



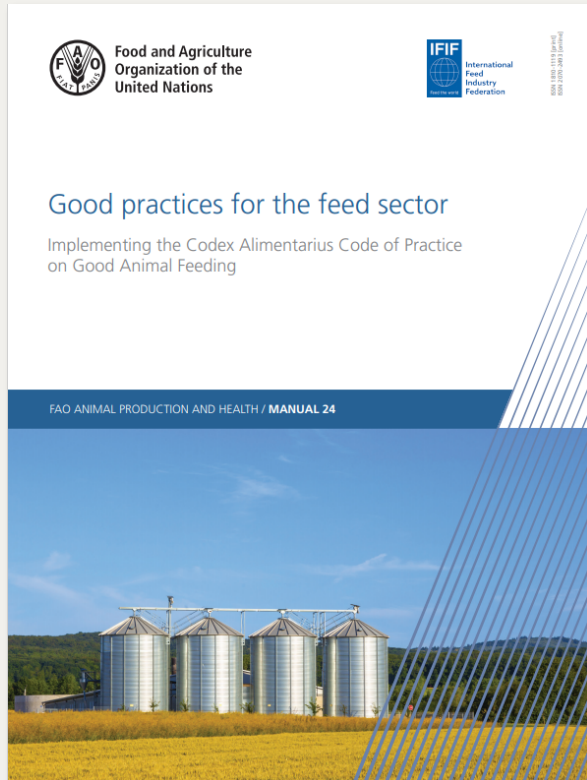
International  
Feed  
Industry  
Federation

# Highlights of the 'FAO/IFIF Manual of Good Practices for the Feed Sector'

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# Introduction



- The partnership between FAO and IFIF resulted in the production of the Manual of Good Practices for the Feed Industry.
- The manual, since its first release in 2010, has been a very valuable tool to increase knowledge and improve feed safety at the production level, and is widely recognized and used in many countries around the world.
- This second publication is a fully revised, updated and expanded version of that manual and addresses recent developments in feed production and benefits from latest scientific and technical knowledge.

The demonstration that a particular instrument or device produces results within specified limits by comparison with those produced by a reference or traceable standard over an appropriate range of measurements.

- Revision and updating of the terms used in the texts;
  - Inclusion of new terms and their definitions.
- 
- International Standardization Organization (ISO) - Animal feeding stuffs – Vocabulary ISO 20588:2019.

# The sections of the 2020 Manual

## Risk analysis – An overview

- A brief overview of risk analysis;
- Components of risk analysis and use of the outputs for feed and food safety;
- Differentiate risks and hazards.

### Risk analysis – An overview

Risk analysis is used to evaluate a risk, to identify appropriate measures to control it and to communicate the whole process. The information and evidence that risk analysis produces are essential for regulators and operators to make effective decisions that improve feed safety, and in turn public health.

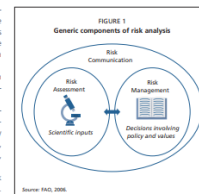
Several feed hazards (see Table 1) are already known and addressed in feed safety controls. Various factors influence their occurrence, thus altering the risk they present. FAO, WHO and Codex Alimentarius have produced extensive and specific publications on risk analysis and risk assessment for application by governments and for application by the Codex Alimentarius (FAO, WHO, 2013a; FAO, 2006; FAO, WHO, 2014a; FAO, WHO, 2007; FAO, WHO, 2008b; FAO, WHO, 2011a; FAO, WHO, 2013a; FAO, WHO, 2013b).

There are three distinct components of risk analysis: risk management, risk assessment and risk communication. The interactivity of these components is essential for a risk analysis to be successful (see Figure 1).

Risk assessment is considered to be the "science-based" component of risk analysis, while risk management is the component in which scientific information and other factors, such as economic, social, cultural and ethical considerations, are integrated and weighed in choosing the preferred risk management options. Risk communication is the interactive exchange of information and opinions throughout the risk analysis process.

#### INTERNATIONAL AND NATIONAL RISK ANALYSIS FRAMEWORK

Feed safety risk analysis is performed by authorities at the international, regional and national level. At the international level, Codex Alimentarius feed and food safety standards provide guidance to risk managers. Risk



assessment is carried out by the FAO/WHO expert bodies: JECFA (Joint Expert Committee on Food Additives), JMPR (Joint Meeting on Pesticide Residues) and JEMRA (Joint Expert Meeting on Microbiological Risk Assessment) and ad-hoc FAO/WHO experts meetings. At the national level, competent authorities are responsible for carrying out the full risk analysis process.

#### RISK ANALYSIS PROCESS

The risk analysis process begins with preliminary risk management, where it seeks to define the issue(s), articulate the objectives of the analysis and identify the questions to be addressed and answered by the risk assessment, when and if it is needed. Risk management and risk assessment should be carried out with full transparency and with intensive dialogue

**TABLE 1**  
Examples of hazards in the feed chain

Biological	Chemical	Physical
Bacteria	Naturally occurring toxins	Metals, parts of equipment
Parasites	Pesticide residues	Glass
Viruses	Veterinary drug residues	Stones
Prions	Potentially toxic elements	Ropes
	Chemical contaminants from packaging	Nanomaterials
	Environmental pollutants	Microplastics
		Radioisotopes

# The sections of the 2020 Manual

## Section 1 - Health hazards associated with feed

- Significantly expanded;
- Detailed information on biological, chemical and physical hazards;
- Hazards of feed and products of feed production technologies of increasing relevance;
- Tables summarizing the information on the specific hazards.

Hazard	<i>Salmonella</i> spp.
Sources	Contaminated feed ingredients of oil seed or fruit origins, of marine origin (fish meal), or terrestrial animal origin (meat (and bone) meal). Environmental sources such as poultry houses and poultry litter. Breeder and slaughter animals including asymptomatic carriers (swine, poultry, and cattle); wild birds and rodents; crushing and feed producing plants especially when hygiene controls are insufficient since this may allow pathogenic growth.
Transfer to food of animal origin	High
Potential impact on human health	High

Source: adapted from FAO, WHO, 2019d

### SECTION 1

#### Health hazards associated with feed

All feed and feed ingredients should meet minimum safety standards. It is essential that levels of undesirable substances are sufficiently low in feed and feed ingredients that their concentration in food for human consumption is consistently below the level of concern. Codex Maximum Residue Limits and Extraneous Maximum Residue Levels set for feed should be applied. Maximum residue limits set for food, such as those established by the Codex Alimentarius Commission, may be useful in determining minimum safety standards for feed.

##### Undesirable substances

The presence in feed and feed ingredients of undesirable substances such as industrial and environmental contaminants, pesticides, radionuclides, persistent organic pollutants, pathogenic agents and toxins such as mycotoxins should be identified, controlled and minimised. Animal products that could be a source of the Bovine Spongiform Encephalopathy (BSE) agent should not be used for feeding directly to, or for feed manufacturing for, ruminants. Control measures applied to reduce unacceptable level of undesirable substances should be assessed in terms of their impact on food safety.

The risks of each undesirable substance to consumers' health should be assessed and such assessment may lead to the setting of maximum limits for feed and feed ingredients or the prohibition of certain materials from animal feeding.

Codex Alimentarius Code of Practice on Good Animal Feeding (CAC 54-2004)

Hazards to human health that can be transferred from feed to food of animal origin, therefore resulting in a food safety risk, may be introduced in the feed/food chain through feed and drinking water for animals. Feed may be contaminated during production, handling, storage, transportation and use. Hazards in feed may also result from accidental or deliberate human intervention (e.g. fraud, adulteration). The expansion of international trade of feed and feed ingredients may also increasingly spread hazards.

Hazards in feed can be biological, chemical or physical. Each hazard is associated with sources and routes of contamination and exposure. Previously unidentified hazards may be associated with new or increasingly used feed or feed ingredients (e.g. food and agro-industrial products, insects, former food products, marine resources or with new feed production technologies). New agricultural and manufacturing practices, availability of new feed ingredients, increasing pathogen resistance, climate changes and decrease in biodiversity will all demand particular attention in pursuing prevention of contamination, sharing of data and a continuous communication among feed and food stakeholders (Pink-Gemmel, J., ed., 2012).

##### BIOLOGICAL HAZARDS

Processing of feed ingredients typically involves steps like heat and/or addition of certain substances followed by cooling. These manufacturing processes may help reduce biological contamination. However, with insufficient hygiene and/or inadequate heating and cooling conditions, the growth of certain pathogens may occur. Furthermore, transports in uncleaned vehicles or in uncontrolled temperature or humidity settings can affect the survival and growth of pathogens.

To identify and characterize pathogens, understanding the factors that affect the sources and routes of contamination remains crucial to prevent further contamination.

##### *Salmonella* spp.

*Salmonella* are gram-negative bacteria ubiquitous in nature and common in the environment. More than 2500 serotypes of *Salmonella* are reported. All serovars are considered as potential pathogens to humans and are an important pathogen also in animals. In both humans and animals, the infection is transmitted by the faecal or oral route.

A wide spectrum of serovars of *Salmonella* can be isolated from feed, including those most commonly isolated

# The sections of the 2020 Manual

## Section 2 – General principles and requirements

- Feed ingredients;
- Labelling;
- Traceability/product tracing and record keeping of feed and feed ingredient;
- Recall;
- Special conditions applicable to emergency situations;
- Inspection and control procedures;
- Feed additives and veterinary drugs used in medicated feed.

SECTION 2  
General principles and requirements

Feed and feed ingredients should be obtained and maintained in a stable condition so as to protect feed and feed ingredients from contamination by pests, or by chemical, physical or microbiological contaminants or other objectionable substances during production, handling, storage and transport. Feed should be in good condition and meet generally accepted quality standards. Where appropriate, Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP) and, where applicable, Hazard Analysis and Critical Control Point (HACCP) principles should be followed to control hazards that may occur in feed. Potential sources of contamination from the environment should be considered.

Parties that produce feed or feed ingredients, those that rear animals for use as food and those that produce with animal products need to collaborate to identify potential hazards and their level of risk to consumers' health. Such collaboration will enable the development and maintenance of appropriate risk management options and safe feeding practices.

#### Feed ingredients

Feed ingredients should be obtained from safe sources and be subject to a risk analysis where the ingredients are derived from processes or technologies not hitherto evaluated from a food safety point of view. The procedures used should be consistent with the Working Principles for Risk Analysis for Application in the Framework of the Code Alimentarius. Manufacturers of feed additives, in particular, should provide clear information to the user to permit correct and safe use.

Monitoring of feed ingredients should include inspection and sampling and analysis for undesirable substances using risk-based protocols. Feed ingredients should meet acceptable and, if applicable, statutory standards for levels of pathogens, mycotoxins, pesticides and undesirable substances that may give rise to consumers' health hazards.

#### Labelling

Labelling should be clear and informative as to how the user should handle, store and use feed and feed ingredients. Labelling should be consistent with any statutory requirements and should describe the feed and provide instructions for use. Labelling or the accompanying documents should contain, where appropriate:

- information about the species or category of animals for which the feed is intended;
- the purpose for which the feed is intended;
- a list of feed ingredients, including appropriate reference to additives, in descending order of proportion;
- contact information of manufacturer or registrant;
- registration number if available;
- directions and precautions for use;
- lot identification;
- manufacturing date; and
- "use before" or expiry date.

#### Traceability/product tracing and record keeping of feed and feed ingredients

Traceability/product tracing of feed and feed ingredients, including additives, should be enabled by proper record keeping for timely and effective withdrawal or recall of products if known or probable adverse effects on consumers' health are identified. Records should be maintained and readily available regarding



# The sections of the 2020 Manual

## Section 3 – Good production practices

- GMP and HACCP are covered in detail;
- Updated according to new published references;
- Figures and schematics were introduced.

### SECTION 3 Good production practices

#### Production, processing, storage, transport and distribution of feed and feed ingredients

The production, processing, storage, transport and distribution of safe and suitable feed and feed ingredients is the responsibility of all participants in the feed chain, including farmers, feed ingredient manufacturers, feed compounders, traders, etc. Each participant in the feed chain is responsible for all activities that are under their direct control, including compliance with any applicable statutory requirements.

Feed and feed ingredients should not be produced, processed, stored, transported or distributed in facilities or using equipment where incompatible operations may affect their safety and lead to adverse effects on consumer health. Due to the unique characteristics of aquaculture, the application of these general principles must consider the difference between aquaculture and terrestrial-based production.

Where appropriate, operators should follow GMPs and, where applicable, HACCP principles to control hazards that may affect feed and food safety. The aim is to ensure feed safety and in particular to prevent contamination of animal feed and food of animal origin as far as this is reasonably achievable, recognising that total elimination of hazards is often not possible.

The effective implementation of GMPs and, where applicable, HACCP-based approaches should ensure, in particular, that the following areas are addressed:

#### Premises

Buildings and equipment used to process feed and feed ingredients should be constructed in a manner that permits ease of operation, maintenance and cleaning and minimises feed contamination. Process flow within the manufacturing facility should also be designed to minimise feed contamination. Water used in feed manufacture should meet hygienic standards and be of suitable quality for animals. Tanks, pipes and other equipment used to store and convey water should be of appropriate materials which do not produce unacceptable levels of contamination.

Sewage, waste and rain water should be disposed of in a manner which avoids contamination of equipment, feed and feed ingredients.

#### Receiving, storage and transportation

Chemical fertilisers, pesticides and other materials not intended for use in feed and feed ingredients should be stored separately from feed and feed ingredients to avoid the potential for manufacturing errors and contamination of feed and feed ingredients.

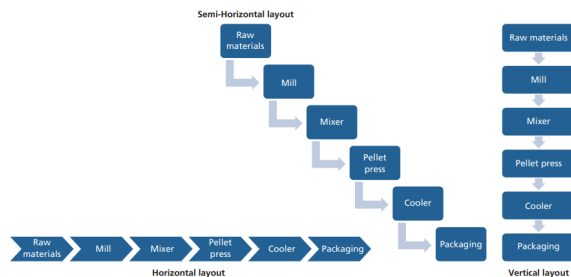
Processed feed and feed ingredients should be stored separately from unprocessed feed ingredients and appropriate packaging materials should be used. Feed and feed ingredients should be received, stored and transported in such a way as to minimise the potential for any cross-contamination to occur at a level likely to have a negative impact on food safety.

The presence of undesirable substances in feed and feed ingredients should be monitored and controlled.

Feed and feed ingredients should be delivered and used as soon as possible. All feed and feed ingredients should be stored and transported in a manner which minimises deterioration and contamination and enables the correct feed to be sent to the right animal group.

Care should be taken to minimise deterioration and spillage at all stages of handling, storage and transport of feed and feed ingredients. Special precautions should be taken to limit fungal and bacterial growth in moist and semi-moist feed. Contamination should be minimized in feed and feed ingredient

FIGURE 4  
Schematic representation of feedmill layouts



Source: Prof Motjataba Zaghari.

FIGURE 14  
New lighting system (occupies less space, does not allow for dust collection, is no attractive for insects, is well protected, and has better light distribution)



# The sections of the 2020 Manual

## Section 4 – On-farm production and use of feed and feed ingredients

### SECTION 4 On-farm production and use of feed and feed ingredients

This section provides guidance on the cultivation, manufacture, management and use of feed and feed ingredients on farms and in aquaculture.  
This section should be used in conjunction with the applicable requirements of sections 4 and 5 of the Code.

To help ensure the safety of feed used for human consumption, good agricultural practice should be applied during all stages of on-farm production of pastures, cereal grain and forage crops used as feed or feed ingredients for food producing animals. For aquaculture the same principles should apply, where applicable.

Three types of contamination represent hazards at most stages of on-farm production of feed and feed ingredients, namely:

- Biological, such as bacteria, fungi, parasites and other microbial pathogens;
- Chemical, such as residues of medication, pesticides, herbicides or other agricultural substances; and
- Physical, such as broken needles, machinery and other foreign material.

**Agricultural production of feed**  
Adherence to good agricultural practice is encouraged in the production of natural, improved and cultivated pastures and in the production of forage and cereal grain crops used as feed or feed ingredients for food producing animals. Following good agricultural practice standards will minimise the risk of biological, chemical and physical contaminants entering the food chain. If crop residues and stubble are grazed after harvest, or otherwise enter the feed chain, they should also be considered as livestock feed. Must livestock will consume a portion of their bedding. Crops that produce bedding material or bedding materials such as straw or wood shavings should also be managed in the same manner as animal feed ingredients. Good pasture management practices, such as rotational grazing and dispersion of manure droppings, should be used to reduce cross contamination between groups of animals.

**Site selection**  
Land used for production of animal feed and feed ingredients should not be located in close proximity to industrial operations where industrial pollutants from air, ground water or runoff from adjacent land could be expected to result in the production of feeds of animal origin that may present a food safety risk. Contaminants present in runoff from adjacent land and irrigation water should be below levels that present a food safety risk.

**Fertilisers**  
Where manure fertilisation of crops or pastures is practised, an appropriate handling and storage system should be in place and maintained to minimise environmental contamination, which could negatively impact on the safety of food of animal origin.  
There should be adequate time between applying the manure and grazing or forage harvesting (silage and hay making) to allow the manure to decompose and to minimise contamination.  
Manure, compost and other plant nutrients should be properly used and applied to minimise biological, chemical and physical contamination of food of animal origin which could adversely affect food safety.  
Chemical fertilisers should be handled, stored and applied in a manner such that they do not have a negative impact on the safety of food of animal origin.

- Agricultural production of feed was updated;
- On farm practices were completely revised;
- New references, practical tables and schematics are provided.

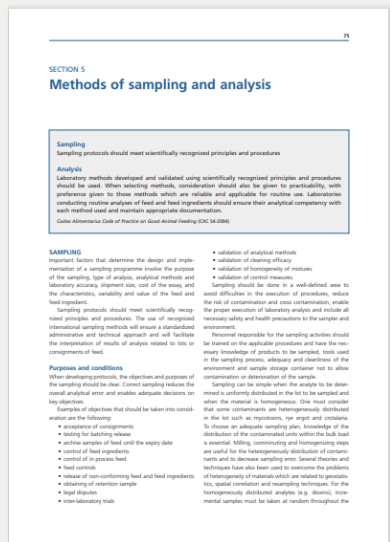




# The sections of the 2020 Manual

## Section 5 – Methods of sampling and analysis

- Sampling references were updated;
- Information for internal labs analysis, methods and equipment;
- Information on uncertainty of measurements.



# The sections of the 2020 Manual References and appendices



1. Codex Alimentarius Code of Practice on Good Animal Feeding
2. Relevant Codex Alimentarius texts
3. Relevant FAO publications
4. National codes of practice
5. The role of national feed associations and setting up a feed association



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# Thank You!

