CODEX ALIMENTARIUS COMMISSION

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Food and Agriculture Organization of the United Nations

World Health Organization

Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - E-mail: codex@fao.org - www.codexalimentarius.org

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON RESIDUES OF VETERINARY DRUGS IN FOODS

25th Session
(Virtual)
12-16 and 20 July 2021

MATTERS OF INTEREST ARISING FROM FAO/WHO WORK ON FEED SAFETY INCLUDING THE JOINT FAO/WHO EXPERT MEETING ON CARRY-OVER IN FEED AND TRANSFER FROM FEED TO FOOD OF UNAVOIDABLE AND UNINTENDED RESIDUES OF APPROVED VETERINARY DRUGS

FAO ACTIVITIES

1. In the last decades, the rapidly growing world population, along with higher urbanization and changes in lifestyle and eating habits, have increased the consumption of food of animal origin. The trend has been particularly significant in many emerging economies, where increasing per capita income has led to higher consumption of animal proteins. The higher demand of livestock products has been met mainly through the intensification of production systems, a shift towards poultry and swine production, all associated with an increased use of animal feed. The challenge has not only been to meet the growing demand for feed, but also to ensure its safety. Feed safety is a key element in the sustainable production of food of animal origin: it is a prerequisite for food safety and human health, as well as a necessity for animal health and welfare; it is a component of access to trade, income generation and economic sustainability. In fact, feed is an integral part of the food chain. The link between feed and food safety is now well recognized; in particular the modern approach to food safety identifies measures to minimize and prevent and the entry of hazards at the early stages of the production chain, including feed and feed ingredients primary production.

2. Feed safety is now accepted as a shared value and a shared responsibility. Farmers and the whole feed industry have grown in awareness and responsibility, and in many countries, they have met the challenge by contribution to the production of safe and quality feed.

3. Safe feed is also essential for income generation and access to trade while contributing to minimize feed and food losses. For all these reasons, feed production, both at feed plants and on-farm, must be subject, in a similar manner as food production, to the quality assurance of integrated safety systems. However, in many countries, adequate know-how and sufficient awareness among all operators along the whole value chain to ensure feed safety are often lacking. Even where more knowledge is available and control systems are in place, new and unconventional feed ingredients are entering the production chain. these ingredients, which include agro-industrial co-products (such as the ones of the biofuel industry), insects, food processing co-products, former food products bring with them possible new safety hazards. The increase in international trade of feed and feed ingredients can also bring unforeseen feed safety risks. New agricultural practices, transboundary transfer of resistant pathogens and climate changes to name a few examples, all require continued efforts to guarantee feed safety and strong and transparent communication among all parties involved in the feed/food chain.

4. A contemporary risk-based approach to feed/food safety requires recognizing its importance and knowing and applying adequate measures to reduce feed-borne risks to public health at all points of the value chain. The principles of risk analysis and the application of Hazard Analysis and Critical Control Point (HACCP) should be therefore incorporated wherever appropriate in the design and implementation of feed safety programmes.

5. Codex has recognized the importance of animal feeding and its safety for safe food. It has therefore, established two dedicated Task Forces, which have developed texts aiming at providing guidance to governments on good animal feeding practice and on the conduct of risk assessment and prioritization of hazards in feed. Work relevant to animal feed is also carried out in other Codex Committees and Task Forces addressing contaminants, residues of pesticides and veterinary drugs, food hygiene, inspection and certification an antimicrobial resistance.

6. More specifically, the Codex Alimentarius Commission adopted in 2004 the *Code of Practice on Good Animal Feeding*. The Code implies a transition towards a risk-based approach covering the entire feed/food chain. The application of the Code is an important step for the expansion of international trade of feed and products of animal origin. Both feed/food exporting and importing countries can benefit from a greater and safer trade of feed and products of animal origins.

7. FAO assists countries to comply with the Codex Alimentarius requirements and assigns high priority to feed-related good agricultural and production practices. Their application relies on the commitment and involvement of farmers, manufacturers and all other stakeholders in the feed sector. For this reason, close collaboration with the private sector is endeavour for achieving the desired impact.

8. For this reason, FAO has published already in 2010, jointly with the International Feed Industry Federation (IFIF) the manual of *Good Practice for the Feed Industry - Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding* [1], which provided comprehensive information and practical guidelines to assist farmers, producers and all stakeholders along the feed value chain to comply with the requirements of the Codex *Code of Practice on Good Animal Feeding* (CXC 54-2004). The manual targeted commercial feed industries and farm-based feed mixers in low and medium-income countries and emerging economies in their endeavour to meet the rising quality and safety requirements of both the export and domestic markets, with the increasing participation of large-scale retailers everywhere. The manual was also of value to officers engaged in feed inspection, with their supervisory roles in feed safety. It also served as a training manual and guide in several FAO, IFIF and national competent authorities capacity development activities.

9. In 2020, FAO and IFIF have published the manual of *Good Practices for the Feed Sector - Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding* [2], a new publication which is a fully revised, updated and expanded version of the manual published in 2010. The new manual takes into account, even if not specifically addressing them, subsequent Codex Alimentarius documents related to feed, such as the Guidelines on the Application of risk Assessment for Feed and the Guidance for Governments on prioritizing hazards in Feed, as well as many other Codex texts. The new publication addresses recent developments in feed production and benefits from the latest scientific and technical knowledge, e.g. the Reports of the Joint FAO/WHO Expert Meeting on Hazards Associated with Animal Feed [3]and the Joint FAO/WHO Expert Meeting on Carryover in Feed and Transfer from Feed to Food of Unavoidable and Unintended Residues of Approved Veterinary Drugs[4].

10. In 2016, FAO has also developed a Feed Safety Multi-Stakeholder Partnership for Capacity Development for Feed Safety, with the objective to strengthen the capacity of relevant stakeholders along the feed and food value chain to produce and supply safer feed - thereby contributing to animal health and welfare and enhancing food safety and food security. The Partnership addresses feed safety in the feed and food continuum that includes feed ingredients, feed inputs, feeding practices, feed handling, packaging, transportation, storage and manufacture. In the framework of the activities of the partnership, FAO has also developed a Global Feed Safety Platform[5], which is a knowledge exchange mechanism to produce, collect and make available a wide range of information and knowledge on feed safety from numerous sources across the world. The platform brings together all relevant stakeholders along the feed and food chain from the public and private sector, the civil society, academia and research centres. All users of the website can contribute to its content by submitting links to publications, legislation, news and much more.

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1 FAO and IFIF. 2010. *Good practices for the feed industry – Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO Animal Production and Health Manual No. 9. Rome. http://www.fao.org/3/i1379e/i1379e.pdf

2 FAO and IFIF. 2020. *Good practices for the feed sector – Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO Animal production and Health manual no. 24. Rome. https://doi.org/10.4060/cb1761en

3 FAO and WHO. 2019. *Hazards associated with animal feed.* Report of the Joint FAO/WHO expert meeting – 12–15 May 2015, FAO Headquarters, Rome, Italy. FAO Animal Production and Health Report No. 13. Rome. http://www.fao.org/3/ca6825en/CA6825EN.pdf

4 FAO and WHO. 2019. *Carryover in feed and transfer from feed to food of unavoidable and unintended residues of approved veterinary drugs*. Report of the Joint FAO/WHO expert meeting – 8–10 January 2019, FAO Headquarters, Rome, Italy. FAO Animal Production and Health Report No. 13. Rome, Italy.https://doi.org/10.4060/CA6296EN

5 http://www.fao.org/feed-safety/en/

11. Since 2007, FAO and IFIF organize jointly annual International Feed Regulators Meetings (IFRM) which provide an opportunity for regulators and feed industry professionals from across the world to exchange their thoughts and discuss concrete ideas for providing safe feed and food in a sustainable manner around the world. The 15th IFRM is planned to take place in January 2022 in Atlanta, USA.

FAO/WHO ACTIVITIES

Hazards associated with animal feed

12. In May 2015 FAO and WHO jointly organized an expert meeting to provide an updated overview of the current state of knowledge on hazards associated with feed (including feed and products of feed production technologies of increasing relevance, such as insects, former food and food processing co-products and biofuel co-products). The meeting was also intended to provide guidance on the most appropriate use of this information for risk analyses purposes; to identify knowledge gaps and to prioritize future work on the identification of potential hazards of key global concern from the perspective of human and animal health.

13. The expert meeting considered hazards in animal feed which present a risk for human health as a result of transfer from feed to foods of animal origin. They also addressed the impact of these hazards on animal health. While acknowledging the potential wider impacts of some of these hazards on animal health, welfare and productivity, and in turn on food security, the meeting did not comprehensively addressed these aspects but noted the need for further work in these areas. Hazards in water were considered wherever relevant in accordance with the Codex definition of animal feed. With regard to specific issues, veterinary drugs intentionally added to feed were not considered within the scope of the meeting. Antimicrobial resistance was not considered by the expert meeting as it is currently being addressed more comprehensively in other fora.

14. The expert meeting reviewed and discussed potential hazards in feed of chemical, biological and physical origin. While reviewing a wide range of hazards it did not prioritize any particular one or any group of hazards, because of differences in their potential presence in feed according to geographical area, production system and kind of feed (e.g. compound feed vs. pasture or forage), among others. The chemical hazards considered included persistent organic pollutants (POPs) such as polychlorinated-p-dibenzo-dioxins (PCDDs) and polychlorinated dibenzo-furans (PCDFs), dioxin-like polychlorinated biphenyls (dl-PCBs) and non-dioxin-like polychlorinated biphenyls (ndl-PCBs); veterinary drug residues; organochlorine and other pesticides; potentially toxic elements (PTEs) (e.g. arsenic, cadmium, lead, mercury); mycotoxins; and plant toxins (e.g. genotoxic pyrrolizidine alkaloids and anti-nutritionals such as glucosinolates) as well as other potential and emerging chemical hazards. The review of biological hazards considered primarily bacteria but also parasites, viruses and prions. In terms of physical hazards, radionuclides, residues of nanomaterials, micro- and nano-plastics and other relevant materials were addressed. For each of the above, the hazard as well as its occurrence in feed was described, and transfer from feed to food, relevance for food safety, impact on animal heath, and emerging issues and trends were reviewed. In addition, specific consideration was given to feed and products of feed production technologies of increasing relevance. Specific hazards and research requirements associated with the use of insects, former food and food processing co-products, biofuels (bioethanol and biodiesel) co-products, aquatic plants and marine resources as feed were highighted. Methods of analysis, including multi-analyte methods, and sampling were also addressed and for each of the potential hazards both screening and confirmatory methods were considered.

Recommendations to FAO, WHO and Member Countries

15. The expert meeting recommended various measure and activities. It recommended FAO and WHO to develop guidelines for the prevention and control of hazards identified in feed to support the efforts of member countries in addressing these hazards. It recommended FAO, WHO and Member Countries and their capacity development partners to continue with and further enhance capacity development activities, especially on risk assessment and management of hazards in feed, includ- ing for feed sources and technologies of increasing relevance, to better meet domestic and international standards.

Recommendations to the Codex Alimentarius Commission

16. Furthermore, the expert meeting recommended the Codex Alimentarius Commission to develop and update provisions addressing feed and more specifically those related to feed sources and technologies of increasing relevance to the feed sector. Certain recommendations addressed specifically feed sources and technologies of increasing relevance to the feed sector; others risk as- sessment of hazards in animal feed. Finally the expert meeting identified research needs and focus for future work.

Recommendations on residues of veterinary drugs

17. With specific regards to residues of veterinary drugs, while the authorized use of veterinary drugs in feed was outside the scope of the meeting, it was recognized that during manufacture the unintentional cross-contamination of veterinary drugs to subsequent feed can occur. Additionally, feed produced from crops fertilized with bio wastes such as manure from treated animals may result in take up of drugs by plants and subsequent incorporation into feed. Other sources of veterinary drug residues in feed include low levels of antimicrobials in fermentation products such as DDGS. Another source of low levels of veterinary drugs in feed is their natural occurrence as some antibiotics are produced by organisms present in the environment. In these cases, the veterinary drug residues could be considered a class of contaminants.

18. Feed remains a much-used vehicle for the efficient delivery of veterinary drugs to animals. While transfer, metabolism and toxicity of veterinary drugs in feed to animal products is fully assessed as part of the authorization process and establishment of maximum residue limitd (MRLs), the expert meeting noted that this does not cover the different non-target species which may be exposed via cross-contamination of feed, and this may be an important consideration for risk management in some countries.

Conclusions

General conclusions relevant to Codex, FAO, WHO

19. The Meeting concluded highlighting that hazards in feed may present an important risk for human health as a result of transfer from feed to food of animal origin, and can have a negative impact on animal health and welfare, the meeting stressed the importance of pur- suing the prevention and control of hazards in animal feed. Standards, guidelines and practical measures to ensure safe feed need to be developed and implemented, at both national and international levels. Action from multiple players is required to build upon what has already been done to address feed safety by Codex, FAO, WHO and other organizations, national regulators and the feed industry. Ongoing and enhanced capacity development is an important aspect of improving feed safety, particularly in the context of changing feed production systems and feed sources, the need for sustainability in animal production systems and the broader context of global food security.

20. The expert meeting highlighted the role of risk assessment as well as the numerous challenges in undertaking risk assessment presented by the wide range of haz- ards and feed sources, including the need to generate the necessary data on some of these contaminants, collate that data, (if feasible through a global platform and where necessary develop the methodologies needed to facilitate such risk assess- ment. For example, sampling approaches and sampling plans were identified as a key area to be addressed in terms of data collection and monitoring of hazards in animal feed. The role of the industry in generating data to facilitate risk assessment as well as that of national authorities and international bodies to ensure that such data are generated was emphasized.

21. Noting the recognition that Codex Alimentarius gives to safe feed for the production of safe food, the meeting concluded that in order to provide countries with the tools they need to manage feed safety, there was now a need for Codex to continue including explicit consideration of feed when developing or revising Codex standards, codes of practice and other relevant texts for biological and chemical contaminants. The meeting also recognized the differences that exist between countries in relation to their regulatory frameworks for feed, in particular between high-, middle- and low-income countries, and the impact this can have on the potential to manage such hazards. This may be a particular issue in many low-income countries where legislation and infrastructure for the management of feed safety is still immature or even non-existent. The ongoing development of new technologies to make use of available potential feed sources in the context of increasing demand for foods of animal origin highlights the importance of having capacity to address, not only the assessment aspects, but also drive the development of institutional frameworks.

Specific recommendations relevant to residues of veterinary drugs

22. With specific regards to residues of veterinary drugs, the Experts concluded that feed remains a much-used vehicle for the efficient delivery of veterinary drugs to animals. While transfer, metabolism and toxicity of veterinary drugs in feed to animal products is fully assessed as part of the authorization process and establishment of MRLs, the expert meeting noted that this does not cover the different non-target species which may be exposed via cross-contamination of feed, and this may be an important consideration for risk management in some countries.

23. The issue of veterinary drug residues in feed and food has long been recognized due to long standing concerns for public, animal and environmental health as a result of direct exposure to these residues. The experts recommended the Codex Alimentarius Commission to revise and update the Codex *Code of Practice on Good Animal Feeding* (CXC 54-2004) to address new hazards derived from the use of feed and products of feed production technologies of increasing relevance.

Publication

24. The full report of the Joint FAO/WHO expert meeting on Hazards associated with animal feed is available at http://www.fao.org/3/ca6825en/CA6825EN.pdf

Carryover in feed and transfer from feed to food of unavoidable and unintended residues of approved veterinary drugs

25. The Codex Committee on Residues of Veterinary Drugs in Foods (CCRVDF) at its 23rd session requested FAO and WHO to provide scientific advice and risk management options in order to mitigate the unintended and unavoidable presence of residues of approved veterinary drugs in food of animal origin resulting from carryover of veterinary drugs in feed. Such residues when present in feed could be transferred to food of animal origin and might pose a risk to public health and/or lead to possible trade disruption. In particular, the Committee requested scientific advice from FAO and WHO on the following, using residues of lasalocid sodium in eggs as working examples:

- Will the presence of residues of a veterinary drug in food at levels associated with unavoidable and unintended carryover in feed constitute a risk to human health?
- Which risk management recommendations (e.g. limit, standards, etc.) could be established to address the trade issue while protecting human health?
- Are additional measures to those in the Codex *Code of Practice on Good Animal Feeding* (CXC 54-2004) available to minimize unavoidable and unintended carryover in feed?

26. Additionally, the Committee requested that in providing scientific advice, FAO and WHO take into consideration the discussion at the 23rd session of the Committee and the report of the physical working group that was held immediately prior to that session.

27. In response to CCRVDF's request, FAO and WHO held an Expert Meeting from 8 to 10 January 2019 at FAO Headquarters in Rome, Italy.

28. To help the experts to gather more comprehensive information, the meeting was preceded by a Stakeholder Consultation on 7 January 2019. The stakeholders presented on issues of drug carryover from their respective industries/organizations. This was followed by three days of discussion by the experts and resource per- sons on the sources of unavoidable and/or unintentional veterinary drug exposure at feed mill and farm level, human health risks due to the presence of veterinary drug residues in food from unavoidable and unintended carryover in feed, and risk management strategies for carryover of veterinary drugs. From the discussions, the Expert Meeting concluded that in some instances carryover of veterinary drugs is unavoidable to some extent even if the Codex *Code of Practice on Good Animal Feeding* (CXC 54-2004), Good Manufacturing Practices (GMP), and Hazard Analysis and Critical Control Point (HACCP) principles were followed. The Expert Meeting consensus was that the current Codex *Code of Practice on Good Animal Feeding* does not contain sufficient practical guidance on all levels to adequately address the potential for veterinary drug residues in food as a result of carryover in feed.

29. The Expert Meeting considered that an acceptable amount of veterinary drug in food of animal origin (i.e. action level) could be established based on residue tolerances in the subsequent food products from exposed animals, but this was feasible only if the carryover drug had established MRLs in the non-target species exposed to the drug. The Expert Meeting suggested that a suitable risk management option is to consider the establishment of action levels for veterinary drug residues in food products from non-target species. Such action levels would establish a regulatory limit below which no further enforcement action is required.

Conclusions

30. The meeting concluded that ensuring safe feed is an important component of efforts to reduce and prevent food safety hazards from veterinary drug carryover. Specific risk management options developed by the Expert Meeting include:

Code of Practice on Good Animal Feeding (CXC 54-2004)

1. Increase awareness and provide easily accessible information about possible implications for carryover from the use of authorized veterinary drugs, as part of a structured training programme for all competent authorities, professionals and workers.
2. Strengthen national capacities for implementation of the Codex *Code of Practice on Good Animal Feeding* and related measures for animal feed production.
3. Emphasize that when possible, dedicated and separate lines for manufacturing medicated feed should be considered. However, the experts recognize that there may be practical limitations related to construction and maintenance of separate lines in feed mills.
4. Direct prescribers and users of medicated feed to consider the appropriate selection of authorized drugs (including active ingredient, formulation and galenic form) to achieve expected therapeutic outcomes while considering carryover implications.
5. Emphasize monitoring and control of raw feed ingredients that have potential for transfer of veterinary drugs from feed to food (e.g. identification and selection of appropriate raw feed ingredients, avoidance of hazardous raw materials).
6. Emphasize avoidance of the need to use medicated feed by implementing the use of animal health promoting practices and ingredients (e.g. good hygiene and husbandry practices, genetic selection, animal welfare, feed constituents, feed safety and adequate animal nutrition).
7. Include specific advice in the Codex *Code of Practice on Good Animal Feeding* on HACCP-identified control points for carryover during trans- port from feed mill to farm.

Action levels

1. Since carryover of veterinary drugs is unavoidable to some extent even if the Codex *Code of Practice on Good Animal Feeding* (CXC 54-2004), good manufacturing practices (GMPs), and HACCP principles are followed, the Expert Meeting believes that an acceptable amount of drug could be established based on the residue tolerances (i.e., MRLs) in the subsequent food products from exposed animals. This works as long as the carryover drug has established MRLs in the non-target species exposed to the drug. For many veterinary drugs added to feed, MRLs for non-target species/products have not been established, so alternative methods of determining acceptable carryover levels are needed.
2. The Expert Meeting suggests that a suitable risk management option is to consider the establishment of action levels for veterinary drug residues in food. Such action levels would establish a regulatory limit below which no further enforcement action is required. The establishment of these action levels should be based on a documented risk assessment that considers:
    1. Drug carryover in feed or drug residues present in feed ingredients.
    2. Identify action level in feed for non-target species.
    3. Determine transfer factors from feed to food.
    4. Determine action level for food products from non-target species.
3. The Expert Meeting participants agreed that the intended use of a veterinary drug added to the unintended use of the drug should not result in an exposure that exceeds health-based guidance values (HBGVs). It is expected that the action level will be set at levels significantly below MRLs set for an approved use. Based on the different circumstances of the source of drug exposure in food animals (approved drug use versus unintended carryover in feed), different principles might be applied to establish standards in these two scenarios. For example, the As Low As Reasonably Achievable (ALARA) principle would be more appropriate for the latter as setting standards for unintended carryover situations is not a substitute for good feed manufacturing practices.

Publication

31. The full report of the Joint FAO/WHO Expert Meeting on Carryover in feed and transfer from feed to food of unavoidable and unintended residues of approved veterinary drugs *is* available at https://doi.org/10.4060/CA6296EN