record*, the respondent estimates all food consumed using household measures or portion size estimating aids.

Food supplement
A product taken by mouth that contains a "dietary ingredient" (e.g. mineral, vitamin, herb, enzyme) and is intended to supplement the intake of that ingredient from the normal diet.

Fortified food
A food to which vitamins, minerals or other components have been added in addition to the levels that were originally found before the food was refined.

Functional food
Any food claiming to have a health-promoting or disease-preventing property beyond the basic function of supplying nutrients.

GEMS/Food
The World Health Organization's Global Environment Monitoring System – Food Contamination Monitoring and Assessment Programme, which maintains databases on contaminant levels in foods and estimates of dietary exposure to food chemicals.

GEMS/Food consumption cluster diets
Per capita consumption of raw and semiprocessed agricultural commodities expressed in grams per person per day for distinct groups of the world's population that share similar dietary patterns. Based on Food and Agriculture Organization of the United Nations food balance sheet data, the diets were generated using a cluster analysis, which assigned countries to one of the 13 cluster diets. *Related term*: GEMS/Food regional diets.

GEMS/Food regional diets
Per capita consumption of raw and semiprocessed agricultural commodities expressed in grams per person per day for regional and cultural groups of the world. The diets were generated using Food and Agriculture Organization of the United Nations food balance sheet data from selected representative countries for each of the five regions (Middle Eastern, Far Eastern, African, Latin American and European).

The GEMS/Food regional diets have now been replaced by the GEMS/Food consumption cluster diets. *Related term*: GEMS/Food consumption cluster diets.

Genotoxic carcinogen
Carcinogen whose primary mode of action involves deoxyribonucleic acid or chromosomal alterations.

Genotoxicity
Refers to potentially harmful effects on genetic material that may be mediated directly or indirectly and are not necessarily associated with mutagenicity. Tests of genotoxicity include measures that provide an indication of induced damage to deoxyribonucleic acid (DNA) (but not direct evidence of mutation) via effects such as DNA adduct formation, unscheduled DNA synthesis, sister chromatid exchange or mitotic recombination, as well as tests for mutagenicity. *Related term*: Mutagenicity.

Good Agricultural Practice (GAP)
For pesticide use, includes the nationally authorized safe uses of pesticides under actual conditions necessary for effective and reliable pest control. It encompasses a range of levels of pesticide applications up to the highest authorized use, applied in a manner that leaves a residue that is the smallest amount practicable. Authorized safe uses are determined at the national level and include nationally registered or recommended uses, which take into account public and occupational health and environmental safety considerations. Actual conditions include any stage in the production, storage, transport, distribution and processing of food commodities and animal feed.

Good Clinical Practice (GCP)
A standard for the design, conduct, performance, monitoring, auditing, recording, analyses and reporting of clinical trials that provides assurance that the data and reported results are credible and accurate and that the rights, integrity and confidentiality of trial subjects are protected.

Good Laboratory Practice (GLP)
The formalized process and conditions under which laboratory studies are planned, performed, monitored, recorded, reported and audited. Studies performed under GLP are based on the national regulations of

a country and are designed to assure the reliability and integrity of the studies and associated data.

Good Manufacturing Practice (GMP)
For food additives, includes the following: the quantity of the additive added to food does not exceed the amount reasonably required to accomplish its intended physical, nutritional or other technical effect in food; the quantity of the additive that becomes a component of food as a result of its use in the manufacturing, processing or packaging of a food and that is not intended to accomplish any physical or other technological effect in the food itself is reduced to the extent reasonably possible; the additive is of appropriate food-grade quality and is prepared and handled in the same way as a food ingredient.

Good Practice in the Use of Veterinary Drugs (GPVD)
The official recommended or authorized usage including withdrawal periods, approved by national authorities, of veterinary drugs under practical conditions.

Gross error
See Error.

Group acceptable daily intake (ADI)
An ADI established for a group of compounds that display similar toxic effects or share a common toxic metabolite, thus limiting their cumulative intake.

Guidance value
Value, such as concentration in air or water, that is derived after allocation of the health-based guidance value (e.g. acceptable daily intake) among the different possible media (routes) of exposure.

Hazard
Inherent property of an agent or situation having the potential to cause adverse effects when an organism, system or (sub)population is exposed to that agent.

Hazard assessment
A process designed to determine the possible adverse effects of an agent or situation to which an organism, system or (sub)population could be

exposed. The process includes hazard identification and hazard characterization. The process focuses on the hazard, in contrast to risk assessment, where exposure assessment is a distinct additional step.

Hazard characterization
The qualitative and, wherever possible, quantitative description of the inherent properties of an agent or situation having the potential to cause adverse effects. This should, where possible, include a dose–response assessment and its attendant uncertainties. Hazard characterization is the second stage in the process of hazard assessment and the second step in risk assessment.

Hazard identification
The identification of the type and nature of adverse effects that an agent has an inherent capacity to cause in an organism, system or (sub)-population. Hazard identification is the first stage in hazard assessment and the first step in the process of risk assessment.

Health-based guidance value
A numerical value derived by dividing a point of departure (a no-observed-adverse-effect level, benchmark dose or benchmark dose lower confidence limit) by a composite uncertainty factor to determine a level that can be ingested over a defined time period (e.g. lifetime or 24 h) without appreciable health risk. *Related terms*: Acceptable daily intake, Provisional maximum tolerable daily intake, Provisional tolerable monthly intake, Provisional tolerable weekly intake, Tolerable daily intake.

Highest residue (HR)
The highest residue level (expressed as milligrams per kilogram) in a composite sample of the edible portion of a food commodity when a pesticide has been used according to maximum Good Agricultural Practice (GAP) conditions. The HR is estimated as the highest of the residue values (one from each trial) from supervised trials conducted according to maximum GAP conditions and includes residue components defined by the Joint FAO/WHO Meeting on Pesticide Residues for estimation of dietary intake.

Highest residue – processing (HR-P)
Highest residue in a processed commodity calculated by multiplying the highest residue in the raw commodity by the processing factor.

Incurred residue
Residue present in food or feed as a result of treatment with pesticides or veterinary drugs, for example, in the field (as opposed to residue resulting from spiking samples in the laboratory).

Innocuous metabolic products
Products that are known or readily predicted to be harmless to humans at the estimated intakes of the parent compound.

Intake
For the purposes of food and feed risk assessment, the amount of a substance (including nutrients) ingested by a person or an animal as part of its diet (via food, beverages, drinking-water and food supplements). This term does not refer to whole foods. The "intake" of whole foods is termed "food consumption".

Intake assessment
The qualitative and/or quantitative evaluation of the likely intake of chemicals (including nutrients) via food, beverages, drinking-water and food supplements. *Synonymous with*: Dietary exposure assessment.

International estimated daily intake (IEDI)
A prediction of the long-term daily intake of a pesticide residue on the basis of the assumptions of average daily food consumption per person and median residues from supervised trials, allowing for residues in the edible portion of a commodity and including residue components defined by the Joint FAO/WHO Meeting on Pesticide Residues for estimation of dietary intake. Changes in residue levels resulting from preparation, cooking or commercial processing are included. When information is available, dietary intake of residues resulting from other sources should be included. The IEDI is expressed in milligrams of residue per person.

International estimated short-term intake (IESTI)
A prediction of the short-term intake of a pesticide residue on the basis of the assumptions of high daily food consumption per person and highest residues from supervised trials, allowing for residues in the edible portion of a commodity and including residue components defined by the Joint FAO/WHO Meeting on Pesticide Residues for estimation of dietary intake. The IESTI is expressed in milligrams of residue per kilogram of body weight.

JECFA numbers for flavouring agents
Flavouring agents evaluated by the Joint FAO/WHO Expert Committee on Food Additives have been numbered consecutively for administrative purposes since the forty-ninth meeting by the FAO Joint Secretariat. The flavouring agents evaluated at the forty-sixth meeting have been numbered retroactively.

Joint FAO/WHO Expert Committee on Food Additives (JECFA)
An expert committee that has been meeting since 1956. JECFA has been engaged in collecting and evaluating scientific data on food additives and making recommendations on safe levels of use. This has been accomplished 1) by elaborating specifications for the identity and purity of individual food additives that have been toxicologically tested and are in commerce and 2) by evaluating toxicological data on these food additives and estimating acceptable intakes by humans. In 1972, the scope of the evaluations was extended to include contaminants in food, whereas in 1987, the scope was extended even further to include residues of veterinary drugs in food. When evaluating the latter compounds, maximum residue limits are recommended based upon acceptable intakes estimated by the Committee and data relating to Good Practice in the Use of Veterinary Drugs.

JECFA is a technical committee of specialists acting in their individual capacities. Each JECFA is a separately constituted committee. When the term "JECFA" or "the Committee" is used without reference to a specific meeting, it is meant to imply the common policy or combined output of the separate meetings over the years.

Joint FAO/WHO Meeting on Pesticide Residues (JMPR)
The abbreviated title for the Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group on Pesticide Residues, which has been meeting since 1963. The meetings are normally convened annually. The FAO Panel of Experts is responsible for reviewing residue and analytical aspects of the pesticides considered, including data on their metabolism, fate in the environment and use patterns, and for estimating the maximum residue levels and supervised trials median residue levels that might occur as a result of the use of the pesticide according to Good Agricultural Practice. The WHO Core Assessment Group on Pesticide Residues is responsible for reviewing toxicological and

related data on the pesticides and, when possible, for estimating acceptable daily intakes and long-term dietary intakes of residues. As necessary, acute reference doses for pesticides are estimated along with appropriate estimates of short-term dietary intake.

JMPR is a technical committee of specialists acting in their individual capacities. Each is a separately constituted committee. When the term "JMPR" or "the Meeting" is used without reference to a specific meeting, it is meant to imply the common policy or combined output of the separate meetings over the years.

Large portion size
A food consumption amount that represents the 97.5th-percentile consumption (eaters only) of a food that is derived from individual consumer days in a food consumption survey. This is useful in calculating acute dietary exposures.

Limit of detection (LOD)
The minimum concentration of a component in a dietary sample that can be qualitatively detected, but cannot be quantitatively determined, under a pre-established set of analytical conditions.

Limit of quantification (LOQ)
The minimum concentration of a component that can be determined quantitatively with acceptable accuracy and consistency. It often approximates to a value of 3 times the limit of detection.

Long-term exposure
See Chronic exposure.

Long-term toxicity study
A study in which animals are observed during their whole lifespan (or the major part of their lifespan) and in which exposure to the test material takes place over the whole observation time or a substantial part thereof. The term *chronic toxicity study* is used sometimes as a synonym for long-term toxicity study.

Lowest-observed-adverse-effect level (LOAEL)
Lowest concentration or amount of a substance, found by experiment or observation, that causes an adverse alteration of morphology, functional capacity, growth, development or lifespan of the target organism

distinguishable from normal (control) organisms of the same species and strain under the same defined conditions of exposure.

Lowest-observed-effect level (LOEL)
Lowest concentration or amount of a substance, found by experiment or observation, that causes any alteration of morphology, functional capacity, growth, development or lifespan of the target organism distinguishable from normal (control) organisms of the same species and strain under the same defined conditions of exposure.

Margin of exposure (MOE)
Ratio of the no-observed-adverse-effect level or benchmark dose lower confidence limit for the critical effect to the theoretical, predicted or estimated exposure dose or concentration. *Related term*: Margin of safety.

Margin of safety
The margin between the health-based guidance value (reference dose) and the actual or estimated exposure dose or concentration. For some experts, the margin of safety has the same meaning as the margin of exposure. *Related term*: Margin of exposure.

Marker residue (veterinary drugs)
The parent drug, or any of its metabolites, or a combination of any of these, with a known relationship to the concentration of the total residue in each of the various edible tissues at any time between administration of the drug and the depletion of residues to safe levels.

Maximum level (ML)
For contaminants, naturally occurring toxicants and nutrients, the maximum concentration of a substance recommended by the Codex Alimentarius Commission to be legally permitted in a given commodity. For food additives, the level of permission of use given in food standards for the additive in that food or food category.

Maximum residue level for pesticides[1]
Estimated by the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) as the maximum concentration of residues (expressed as milligrams per

[1] It should be noted that "maximum residue limit" and "maximum residue level" are frequently abbreviated using the same acronym MRL, irrespective of the different meaning and context in which they are used.

kilogram) that may occur in a food or feed commodity following Good Agricultural Practice. The estimated maximum residue level is considered by JMPR to be suitable for establishing Codex maximum residue limits (MRLs) and is considered by the Codex Committee on Pesticide Residues as the basis when recommending the Codex MRLs.

Maximum residue limit (MRL)

Veterinary drugs: The maximum concentration of residue resulting from the use of a veterinary drug that is acceptable in or on a food. It is based on the type and amount of residue considered to be without toxicological hazard for human health as expressed by the acceptable daily intake (ADI) or on the basis of a temporary ADI that utilizes an additional safety factor. It also takes into account other relevant public health risks as well as food technological aspects and estimated food intakes. When establishing an MRL, consideration is also given to residues that occur in food of plant origin or the environment. The MRL may be reduced to be consistent with Good Practice in the Use of Veterinary Drugs and to the extent that practical analytical methods are available. MRLs are expressed in terms of milligrams per kilogram tissue or milligrams per litre milk. The MRLs elaborated by the Joint FAO/WHO Expert Committee on Food Additives are "recommended MRLs" that are forwarded to the Codex Committee on Residues of Veterinary Drugs in Foods for consideration.

Pesticides: The maximum concentration of a pesticide residue (expressed as milligrams per kilogram) recommended by the Codex Alimentarius Commission to be legally permitted in or on food commodities and animal feed. MRLs are based on Good Agricultural Practice data, and food derived from commodities that comply with the respective MRLs are intended to be toxicologically acceptable. Consideration of the various dietary residue intake estimates and determinations, at both the national and international level, in comparison with the acceptable daily intake should indicate that foods complying with Codex MRLs are safe for human consumption.

Maximum residue limit (MRL) "not specified"

Available data on the identity and concentration of residues of a veterinary drug in animal tissues indicate a large margin of safety for consumption of residues in food when the drug is used according to Good Practice in the Use of Veterinary Drugs. For that reason, and for

the reasons stated in the individual evaluation, the Committee has concluded that the presence of drug residues in the named animal product does not present a health concern and that there is no need to specify a numerical MRL.

Mean
The arithmetic average of all the values in the data set, computed by adding all the individual values together and dividing by the number in the group.

Mechanism of action
The specific biochemical interaction through which a substance produces an effect on a living organism or in a biochemical system. *Related term*: Mode of action.

Median
The midpoint value obtained by ranking all values from highest to lowest and choosing the value in the middle. The median divides a population into two equal halves.

Model
A set of constraints restricting the possible joint values of several quantities; a hypothesis or system of beliefs regarding how a system works or responds to changes in its inputs. The purpose of a model is to represent as accurately and precisely as necessary with respect to particular decision objectives a particular system of interest.

Model diets
A type of screening method used in dietary exposure assessments that assumes fixed default consumption levels, usually for categories of foods and beverages. Model diets can be based on hypothetical consumption data assuming maximum consumption amounts for broad food groups (e.g. the budget method) or can be derived from national food supply or consumption data (e.g. Global Environment Monitoring System – Food Contamination Monitoring and Assessment Programme consumption cluster diets or total diet studies).

Mode of action
A biologically plausible sequence of key events leading to an observed effect supported by robust experimental observations and mechanistic data. A mode of action describes key cytological and biochemical

events—that is, those that are both measurable and necessary to the observed effect—in a logical framework. *Related term*: Mechanism of action.

Monitoring data
Continuous or repeated observation, measurement and evaluation of health and/or environmental or technical data for defined purposes, according to prearranged schedules in space and time, using comparable methods for sensing and data collection. Evaluation requires comparison with appropriate reference values based on knowledge of the probable relationship between ambient exposures and adverse effects.

Mutagenicity
The capacity to give rise to mutations.

No acceptable daily intake (ADI) allocated
Terminology used by the Joint FAO/WHO Expert Committee on Food Additives in situations where an ADI is not established for a substance under consideration because 1) insufficient safety information is available, 2) no information is available on its food use or 3) specifications for identity and purity have not been developed. The evaluation should be consulted to learn why an ADI was not allocated.

Non-traditional foods
Foods that do not have a history of significant human consumption by the broad community for several generations as part of the ordinary diet.

No-observed-adverse-effect level (NOAEL)
Greatest concentration or amount of a substance, found by experiment or observation, that causes no adverse alteration of morphology, functional capacity, growth, development or lifespan of the target organism distinguishable from those observed in normal (control) organisms of the same species and strain under the same defined conditions of exposure.

No-observed-effect level (NOEL)
Greatest concentration or amount of a substance, found by experiment or observation, that causes no alteration of morphology, functional

capacity, growth, development or lifespan of the target organism distinguishable from those observed in normal (control) organisms of the same species and strain under the same defined conditions of exposure.

Novel food
A food or food ingredient produced from raw materials not normally used for human consumption or food that is severely modified by the introduction of new processes not previously used in the production of food.

Nutrient
Any element or compound necessary for or contributing to an organism's metabolism, growth or other function. Six nutrient groups exist, classifiable as those that provide energy and those that otherwise support metabolic processes in the body. Some of them are essential because they cannot be synthesized in the body and must be obtained from a food source.

Pesticide
Any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances that may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant or agent for thinning fruit or preventing the premature fall of fruit, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage or transport.

Pesticide residue
See Residues of pesticides.

Pharmacodynamics
The study of the physiological effects of drugs on the body or on microorganisms or parasites within or on the body, the mechanisms of drug action and the relationship between drug concentration and effect. *Related term*: Toxicodynamics.

Pharmacokinetics
Description of the fate of drugs in the body, including a mathematical account of their absorption, distribution, metabolism and excretion. *Related term*: Toxicokinetics.

Point estimate
A single numerical value resulting from calculations. *Synonymous with*: Deterministic estimate.

Post-regulation dietary exposure assessment
Calculation of dietary exposure based on the chemical levels found in foods following implementation of regulatory limits or levels.

Poundage data
Estimates of the amount of a food chemical available for use in food manufacturing in a country during a specific period of time (usually 1 year). The total poundage is sometimes divided by the total population size in order to obtain an estimate of per capita availability of a specific chemical substance.

Precision
A measure of the reproducibility of the predictions of a model or repeated measurements, usually in terms of the standard deviation or other measures of variation among such predictions or measurements.

Probabilistic analysis
Analysis in which distributions are assigned to represent variability or uncertainty in quantities. The form of the output of a probabilistic analysis is likewise a distribution. *Related term*: Probabilistic distribution.

Probability distribution (e.g. normal, lognormal, gamma, logistic, log-logistic)
A mathematical description of a function that relates probabilities with specified intervals of a continuous quantity, or values of a discrete quantity, for a random variable. Probability distribution models can be non-parametric or parametric. A non-parametric probability distribution can be described by rank ordering continuous values and estimating the empirical cumulative probability associated with each. Parametric probability distribution models can be fit to data sets by

estimating their parameter values based upon the data. The adequacy of the parametric probability distribution models as descriptors of the data can be evaluated using goodness of fit techniques. Distributions such as normal, lognormal and others are examples of parametric probability distribution models.

Problem formulation
A process that describes the food safety problem and its context, in order to identify those elements of hazard or risk associated with a chemical that are relevant to potential risk management decisions.

Processing aid
Any substance or material, not including apparatus or utensils, and not consumed as a food ingredient by itself, intentionally used in the processing of raw materials, food or its ingredients, to fulfil a certain technological purpose during treatment or processing and that may result in the non-intentional but unavoidable presence of residues or derivatives in the final product.

Processing factor
For a specified pesticide residue, commodity and food process, the residue level in the processed product divided by the residue level in the starting commodity, usually a raw agricultural commodity.

Provisional maximum tolerable daily intake (PMTDI)
The reference value, established by the Joint FAO/WHO Expert Committee on Food Additives, used to indicate the safe level of intake of a contaminant with no cumulative properties. Its value represents permissible human exposure as a result of the natural occurrence of the substance in food and 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. The tolerable intake is generally referred to as "provisional" as there is often a paucity of data on the consequences of human exposure at low levels, and new data may result in a change to the tolerable level. *Related term*: Tolerable daily intake.

Provisional tolerable monthly intake (PTMI)
An end-point used by the Joint FAO/WHO Expert Committee on Food Additives 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.

Provisional tolerable weekly intake (PTWI)
The end-point used by the Joint FAO/WHO Expert Committee on Food Additives 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.

Quality assurance
A set of activities whose purpose is to demonstrate that an entity meets all quality requirements. These activities are carried out in order to inspire the confidence of both customers and managers that all quality requirements are being met.

Quality control
A set of activities or techniques whose purpose is to ensure that all quality requirements are being met. In order to achieve this purpose, processes are monitored and performance problems are solved.

Random error
Processes that are random or statistically independent of each other, such as imperfections in measurement techniques that lead to unexplainable but characterizable variations in repeated measurements of a fixed true value. Some random errors could be reduced by developing improved techniques. *Related term*: Error.

Random sampling
A sample selected from a statistical population such that each individual has an equal probability of being selected.

Reference dose
An estimate of the daily exposure dose that is likely to be without deleterious effect even if continued exposure occurs over a lifetime. *Related terms*: Acceptable daily intake, Health-based guidance value, Provisional maximum tolerable daily intake, Tolerable daily intake.

Regional diets
See GEMS/Food regional diets.

Reproductive testing
Tests covering several reproductive cycles to study reproductive toxicity associated with exposure to a chemical. In the three-generation test, the animals are exposed through three complete reproductive cycles (starting with the F_0 generation at weaning). These tests include exposure in utero and through the milk.

Reproductive toxicity
Adverse effects or abnormalities in, for example, gamete production, reproductive cycle (e.g. menstrual disorders), sexual behaviour (as seen in animals), fertility, gestation, parturition and/or lactation, pregnancy outcomes (spontaneous abortion, stillbirth, etc.) and premature reproductive senescence (i.e. early menopause). *Related term*: Developmental toxicity.

Residues of pesticides
Any specified substances in or on food, agricultural commodities or animal feed resulting from the use of a pesticide. The term includes any derivatives of a pesticide, such as conversion products, metabolites, reaction products and impurities considered to be of toxicological significance. The term "pesticide residue" includes residues from unknown or unavoidable sources (e.g. environmental) as well as known uses of the chemical. The definition of a residue for compliance with maximum residue limits (MRLs) is that combination of the pesticide and its metabolites, derivatives and related compounds to which the MRL applies.

Residues of veterinary drugs
The parent compounds and/or their metabolites in any edible portion of the animal product. They include residues of associated impurities of the veterinary drug concerned.

Response
Change developed in the state or dynamics of an organism, system or (sub)population in reaction to exposure to an agent.

Risk
The probability of an adverse effect in an organism, system or (sub)-population caused under specified circumstances by exposure to an agent.

Risk analysis
A process for controlling situations where an organism, system or (sub)population could be exposed to a hazard. The risk analysis process consists of three components: risk assessment, risk management and risk communication.

Risk assessment
A process intended to calculate or estimate the risk to a given target organism, system or (sub)population, including the identification of attendant uncertainties, following exposure to a particular agent, taking into account the inherent characteristics of the agent of concern as well as the characteristics of the specific target system. The risk assessment process includes four steps: hazard identification, hazard characterization (*Related term*: Dose–response assessment), exposure assessment and risk characterization. It is the first component in a risk analysis process. *Related term*: Safety assessment.

Risk characterization
The qualitative and, wherever possible, quantitative determination, including attendant uncertainties, of the probability of occurrence of known and potential adverse effects of an agent in a given organism, system or (sub)population, under defined exposure conditions. Risk characterization is the fourth step in the risk assessment process.

Risk communication
Interactive exchange of information about (health or environmental) risks among risk assessors, managers, news media, interested groups and the general public.

Risk estimation
Quantification of the probability, including attendant uncertainties, that specific adverse effects will occur in an organism, system or (sub)population due to actual or predicted exposure.

Risk management
Decision-making process involving considerations of political, social, economic and technical factors with relevant risk assessment information relating to a hazard so as to develop, analyse and compare regulatory and non-regulatory options and to select and implement appropriate regulatory response to that hazard.

Safety
Practical certainty that adverse effects will not result from exposure to an agent under defined circumstances. It is the reciprocal of risk.

Safety assessment
An approach that focuses on the scientific understanding and measurement of chemical hazards as well as chemical exposures, and ultimately the risks associated with them. Often (and in this monograph) used synonymously with risk assessment. *Related term*: Risk assessment.

Safety factor
A composite (reductive) factor applied by the risk assessment experts to the no-observed-adverse-effect level (NOAEL) or other reference point, such as the benchmark dose or benchmark dose lower confidence limit, to derive a reference dose that is considered safe or without appreciable risk, such as an acceptable daily intake or tolerable daily intake (the NOAEL or other reference point is divided by the safety factor to calculate the reference dose). The value of the safety factor depends on the nature of the toxic effect, the size and type of population to be protected, and the quality of the toxicological information available. *Related terms*: Assessment factor, Uncertainty factor.

Sample preparation
Includes actions taken to prepare the analytical sample from the laboratory (bulk) sample, such as reducing the size of a large bulk sample by subsampling or removing foreign materials and parts of the sample material that are not analysed (e.g. stones, withered leaves, stones of fruits, bones of meat). Sample preparation may include, for instance, washing, peeling, cooking, etc. so that foods are prepared as for normal consumption (i.e. table ready). Sample preparation may also involve compositing of food samples taken from different regions, brands and even food types before homogenization and analysis.

Sample processing
Includes physical operations performed to prepare a well-mixed or homogeneous matrix to form the analytical sample, from which the test portions for the analysis are taken.

Sampling procedure (protocol)
Operational requirements and/or instructions relating to the use of a particular sample plan (i.e. the instructions for the implementation of the plan).

Screening methods
In exposure assessment, methods used as the first step in estimating the dietary exposure to a food chemical in order to target those chemicals that might pose a health concern. Screening methods use conservative assumptions for both food consumption and chemical concentration. If the estimated exposure exceeds its toxicological reference value, a more accurate method of dietary exposure assessment is used; if it is below the reference value, no further assessment is conducted.

Sensitivity analysis
In risk assessment, a technique that tests the sensitivity of an output variable to the possible variation in the input variables of a given model. The purpose of sensitivity analysis is to quantify the influence of input variables on the output variable and develop bounds on the model output. This comes from dose–response modelling and application of statistical methods.

In exposure assessment, a study of how the variation in the outputs of a model can be attributed to, qualitatively or quantitatively, different sources of variation in model inputs.

Short-term exposure
Multiple or continuous exposure to an agent for a short period of time, usually about 10% of the animal's lifespan (e.g. 90 days in rat, 1 year in dog).

Short-term toxicity study
An animal study (sometimes called a subacute or subchronic study) in which the effects produced by the test material, when administered in repeated doses (or continuously in food or drinking-water) over a period of about 10% of the animal's lifespan (e.g. 90 days in rat, 1 year in dog), are studied.

Single-blind placebo-controlled food challenge
A study in which only the patient is unaware of the food or placebo being tested. In the test, the patient ingests a food that has been

disguised so that the patient is unaware of the contents of the challenge. *Related term*: Double-blind placebo-controlled food challenge.

Standard portion sizes
Quantities (weights) assigned to individual foods (e.g. glass of juice, cookie and banana) that represent amounts that are typically consumed. These values can be used as default values in food consumption surveys and for calculating dietary exposure.

Statistical uncertainty
See Uncertainty.

Steady state
The state where the body eliminates an amount of a xenobiotic that is the same as that absorbed during an exposure interval.

Stratified sampling
A method that selects values at regular intervals throughout each distribution. Calculating the result using the average or median value for each distribution may be thought of as the simplest example of a stratified sampling process, where each distribution has a single stratum.

Subchronic exposure
A contact between an agent and a target of intermediate duration between acute and chronic. (Other terms, such as "less-than-lifetime exposure", are also used.) *Related term*: Short-term exposure.

Supervised trials
Scientific studies in which pesticides are applied to crops or animals according to specified conditions intended to reflect commercial practice, after which harvested crops or tissues of slaughtered animals are analysed for pesticide resides. Specified conditions are usually those that approximate existing or proposed Good Agricultural Practice.

Supervised trials for estimating maximum residue levels
Scientific studies in which pesticides are applied to crops or animals according to specified conditions intended to reflect commercial practice, after which harvested crops or tissues of slaughtered animals are analysed for pesticide residues.

Supervised trials median residue (STMR)
The expected residue level in the food commodity (expressed in milligrams of residue per kilogram of commodity) when a pesticide has been used according to maximum Good Agricultural Practice (GAP) conditions. The STMR is estimated as the median of the residue values (one from each trial) from supervised trials conducted according to maximum GAP conditions and includes residue components defined by the Joint FAO/WHO Meeting on Pesticide Residues for estimation of dietary intake. For some commodities, such as banana, STMR levels may be determined directly from levels measured in the edible portion when data are available.

Supervised trials median residue – processed (STMR-P)
The expected residue in a processed food commodity when a pesticide has been used according to maximum Good Agricultural Practice conditions and the commodity is processed according to the main practice used to prepare the food prior to consumption. It is calculated by multiplying the STMR of the raw agricultural commodity by the corresponding processing factor or derived directly from a series of processing trials. The STMR-P is expressed in units of milligrams per kilogram of commodity.

Susceptibility factors
Characteristics thought to increase the susceptibility of an individual to adverse health outcomes.

Systematic error
See Error.

Target tissue or organ
For veterinary drugs, the edible animal tissue (muscle, fat, liver or kidney) selected to monitor for the total residue in the target animal. It is usually, but not necessarily, the tissue with the slowest depletion rate of residues. For food additives, contaminants and pesticides, the target tissue/organ means the biological tissue(s) or organ(s) where the biological activity/toxicity of the substance is exerted in the body.

Temporary acceptable daily intake (ADI)
Used when data are sufficient to conclude that use of the substance is safe over the relatively short period of time required to generate and evaluate further safety data, but are insufficient to conclude that use

of the substance is safe over a lifetime. A higher than normal safety factor is used when establishing a temporary ADI, and an expiration date is established by which time appropriate data to resolve the safety issue should be submitted for evaluation. The temporary ADI is listed in units of milligrams per kilogram of body weight.

Temporary maximum residue limit (MRL)
Used when a temporary acceptable daily intake has been established and/or when it has been found necessary to provide time to generate and evaluate further data on the nature and quantification of residues. Temporary MRLs are expressed in terms of milligrams per gram of tissue or milligrams per litre of milk.

"Tentative" specifications
Term used by the Joint FAO/WHO Expert Committee on Food Additives only in cases where data on the purity and identity of the substance (food additive) are required. The assignment "tentative" will require submission and re-evaluation of data within a specified period of time (usually 2 years).

Teratogen
An agent that, when administered prenatally, induces permanent abnormalities in structure.

Teratogenicity
The property of producing or potential to produce structural malformations or defects in an embryo or fetus.

Test portion
Quantity of material, of proper size for measurement of the concentration or other property of interest, removed from the test sample.

Theoretical added maximum daily intake (TAMDI)
A conservative estimate of potential exposure to a specific flavouring substance on the basis of proposed or allowed maximum (upper use) levels (UULs) in the different categories of foods and beverages that could be flavoured. The resulting exposure estimate is that of a hypothetical consumer who consumes every day one standard portion of food/beverage from each of these categories, and those foods/beverages always contain the specific flavouring at

its specified UUL. The TAMDI is calculated by summing the exposures estimated for each individual food/beverage category to estimate total daily intake.

Theoretical maximum daily intake (TMDI)
A prediction of the maximum daily intake of, for example, a pesticide residue, assuming that residues are present at the maximum residue levels/limits and average daily consumption of foods per person (e.g. as represented by Global Environment Monitoring System – Food Contamination Monitoring and Assessment Programme diets). The TMDI can be calculated for the various regional or consumption cluster diets and is expressed in milligrams of residue per person.

Threshold
Dose or exposure concentration of an agent below which a stated effect is not observed or expected to occur.

Threshold dose
The dose at which an effect just begins to occur—that is, at a dose immediately below the threshold dose, the effect will not occur, and immediately above the threshold dose, the effect will occur. For a given chemical, there can be multiple threshold doses, in essence one for each definable effect. For a given effect, there may be different threshold doses in different individuals. Further, the same individual may vary from time to time as to his or her threshold dose for any effect. For certain chemicals and certain toxic effects, a threshold dose may not be demonstrable. The threshold dose will fall between the experimentally determined no-observed-(adverse-)effect level and the lowest-observed-(adverse-)effect level, both of which have been used by different scientific groups as a surrogate for the threshold dose in the performance of risk assessments.

Tolerable daily intake (TDI)
Analogous to acceptable daily intake. The term tolerable is used for agents that are not deliberately added, such as contaminants in food. Note that the Joint FAO/WHO Expert Committee on Food Additives uses the term provisional maximum tolerable daily intake. *Related terms*: Acceptable daily intake, Health-based guidance value, Provisional maximum tolerable daily intake.

Tolerable intake
Estimated maximum amount of an agent, expressed on a body mass basis, to which each individual in a (sub)population may be exposed over a specified period without appreciable risk.

Total diet study
A study that determines levels of various food additives, pesticide and veterinary drug residues, contaminants and nutrients in foods, so that dietary intakes of those analytes by the population of interest can be estimated.

Total organic solids (TOS)
The difference between the total solids content and the ash, water, diluent and carrier contents. TOS is used when estimating dietary exposure to enzyme preparations. The estimated dietary exposure is expressed in terms of milligrams of TOS per kilogram of body weight.

Toxicity
The potential of a substance to cause injury (adverse reaction) to a living organism.

Toxicodynamics
The process of interaction of chemical substances with target sites and the subsequent reactions leading to adverse effects. *Related term*: Pharmacodynamics.

Toxicokinetics
The process of the uptake of potentially toxic substances by the body, the biotransformation they undergo, the distribution of the substances and their metabolites in the tissues, and the elimination of the substances and their metabolites from the body. Both the amounts and the concentrations of the substances and their metabolites are studied. The term has essentially the same meaning as pharmacokinetics, but the latter term should be restricted to the study of pharmaceutical substances. *Related term*: Pharmacokinetics.

Toxicological reference value
See Acceptable daily intake, Acute reference dose, Health-based guidance value, Provisional maximum tolerable daily intake, Provisional tolerable weekly intake, Provisional tolerable monthly intake, Reference dose, Tolerable daily intake.

Traditional foods
Foods that have a history of significant human consumption by the broad community for several generations as part of the ordinary diet at the global, regional or local level or as a part of an ethnic diet.

Transgenic
Referring to an experimentally produced organism in which deoxyribonucleic acid (DNA) has been artificially introduced and incorporated into the organism's germline, usually by injecting the foreign DNA into the nucleus of a fertilized embryo.

Transgenic animal
A fertile animal that carries an introduced gene in its germline.

Transplacental carcinogenesis
The appearance of neoplasia in the progeny of females exposed to chemical agents during pregnancy.

Uncertainty
In risk assessment, imperfect knowledge concerning the present or future state of an organism, system or (sub)population under consideration.

In exposure assessment, lack of knowledge regarding the "true" value of a quantity, lack of knowledge regarding which of several alternative model representations best describes a system of interest or lack of knowledge regarding which probability distribution function and its specification should represent a quantity of interest.

Uncertainty analysis
A process in which the sources of uncertainty in an estimate are identified and an estimate is made of the magnitude and direction of the resulting error.

Uncertainty factor
Reductive factor by which an observed or estimated no-observed-adverse-effect level or other reference point, such as the benchmark dose or benchmark dose lower confidence limit, is divided to arrive at a reference dose or standard that is considered safe or without appreciable risk. *Related terms*: Assessment factor, Safety factor.

Unit weight
This represents the typical weight of a commodity unit (e.g. a single apple, a single banana) that is used in the calculation of acute dietary exposure estimates.

Use pattern
The combination of all factors involved in the use of a pesticide, including the concentration of active ingredient in the preparation being applied, rate of application, time of treatment, number of treatments, use of adjuvants and methods and sites of application, which determine the quantity applied, timing of treatment and interval before harvest.

Validation
Process by which the reliability and relevance of a particular approach, method, process or assessment is established for a defined purpose. Different parties define "reliability" as establishing the reproducibility of the outcome of the approach, method, process or assessment over time. "Relevance" is defined as establishing the meaningfulness and usefulness of the approach, method, process or assessment for the defined purpose.

Variability
Heterogeneity of values over time, space or different members of a population. Variability implies real differences among members of that population. For example, in exposure assessment, different individuals have different intakes and susceptibilities. In relation to human exposure assessment, differences over time for a given individual are referred to as intraindividual variability; differences over members of a population at a given time are referred to as interindividual variability.

Veterinary drug
Any substance applied or administered to any food-producing animal, such as meat- or milk-producing animals, poultry, fish or bees, whether for therapeutic, prophylactic or diagnostic purposes or for modification of physiological functions or behaviour.

Veterinary drug residues
See Residues of veterinary drugs.

Weight of evidence
A process in which all of the evidence considered relevant to a decision is evaluated and weighted.

Withdrawal period
The interval between the time of the last administration of a veterinary drug and the time when the animal can be safely slaughtered for food or when milk or eggs can be safely consumed.

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Main sources of definitions in glossary of terms:

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