CODEX ALIMENTARIUS COMMISSION E

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Agenda Item 9 **CX/PR 19/51/14**
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CODEX COMMITTEE ON PESTICIDE RESIDUES

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DISCUSSION PAPER

DISCUSSION PAPER ON THE REVIEW OF THE INTERNATIONAL ESTIMATE OF SHORT-TERM INTAKE EQUATIONS

(Prepared by the EWG chaired by the Netherlands and co-chaired by Brazil and Uganda)

Background

1. CCPR50 (2018) agreed to re-establish the EWG on the review of the IESTI equations, chaired by the Netherlands and co-chaired by Brazil and Uganda with the following TOR[1]:

   (i) To review and provide illustrative comments on advantages and challenges that arise from the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade.

   (ii) To gather relevant information on bulking and blending, in order to feed into the risk assessors work through the JMPR Secretariat (Items 4 and 13 on the table noted in REP18/PR, Appendix XII).

   (iii) Based on the above considerations develop a discussion paper providing recommendations for consideration at CCPR51 (2019).

   (iv) To append the information on the history, background and use of the IESTI equations as part of the CCPR50 report (REP18/PR, Appendix XI).

   (v) To append the table on technical / risk assessment challenges that either arise from the possible revision of the current IESTI equations or are current challenges as well as part of the CCPR50 report (REP18/PR, Appendix XII).

   CCPR50 already take action on points (iv) and (v) (see REP18/PR, Appendices XI and XII).

2. The EWG was joined by member countries, one Member Organization and observer organizations. The List of Participants is provided in Appendix III. Initially, all documents addressing TOR (i) – (iii) were developed by the Netherlands, and agreed to put up for discussion by Brazil and Uganda. Comments provided by the members of the EWG were addressed by the drafting team. Progress on these documents are discussed below.

Reading guide

3. The current document intends to address TOR (iii) and briefly summarizes the ongoing work on reviewing the IESTI. This document was revised based on the comments provided by members of the EWG during a webconference on 22 January 2019.

4. At the end of the current document recommendations to CCPR51 are formulated.

5. In Appendix I of this document, TOR (i) is addressed by reviewing and providing illustrative comments on advantages and challenges that arise from the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade, as far as possible to date.

6. In Appendix II of this document, to address TOR (ii), a draft CL is provided that may be used by CCPR to gather relevant information on bulking and blending, in order to feed into the risk assessors work through the JMPR Secretariat.

[1] REP18/PR para. 137

Introduction

7. The issue of reviewing the IESTI equations was first introduced at CCPR48 (2016). The reason being, that JMPR called for an evaluation of the IESTI in its Meetings in 2006[2], 2007[3], and 2010[4]. In response to this, EFSA and RIVM[5] organized a 2-day Scientific Workshop, preceded by a stakeholder meeting, in September 2015 to seek the views of international experts on the IESTI methodology. FAO and WHO co-sponsored this event, which took place in Geneva (for short: the 2015 Geneva workshop).

8. The workshop identified several elements, which could improve the scientific basis for the IESTI equations for further consideration by JMPR. The workshop also made other recommendations related to risk management and risk communication for consideration by CCPR. The report of the 2015 Geneva workshop was published as an EFSA event report in December 2015[6]. An advanced draft of the report was provided to the JMPR 2015 Meeting for its consideration.

9. The JMPR 2015 discussed the draft EFSA event report and recommended that a WHO/FAO working group be established to compare the use of current and proposed equations and to present the outcome to the CCPR in due course.

10. CCPR48 discussed[7] a paper[8] prepared by The Netherlands and Australia on the recommendations from the Geneva Workshop and JMPR 2015.

11. The Committee's discussion indicated general support for the proposal to explore the potential impact of possible changes to the IESTI equations and highlighted the need to clearly define the issues to be addressed, how they had developed and what should be done. Delegations also acknowledged that, after being in place for more than a decade, it was timely for JMPR to review the IESTI procedure and for CCPR to address the need to harmonize approaches for risk assessment, risk management and risk communication[9].

12. A CCPR EWG (EWG-1) was established by CCPR48 with the following TOR[10]:

> To identify advantages and challenges that might arise from the possible revision of the current IESTI equations and the impact on risk management, risk communication, consumer protection goals, and trade. The recommendations of the international EFSA/RIVM workshop cosponsored by FAO and WHO and the discussions in CCPR48 should be taken into account.

13. A discussion paper[11] addressing this TOR was presented CCPR49 (2017). An in-session WG meeting was held, and the results from this meeting were also presented to CCPR. It was concluded that EWG-1 could not fully accomplish its work because of the divergent views on the need to revise the IESTI equations. However, there was general support to continue the discussion on the review of the IESTI equations. The EWG was re-established (EWG-2). Furthermore, CCPR49 agreed with the following recommendations to FAO/WHO[12]:

    (i) To review the basis and the parameters of the IESTI equations;

    (ii) To benchmark the outcomes of the IESTI equations to a probabilistic distribution of actual exposures; and

    (iii) To present the outcome to CCPR.

14. Codex members and observers are referred to the discussion paper[11] submitted to CCPR49 and the CCPR49 Report[13] for a full account of background and discussions.

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[2] http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/JMPR/JMPRrepor2006.pdf
[3] http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/JMPR/Report07/report2007jmpr.pdf
[4] http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/JMPR/Report10/JMPR_2010_contents.pdf
[5] RIVM is a Dutch acronym for the Dutch National Institute for Public Health and the Environment
[6] Event Report of the EFSA/RIVM Scientific Workshop, co-sponsored by FAO and WHO, 'Revisiting the International Estimate of Short-Term Intake (IESTI equations) used to estimate the acute exposure to pesticide residues via food', 8/9 September 2015, Geneva, Switzerland.
http://www.efsa.europa.eu/en/supporting/pub/907e
[7] REP16/PR paras 184-194
[8] REP16/PR, CRD03
[9] REP16/PR paras. 190-191
[10] REP16/PR para. 193
[11] CX/PR 17/49/12
[12] REP17/PR paras. 147–160 discussion; para 161 new TOR, para 162-163 request to FAO/WHO
[13] REP17/PR, paras. 147 -163

15. The EWG-2 provided the following documents to CCPR50 (2018): A discussion paper[14] containing the requested document providing information on the history, background and use of the IESTI equations; and a document[15] containing the work-in-progress on advantages and challenges of the current IESTI and on bulking and blending.

16. CCPR50 agreed to make available the *"information document on history, background and use of the IESTI"* as an Appendix[16] to the ~~2018~~ report.

17. CCPR50 agreed to continue the review of the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade (including illustrative comments and advantages and challenges).

18. CCPR50 also agreed to continue the effort to gather information on bulking and blending while deleting the reference to "Table 3 Appendix 2 of CX/PR 17/49/12" to ensure a more focused scope and manageable work for the EWG.

19. The EWG was again re-established (EWG-3) with TOR as described in paragraph 1 above.

Progress of EWG-3

***TOR (i). To review and provide illustrative comments on advantages and challenges that arise from the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade*.**

20. This was addressed by EWG-3 by drafting the document that is presented in Appendix I. The document was discussed by the EWG in two webconferences and written comments were provided by six countries / organizations. However, the scientific advice from FAO/WHO (see paragraph 13) was not yet available. It was noted by the EWG that scientific advice from FAO/WHO to CCPR would need to go through JMPR first. Since JMPR meets in September, and JMPR 2018 did not report on a review of the basis and the parameters of the IESTI equations, nor on a benchmark of the outcomes of IESTI equations to a probabilistic distribution of actual exposures, it is anticipated that no results on these issues will be available yet for CCPR51 to discuss in April 2019.

TOR (ii). To gather relevant information on bulking and blending, in order to feed into the risk assessors work through the JMPR Secretariat (Items 4 and 13 on the table in REP18/PR, Appendix XII)

21. A document was prepared, discussed by the EWG in two webconferences and written comments were provided by four countries / organizations. The document may serve as a CL to CCPs (see Appendix II).

Recommendations

22. CCPR51 is invited to consider the recommendations below.

Recommendation 1: TOR (i)

It is **recommended** to further develop the document that provides a review and illustrative comments on advantages and challenges that arise from the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade once FAO/WHO provide a review on the basis and the parameters of the IESTI equations, and a benchmark of the outcomes of the IESTI equations to a probabilistic distribution of actual exposures (see Appendix I).

Recommendation 2: TOR (ii)

It is **recommended** to distribute the document on gathering data on bulking and blending by means of a Codex CL to Codex members and observers with a deadline of 14 October 2019. The information gathered will, after discussion by CCPR52 (2020), be provided to JMPR (2020) (see Appendix II).

Recommendation 3: TOR (iii)

Furthermore, it is proposed to re-establish the EWG 1) to continue work on the issues covered by the current EWG-2 TOR (i) and (ii), 2) to interact with the JMPR Secretariat on the expected scientific advice and 3) to prepare the discussion paper for consideration at CCPR52, taking into account the possible report by JMPR 2019 on the review of the IESTI.

[14] CX/PR 18/50/12
[15] REP18/PR, CRD09
[16] REP18/PR, Appendix XI

APPENDIX I
Document addressing TOR (i) of the EWG

ADVANTAGES AND CHALLENGES THAT ARISE FROM THE CURRENT IESTI EQUATIONS

Reading guide

TOR (i) is addressed by reviewing and providing illustrative comments on advantages and challenges that arise from the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade, **as far as possible to date.**

JMPR 2018 did not report on a review of the basis and the parameters of the IESTI equations, nor on a benchmark of the outcomes of IESTI equations to a probabilistic distribution of actual exposures, therefore it is anticipated that no results on these issues will be available yet for CCPR51 to discuss in April 2019.

This being the case, the discussion on the advantages and challenges that arise from the current IESTI equations could not be finalized and the current Appendix I does NOT present a final document but the work-in-progress.

Advantages and challenges of the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade

Background

Since 2016, CCPR48 has discussed a review of the risk management and risk communication aspects of the IESTI equations. In 2017, CCPR49 significantly changed the mandate, because of the diverging views on the necessity and degree of a revision of the IESTI model. However, there was consensus on the continuation of the EWG. During CCPR50 (2018) the EWG was unable to present a final revised document, because the draft of the discussion paper also covered technical/scientific issues and therefore wasn't emphasizing strongly enough on the key issues falling under the remit of CCPR. Now, a new document is drafted to better address the adjusted terms of reference[1] [2].

CCPR50 agreed on the following terms of reference:

(i) To review and provide illustrative comments on advantages and challenges that arise from the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade.

Introduction

The MRL is the maximum concentration of a pesticide residue (expressed as mg/kg) legally permitted in or on food commodities and animal feeds. MRLs are based on GAP data. Food commodities and processed foods derived thereof that comply with CXLs should be toxicologically acceptable (CAC, 2016).

One of the aspects to be addressed during MRL setting is the acute (short-term) dietary exposure of a pesticide residue. At the international level, the acute dietary exposure to pesticide residues is calculated using a deterministic method, the so-called IESTI (Hamilton & Crossley, 2004; WHO, 2009). To characterize possible risks related to the calculated acute dietary exposure, the acute exposure is compared with an established toxicological threshold for acute toxicity (ARfD) of the chemical (WHO, 2009).

The IESTI equations have been established for four different cases that are used to assess acute dietary exposure. The different cases depend on the unit weights of the RAC, the unit weight of the RAC compared to the consumption level, and on whether or not the food product is bulked or blended. The IESTI equations' history, background and use were discussed in another document which was adopted by CCPR50: History, Background And Use Of The IESTI Equations (REP18/PR, Appendix XI). The present document describes the advantages and challenges related to the use of the IESTI equations.

[1] Technical issues related to the model (e.g. variability factor, unit weight, large portion) are primarily the responsibility of the JMPR and are not discussed in this document. Nevertheless, because of their related impact more detailed discussion of some these topics as per previous discussions by CCPR has been provided in Appendix 1 to this document.
[2] The remaining EWG TOR will be addressed separately from this document and include: (ii) to gather relevant information on bulking and blending, in order to feed into the risk assessor's work through the JMPR Secretariat (Items 4 and 13 on the table noted in Appendix XII) and (iii) to develop a discussion paper providing recommendations for consideration at CCPR51.

In the framework of establishing CXLs the IESTI is used by JMPR. Improvement of science-based aspects of the model (e.g. variability factor, unit weight, large portion) is the responsibility of the JMPR and are not discussed in the main body of this document. A full list of scientific challenges, which are not in the remit of CCPR, were identified by the EWG and can be seen in REP18/PR, Appendix XII, and was forwarded to FAO/WHO for scientific considerations. In addition, advantages and challenges that might arise from the possible revision of the current IESTI equations were identified and discussed in the proceeding draft documents (see tables 1 and 2 in CX/PR 17/49/12 or Appendix 1 of CRD09 during CCPR50). In Appendix I of this document the scientific issues related to the IESTI parameters, which fall under the remit of JMPR are presented. The advantages and challenges addressed in this document specifically concern those aspects of the use of the JMPR IESTI model that are within the mandate of the CCPR and relate to risk management, risk communication, consumer protection and trade. These aspects include proposed IESTI changes like the proposed use of the MRL instead of the currently used the HR or STMR.

Which are the advantages of the current IESTI equations?

Advantages

The current IESTI approach is a consolidated methodology that relies on deterministic equations that are transparent and clearly define four primary exposure scenarios and data inputs. This deterministic approach can be adopted by different national and global authorities that are subject to different regulatory frameworks and requirements. The deterministic approach, with clear scenarios and data inputs, also enables more uniform risk assessments across member countries, including countries that do not have national consumption data available.

Impact on risk management**:** The IESTI deterministic calculations establish clear scenarios and inputs that can be easily understood by risk managers and used by them to establish more definitive assessment criteria for risk management. This can help facilitate global harmonization when uniform data inputs are accepted at the national and global level. This can also help establish policies and procedures to make risk management more consistent, transparent, and reproducible.

One consolidated model at Codex level (e.g. JMPR IESTI method) allows direct comparison between exposures for specific pesticide-commodity combinations. This allows risk managers to make decisions on the use of pesticides both at national and global level. Furthermore, harmonization at Codex level may result in the same acceptance or rejection of MRLs worldwide.

In general, the IESTI relies on deterministic methods that can be more easily adopted and require fewer resources to develop/maintain/update than more sophisticated methods. This enables the risk associated with pesticide residue levels to be more rapidly determined in situations in which a fast decision is needed by risk managers.

Impact on risk communication: Deterministic models can be made publicly available, thereby facilitating a transparent, credible and unambiguous calculation approach; A single consolidated model at Codex level allows easy risk communication as interested parties can see how the exposure was calculated. Furthermore, it allows provisions of pre-generated models to reproduce results or extend its domain of applicability (e.g. food inspection services or national competent authorities).

It is agreed that it is important that JMPR evaluations are publicly available, so all input parameters are well documented. Also risk communication needs to support messaging that the current MRLs are health protective.

Impact on consumer protection goals: The current IESTI equations are supposed to be conservative and intended to cover acute dietary exposure from residues in/on individual commodities obtained from (major and minor) crops and crop groups for which MRLs have been set. In addition, the IESTI approach facilitates a risk-based approach for consumer protection that considers dietary intake based on national consumption surveys and factors that may modify residue concentrations. However, quantitative consumer protection goals have never been formulated to conclude on the conservatism of the current IESTI equations. For example, with respect to exposure distributions percentiles of interest have not been identified by CCPR or national authorities and the degree to which IESTI is high or exaggerates exposure has only been cursorily investigated[3]. Currently, FAO/WHO is benchmarking the outcomes of the IESTI equations to a suitable probabilistic distribution of actual exposures (requests from CCPR49, see REP17/PR, paragraphs 156 and 162). This will form the basis to formulate the consumer protection goals. The work by FAO/WHO has not been finalized yet. At the Codex level, the JMPR IESTI provides support to establish MRLs for international trade. A conservative model established on harmonized methodology describing the conservatism should address the consumer protection goals of Codex members.

[3] CCPR34. ALINORM 03/24 paras. 33-39, CX/PR 02/3-Add.1: Annex;
CCPR36 ALINORM 04/27/24 paras. 46-59, CX/PR 04/4
CCPR37 ALINORM 05/28/24 paras. 62-76, CX/PR 05/37/4.

Impact on trade: A consolidated deterministic model estimates acute dietary exposure to a certain residue in a harmonized way.

Using one harmonized, agreed methodology at Codex level facilitates trade as all parties involved know how the acute dietary exposure is calculated. When aligned with a broad range of consumption data, the outcome of the model (is the MRL toxicologically acceptable) will be similar for all parties using it. It will theoretically result in the same acceptance or rejection of MRLs and probably an increase acceptance of MRLs worldwide. It is acknowledged that other input data such as health based reference values and residue definitions will need alignment as well.

Which are the challenges of the current IESTI equations?

Challenges

Many individual countries experience the current JMPR IESTI model as too rigid, too conservative or not conservative enough. Consequently, their own selection of parameters, including national consumption patterns with or without national unit weights and/or national variability factors are used. Also, some countries have developed their own deterministic or probabilistic models, using modification of the IESTI-equations or completely different approaches. Harmonization of input parameters or the development of a single model at Codex level from these diverging models, that will suit all member countries, is a challenge.

Any change in the current JMPR IESTI model may reduce the number of CXLs, which may have an impact on the availability of specific pesticides. This may not only affect trade, but also food production in general. Growers need to vary the use pesticides with different modes of action to prevent pesticide resistance.

Impact on risk management: A consolidated deterministic model estimates acute dietary exposure to a certain residue in a harmonized way. However, diverging input variables will result in different exposure outcomes.

The decision on the best use of input variables is challenging, since no quantitative consumer protection goals (e.g. specific percentiles of the population or vulnerable sub-groups) have been formulated.

When different countries use different deterministic models risk management decisions at the international level are hindered or made more difficult as no direct comparison of the exposure to a certain pesticide-commodity between one country and another can be made. Consequently, extensive negotiations between countries may be needed to accept MRLs worldwide.

The problem of changing the equation to the proposed 2015 Geneva equations, (with a replacement of the HR by the MRL) is that the JMPR equations consistently become more conservative and MRLs will be lost. Many believe existing monitoring data does not indicate that the proposed additional conservatism is necessary for public health.

Regarding uniformity of the IESTI methodology worldwide it should be clear that even if a single IESTI equation is used, as long as countries reserve the right to use their own consumption, variability factors and other inputs, the overall process can't be stated as "uniform world wide". However, by ensuring that the JMPR IESTI model contains all available consumption data worldwide and by ensuring that the CXLs are based on the highest pesticide dose rates worldwide, the JMPR IESTI model could cover global trade.

Impact on risk communication: A consolidated model can be made publicly available and is easy to use by the public. However; the selection of scientific input parameters deviates between countries and this hampers risk communication. Additionally, the use of the HR/STMR instead of the MRL reflects a different understanding of protection goals and in their communication to the public.

One of the challenges is the use of the HR or the STMR in the IESTI model. Both values relate to the residue of toxicological concern, are estimated based on a specific GAP and used to assess the toxicological acceptability residues,. However, the MRL is established at a higher level to ensure compliance of treated commodities in trade. The dilemma, that consumers may be potentially exposed to residues above the highest concentration used for assessing the toxicological acceptability but below legal limits poses a significant challenge, especially for risk communication.

Any change in the current JMPR IESTI model may trigger the need to reduce the value of some CXLs. Modifying all the CXLs considered toxicologically acceptable with the current model, but not toxicologically acceptable with a modified IESTI model, would be quite challenging.

However, re-evaluation of CXLs currently follows a 10-15 year periodic review procedure. Before this planned review, some parameters used for the initial risk assessment could be modified (e.g. consumption data could be updated) and could change the acceptability of some CXLs. It is noted that such changes do not currently trigger the re-evaluation of the CXLs prior to the scheduled periodic review. The same approach could be followed with the entry into force of a modified IESTI equation: the equation would only be applicable once the active substance is reviewed and/or when a specific CXL is reviewed/modified. Furthermore, if CXL should be revoked, alternative critical agricultural uses could be used to support lower CXL.

Challenges for risk communication could also be addressed by explaining the compounded conservatism built into the current equation and then communicating actual residues monitored. It is noted that comparison to actual monitored residues is not applicable in the authorization process of new active substances or new uses.

Impact on consumer protection goals: Quantitative consumer protection goals have never been formulated for the current IESTI equations, neither at the national nor at the international level, instead IESTI protection levels are defined or characterized as "conservative", "health protective" or "high end" without quantitative characterization, for example, as through a probabilistic approach.

In spite of harmonization, the conservatism used in the models at Codex level should cover the majority of national approaches to ease the general acceptance of MRLs. However, consensus on the degree of conservatism applied and the underlying protection goals for worldwide trade is a challenge. It has been agreed that benchmarking the IESTI outcomes to distributions of exposures obtained by using monitoring results can help inform how conservative the existing equation is.

Impact on trade: Deterministic models are supposed to estimate acute dietary exposure to a certain residue in a harmonized way. However, when diverging variables are used by different countries, international trade will be hindered, as the acceptability for the consumer of the traded food needs to be negotiated per commodity. An MRL in one country may be acceptable based on that countries' model, but not based on that of another country.

Furthermore, it needs mentioning that a current trade barrier around MRLs is when CXLs are not implemented in an importing country. Introducing one consolidated deterministic method at global level does not necessarily lead to acceptance and implementation by all countries.

To perform a proper analysis of the impact on trade a downstream trade analysis needs to be conducted. Currently there is no known methodology to quantitatively assess the impact on trade of the MRLs established by Codex using the current IESTI approach. Codex Members are therefore asked for ideas how to assess the impact on trade for the current IESTI. Are there ways to quantify the effect of what Codex does? Is it within the CCPR mandate to hire commercial businesses to perform a quantitative financial assessment? It is noted that without a proper reference point to relate the non-acceptance of newly proposed MRL this might be a difficult task. Furthermore, alternative GAPs may be available to set alternative MRLs. In reality it is very difficult to see the impact of the establishment of CXLs on global trade.

The outcome of the ongoing benchmarking exercise of the current IESTI against probabilistic methods may also be taken into account to assess the impact of the use of the current IESTI on global trade.

Conclusion

This document provides a provisional overview of advantages and challenges that arise from the use of the current IESTI equations and their impact on risk management, risk communication, consumer protection goals and trade.

References

CAC, 2018. Joint FAO/WHO Food Standards Programme. Procedural Manual 26th edition: http://www.fao.org/fao-who-codexalimentarius/publications/en/ **Error! Hyperlink reference not valid.**

CCPR34. CX/PR 02/3-Add.1: Annex: The Probabilistic Approach to Acute Dietary Exposure Analysis and Its Applicability at the International Level. Available at: http://www.fao.org/fao-who-codexalimentarius/shproxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FShared%2BDocuments%252FArchive%252FMeetings%252FCCPR%252Fccpr34%252Fpr0203be.pdf

CCPR50, REP18/PR, Appendix XI: History, Background And Use Of The IESTI Equations

CCPR50, REP18/PR, Appendix XII: Technical / Risk assessment challenges that arise from the possible revision of the current IESTI equations or are current challenges as well

Hamilton DJ and Crossley S eds, 2004. Pesticide residues in food and drinking water: Human exposure and risks. John Wiley & Sons (Wiley Series in Agrochemicals and Plant Protection).

Van der Velde-Koerts T., Margerison S., Breysse N., Lutze J., Mahieu K., Reich H., Rietveld A., Sarda X., Sieke Ch., Vial G., and Ossendorp B.C. (2018) Impact of proposed changes in IESTI equations for short-term dietary exposure to pesticides from Australian and Codex perspective, Journal of Environmental Science and Health, Special Issue: The International Estimate of Short-Term Intake (IESTI) Revision and its Consequences Volume 53 (6); 366-380

World Health Organization (WHO), 2009. EHC 240, Principles and methods for the risk assessment of chemicals in food, Chapter 6: Dietary exposure assessment of chemicals in food. http://www.inchem.org/documents/ehc/ehc/ehc240_index.htm

ANNEX: ADVANTAGES AND CHALLENGES OF APPLIED INUT PARAMETERS IN THE IESTI EQUATION

For completeness of the discussion document on advantages and challenges of the IESTI equation, this appendix is included. It lists the scientific challenges related to the IESTI parameters that do not fall under the remit of the CCPR EWG, but fall under the scope of the JMPR. The main document and this appendix do not cover the full list of advantages and challenges as identified in table 1 and 2 in CX/PR 17/49/12 or REP18/PR, Appendix XII.

Although the IESTI equations were intended to be used by all end- users in the same manner, over time, the input values for the different parameters of the equations started to diverge between the various user groups. The main challenges regarding the use of the IESTI equations, are linked to these diverging input values for the equation parameters. The parameters are listed in Table 1 as well as the background reasoning for these differences. It is recognized that some parameters are influenced by different regional and cultural habits and will remain nation specific. However, the methods on how to collect and develop these nation specific data should be harmonized (large portion and interlinked body weight, unit weight). Other parameters, such as the input variable for determining the residue (HR(-P), STMR(-P), or MRL) and for different statistical assumptions (variability factors) can be harmonized. These are data-driven, science based parameters and do not fall under the remit of the EWG of CCPR. Challenges due to potential changes of these parameters should be discussed by JMPR. Differences from residue definition, conversion factors, reference values and hazard based cut-offs is not addressed by changing the exposure elements of the IESTI equation and differences in residue levels based on different use labels will remain, when comparing the outcomes between different national agencies. In theory, the globally set residue levels should cover the authorized uses in all Codex countries.

Table 1 Differences in applied input parameters in the IESTI equation.

IESTI parameter	Difference, reasons for differences
Residue (HR, HR-P, STMR, STMR-P)	Different residue values between national/regional authorities and JMPR, because of differences in the submitted data and/or differences in use (dose rate, pre-harvest interval) and because different residue definitions are used between authorities. Lack of transparency whether HR/HR-P/STMR/STMR-P used in risk assessments refers to raw edible portion or RAC and whether PF and/or CF have been used.
Variability factor (v)	JMPR uses variability factor v= 1 for case 1 & 3 and v= 3 for case 2a & 2b, whereas in other countries other variability factors are applied, e.g. v=1 for case 1 & 3, v= 5 or 7 for case 2a & 2b, depending on the unit weight, and v= 10 for granular applications. It is noted that in other frameworks, a.o. the contaminant framework, using probabilistic exposure models, variability factors are not applied
Large Portion (LP) or reliability of estimate of 97.5th percentile consumption given sample size and ambiguities associated with categorization	Different large portions between countries. These differences can be the result of different cultural habits, but also due to lack of clear guidance on how the LP data are derived from food surveys. Currently, the maximum LP from all countries that have submitted consumption data per commodity, is used, With this it is noted that not all countries have submitted consumption data.
Unit weight (U_{RAC} and U_e)	Not all countries submit consumption data and consequently no unit weight data are submitted either. Some countries do submit consumption data but without unit weight data. Different unit weights between countries exist because of different cultural habits and trading practices. Furthermore, there is a lack of guidance on how to derive information on unit weight and how to define the unit (e.g. spinach). Finally, probabilistic models do not use unit weights at all.

The HR and STMR in the IESTI equation(s)

The HR and the STMR used in the IESTI calculation refer to the residue as defined by the residue definition for dietary risk assessment present in the raw edible portion of the crop. When the HR or STMR are not available for the raw edible portion, the HR or STMR of the crop (further referred to as RAC) is used in the dietary risk assessment, adding additional uncertainty.

The HR, STMR and MRL are generally based on data from the same supervised residue trials, though sometimes different residue definitions are applicable. The MRL is based on the residue definition for enforcement aiming at a marker compound, rather than the full residue that is relevant for dietary risk assessment. The residue relevant for dietary risk assessment serves as basis for HR and STMR and often contains more compounds.

When only limited residue data are available and the variability (standard deviation) of the residue population is significant, the resulting MRL recommendation can be substantially higher than the HR and the STMR.

MRLs leading to a dietary exposure exceeding the ARfD as calculated with the IESTI can occur. Two examples were identified in the 2017 JMPR report. One example was for fenpyroximate on apples, pears and cucumbers (using MRLs[4] of 0.2 and 0.3 m/kg for pome fruit and cucumbers versus the HRs of 0.15, 0.14 and 0.24 for apples, pears and cucumbers, respectively). The second example was for chlormequat on oats, using the MRL of 4 mg/kg instead of the STMR of 1.3 mg/kg. In such situations, food safety inspection services cannot act because the legal limit –the MRL- is not exceeded although the dietary exposure is calculated to be above the ARfD. The situation actually becomes relevant where the acute dietary exposure calculation performed with the HR (or STMR for IESTI case 3) is close to the ARfD. Thus, a residue concentration observed in monitoring, complying with the MRL may, if inserted in the IESTI equation instead of the HR/STMR, lead to an exposure higher than the ARfD. This triggered the question whether the HR (and STMR) in the IESTI equation should be replaced by the same metric as used for enforcement; the MRL.

Replacing the HR and STMR by the MRL will not automatically lead to “the same metric” in all cases. For example, a different residue definition for raw and processed matrices may be in place for dietary risk assessment. This creates additional conversion factors to be considered.

The variability factor in the IESTI equation(s)

To obtain representative samples from supervised field trials several units of the RAC are taken from a treated plot (see Table V.1 in FAO 2009). For commodities with a unit weight, e.g. one tomato, of >25 g twelve to twenty-four individual units are homogenized in a composite sample and subsequently analyzed. However, consumers are exposed to residues in individual units and the residue in some individual units may be much higher while others will be lower than the residue that was measured in the composite sample. The variability factor is the factor applied to reflect that uncertainty in the variability of residues in individual units (FAO 2009).

Previously, the JMPR (JMPR, 2002) used variability factors of 1, 3, 5, 7 or 10 for different types of commodities. After discussing the work of IUPAC, the 2003 JMPR agreed to replace the default variability factors of 3, 5, 7 and 10 by a new default variability factor of 3 for all commodities, except for U_{RAC} < 25 g where no variability factor is used (a variability of factor of 1 in the calculation sheets) (JMPR, 2003). From 2006 onwards, JMPR has used a default variability factor of 3 while other countries continued to use the ‘old’ variability factors (FAO 2002). The use of a higher variability factor by other countries leads to higher exposure estimates commodities when compared to the JMPR estimates. This difference in exposure estimates results in recurring disagreements on the safety of CXLs between Codex Member States.

The use of a default variability factor of 3 instead of 5 and 7 was discussed within the EU. The change was not adopted, because studies showed that the variability factors for supervised trials and market place surveys will exceed the proposed default value of 3 in 34-65% of cases and the default value of 7 in 0.2-1% of the cases. However, the PPR Panel also noted that the assessment of acute risks from dietary exposure uses conservative assumptions for portion size and the residue concentration as well as the variability factor. It was recommended to further investigate the combined effect of these conservative assumptions on the overall level of consumer protection (EFSA 2005). Currently, FAO/WHO is benchmarking the outcomes of the IESTI equations to a suitable probabilistic distribution of actual exposures (requests from CCPR49, see REP17/PR paragraphs 156 and 162). This will form the basis to formulate the consumer protection goals.

[4] The acute dietary risk assessment for fenpyroximate using the MRL instead of the HR did not take into account the additional metabolites that are included in the residue definition for risk assessment. Thus, if a shift is made from using the HR and STMR to the MRL, ideally, a conversion factor should be calculated that needs to be included in the equation as well. Without this conversion factor the calculated exposure may underestimate the toxicologically relevant dietary burden for consumers.

Expression of the large portion

Expression of the large portion in kg/person and/or g/kg bw/day: Large portions can be derived from FCS in different ways. The current IESTI equations use a LP as kg/person divided by the mean bodyweight (LP_{person}/bw) of the population group of the dietary survey from which the LP was derived (e.g. general population, adults, children). In this way it is not possible to take into account a possible correlation between the amount consumed and the body weight and, since it is expected that the larger portions (based on kg/person) are consumed by subjects representing body weights above the average, the use of an average bodyweight can be considered as a conservative assumption. This is especially true for children due to the high variability in body weight among individuals of different ages but within the same children group in the survey. The direct use of the P97.5 from a distribution based on kg/kg bw/day would provide a more precise estimate for large portion. In addition, a P97.5 value from a distribution based on kg/kg bw/day values corresponds to babies/toddlers or children who eat a lot relative to their bodyweight. This effect is most obvious in FCS performed among the general population including a wide range of ages (Van der Velde-Koerts et al, 2018). Transparent data collection is a prerequisite. WHO is responsible to collect these data in GEMS food and should provide clear guidance for data collection. Any change to the implemented JMPR IESTI should include availability of proposed revised LP data. A plan is needed to get consistent international data collection.

Expression of the large portion raw, processed or combined: The LP should be matched to the commodity to which the HR or STMR relates. In the case of commodities that are predominantly eaten as the fresh fruit or vegetable, the LP should relate to the raw agricultural commodity. However, when major portions of the commodity are eaten in a processed way (e.g. grains) and when information on the residue in the processed commodity is available, the LP should relate to the processed commodity (e.g. flour or bread). In practice, some countries derive one single large portion to cover both the raw and processed forms of a certain commodity, while other countries report the large portions for specified raw and processed commodities. For example, LPs can be derived for orange raw and orange juice separately, or for total orange products consumed on a single day (including orange raw, orange juice and other orange products). Currently, there is no clear definition of the commodities for which large portions need to be derived, leading to different interpretations and potentially very different P97.5 consumption values. Consumption of more obscure or esoteric food items might result in even greater aggregation in some countries (e.g, countries consuming less oranges might report these generically as “citrus”). Comparisons, thus, can be difficult and dangerous when reporting can vary in this way. Clear guidance on expression of the large portion should be prepared and disseminated, preferably via the WHO.

Different LPs in different countries: As large portion for a certain commodity JMPR uses the most critical (highest) of the values reported by the individual member states. Different LP values for a given commodity can be expected for different Codex Member countries. These different LPs cannot be harmonization in the IESTI equations. JMPR aims at using the maximum large portion for any country and should therefore cover exposure for every individual Codex member country.

Impact of new FCS on LPs: The 97.5th percentile consumption among consumers only (LP) can be very unstable. So it may change a lot from survey to survey. This would imply that every time a new consumption survey is conducted its impact on the existing highest LP per commodity should be assessed. However, actual consumption patterns do not change rapidly over time. Focus should be on gaining a robust set of agreed consumption data with improved consistent survey information, to be a global foundation, rather than reacting to individual survey updates.

In addition, national food surveys usually may not cover certain minority populations in sufficient numbers to allow development of minority-specific consumption estimate. In the most unfavorable situations this could mean that the LP is underestimated. It is noted that minorities are not excluded from surveys and in some nations sometimes actively attempted to oversample them in the study design so that minority-specific consumption estimates are available. Where more countries submit consumption data, the likelier the chance that a minority commodity in one country is a majority commodity in another country, serving as input for the maximum large portion worldwide.

The Unit Weight Concept

In the IESTI calculation, the unit weight value (U) affects the outcome of the IESTI equation in two ways. The U_e determines whether the LP will be composed by more than one crop unit (case 2a) or will be a portion of the unit (case 2b) and subsequently determines which IESTI formula is applicable. Furthermore, the U_{RAC} determines whether a variability factor is to be applied to the HR. According to JMPR procedures, no variability factor[5] is used if the U_{RAC} is smaller than 25 g and a variability factor of 3 is used if the U_{RAC} is 25 g or higher.

[5] Please note that ‘no variability factor’ equals using a variability factor of 1

Many countries do not submit unit weight data at all. Several countries have provided unit weight data without specifying whether the U values provided represents the median of units consumed in a country or a different estimation. Also, it is not clear in all cases whether the value refers to the whole commodity or to the raw edible portion (JMPR, 2006). For some commodities it is not so evident how the unit weight should be expressed (e.g. spinach as single leaves, as plants or as bunches; bananas as single fruit or a hand of seven fruits). This also applies to other crops (e.g. elderberries, grapes, Chinese cabbage, rucola, tomatoes). Thus, more guidance is needed on how to derive unit weight data. Without a clear rationale different unit weights are used in different parts of the world for the same crop commodities. It is noted that several commodities exist in varieties that have very different unit weights, e.g., cherry tomatoes versus flesh tomatoes. The use of different unit weights results in very different outcomes of the IESTI, even if the large portion and residue levels are the same (Van der Velde-Koerts, 2010; see Figure 1 below). An increase of the unit weight shows a linear increase of the IESTI outcome (JMPR) with the increase of the unit weight. The use of the unit weigh concept has an even higher, fluctuating impact on the outcome of the EU IESTI. This impact is expected when considering that the unit weight drives the selection of the use of variability factors, which are higher in EU.

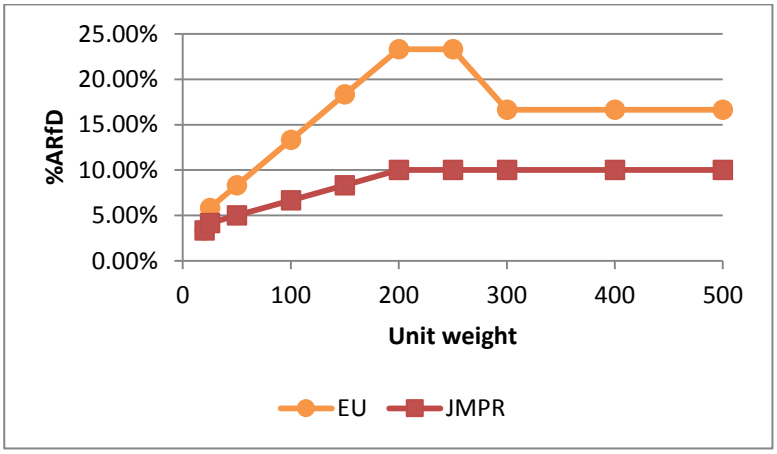

Figure 1 IESTI (expressed as %ARfD) as a function of unit weight (U_{RAC}=U_e= 20-500 g), while all the other parameters are kept constant (HR = 0.2 mg/kg, LP = 200 g/person, bw = 60 kg, ARfD = 0.02 mg/kg bw) for 3 situations: EU (v=1,5,7), JMPR (v=1, 3).

In the IESTI equations, it is required to express the LP as kg/person to compare the LP (97.5th percentile) with the unit weight to decide on the equation to be used (case 2a or case 2b). Subsequently, in the case 1, 2a, 2b and 3 equations the LP as kg/person is divided by the average bodyweight (LP_{person}/bw). The drawbacks on expressing the LP as kg/person were described previously in this document.

In case 2a the LP expressed as g/person is required to calculate the exposure. So even in cases where the consumption distribution is based on g/kg bw, this value has to be multiplied by the average bodyweight to get a g/person value. This may result in an unrealistic high large portion, since the actual bodyweight can be much lower especially in surveys including large age differences ('general population surveys'). For case 1, case 2b and case 3 this is no problem, since the kg/person value is again divided by that same average bodyweight. However, in case 2a only part of the unrealistic high large portion is multiplied by the variability factor, while the other part is not multiplied by the variability factor. This introduces additional errors in the exposure assessment. Resolution of the point requires the raw data of the consumption survey to be transparently available.

References:

CCPR50, REP18/PR, Appendix XII: Technical / Risk assessment challenges that arise from the possible revision of the current IESTI equations or are current challenges as well

Van der Velde-Koerts T., Breysse N., Pattingre L., Hamey P/Y., Lutze J., Mahieu K., Margerison S., Ossendorp B.C., Reich H., Rietveld A., Sarda X., Vial G., and Sieke Ch. (2018) Effect of individual parameter changes on the outcome of the estimated short-term dietary exposure to pesticides, Journal of Environmental Science and Health, Special Issue: The International Estimate of Short-Term Intake (IESTI) Revision and its Consequences Volume 53 (6); 380-393

APPENDIX II

Document addressing TOR (ii)

TO GATHER RELEVANT INFORMATION ON BULKING AND BLENDING'

Proposed Circular Letter

TO	Codex Contact Points Contact Points of international organizations having observer status with Codex	
FROM	Secretariat, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme	
SUBJECT	**Request for bulking or blending information**	
DEADLINE	**14 October 2019**	
COMMENTS	**To:** CCPR Secretariat Institute for Control of the Agrochemicals Ministry of Agriculture (ICAMA) E-mail: ccpr@agri.gov.cn	**Copy to:** Secretariat Codex Alimentarius Commission Joint FAO/WHO Food Standards Program E-mail: codex@fao.org

Background

The IESTI equations are used by JMPR to assess the short-term dietary intake of pesticide residues. Since 2016, CCPR is working on a review of the risk management and risk communication aspects of the IESTI equations. An international scientific workshop, held in Geneva in 2015, discussed the IESTI equations (EFSA, 2015) and concluded among other things that there are substantial uncertainties and inconsistencies regarding the degree of bulking and blending of the commodities that are evaluated by the 'case 3' IESTI equation. It was recommended to further investigate bulking and blending practices. This type of information is not readily available to risk assessors; therefore CCPR50 agreed:

- (ii) To gather relevant information on bulking and blending, in order to feed into the risk assessors work through the JMPR Secretariat (Items 4 and 13 on the table noted in Appendix XII) (CCPR50, 2018: REP18/PR, para 137).

Items 4 and 13 in the table noted in Appendix XII of REP18/PR read as follows:

- 4 "Information on bulking or blending practices needs to be gathered in order to decide on cases where a median residue instead of the MRL could be used in the dietary risk assessment, or a homogenization factor could be added (see item 13)."
- 13. "For blended foods (e.g. fruit juice, seed/nut oil, flour, corn meal), it is suggested to add a homogenization factor (<1) to the equation to reflect the decreased variability in pesticide residues resulting from processing."

The case 3 IESTI equation is used when a raw agricultural commodity or processed commodity is bulked or blended before it goes into trade. The case 3 IESTI equation uses the supervised trials median residue value for raw or processed commodities (STMR or STMR-P) as best estimate for the concentration found in the bulked or blended commodity. Currently, case 3 applies to cereal grains, oilseeds, and pulses when treated pre-harvestly as well as to milk and processed commodities such as flour, vegetable oils, fruit juices and various dried and canned vegetables.

Case 3

$$\text{IESTI} = \frac{\text{LP}_{\text{person}} \times (\text{STMR or STMR - P})}{\text{bw}}$$

Request for bulking or blending information

As the current assumptions for bulking or blending are not substantiated by data, information on bulking and blending practices is needed to confirm that the STMR or STMR-P is the best estimate for the concentration found in the bulked or blended commodity.

Codex members and observers are invited to submit information on bulking or blending, through their Contact Points, **before 14 October 2019**. Information could be obtained from institutes involved in agro-food market and chain research or from primary food processing industries and its branche organizations.

Bulking is defined here as the combining of a commodity (e.g. cereal grains, oil, sugar) to a large quantity to enable storage or transport in an unpackaged form. Blending is defined here as the mixing of a commodity (e.g. tea, coffee, whisky) to make a consumer product of the desired quality.

Different types of case 3 commodities can be distinguished for which bulking or blending information is needed:

- Commodities that are usually bulked or blended before, during or after industrial processing to e.g. juice (orange, apple, grape), wine, beer, oil or dried, frozen, canned, or pickled products.
- Commodities that are usually bulked or blended before trade (e.g. dry beans, dry peas, cereal grains, oilseeds, dried teas).

Annex I provides a list of commodities assessed as case 3 commodities in the current JMPR IESTI model and for which bulking or blending information is needed to support the current case 3 status. Because JMPR's focus is primarily about commercialized and traded commodities that go into international trade, bulking and blending information is requested for food commodities that are intended for international trade. The allocation of commodities as case 3 should reflect the most common or usual practices for international trade and should not be based on practices that are exceptional.

Not all commodities listed in the Annex I are grown/processed by each Codex Member country, but Codex Members or observers are encouraged to provide reliable bulking or blending information for international trade for as many commodities as possible. It is noted that information on bulking or blending of cereals (rice, wheat, barley), wine, dried tea, and juices (oranges, apples, blackberries, stone fruits) are of primary interest, since exceedances of the ARfD have been observed for these commodities on a more regular basis.

Information on bulking and blending will be used to address the question of how a pesticide residue in a commodity gets "diluted" when it is blended with non-treated commodities. With regard to bulking or blending over several farms or several storage facilities it is assumed that pesticide treatment regimes between these farms or storage facilities are different. Single farms come in very different sizes and at large production farms bulking or blending may already have occurred in the field or at the farm. For large production farms, the question then comes down to whether the bulked or blended commodity is derived from areas that received the same pesticide treatment, or from areas that received different pesticide treatments.

Information requested is:

Question 1: Do you think that the internationally traded or consumed portion of the commodity in question (from the list in Annex I) can be derived from a single commodity unit, a single farm (in case of pre-harvest treatments) or a single storage facility (in case of post-harvest treatments) or a single pesticide treatment regime (in case of large production farms)? If the answer to this question is Yes, can you substantiate this view?

A good indicator of unbulked/unblended processed commodities is the capability of quality control systems to refer single products back to their producing farms. Can you provide a list of commodities for which such tracking and tracing systems are in place?

Question 2: Do you think that the internationally traded or consumed portion of the commodity in question (from the list in Annex I) is usually bulked or blended over several farms (in case of pre-harvest treatments), over several storage facilities (in case of post-harvest treatments) or over several pesticide treatment regimes (in case of large production farms) before the commodity is internationally traded or consumed?

If the answer to this question is Yes, can you substantiate this view?

- Question 2a: Can you indicate why the raw or processed commodities listed in Annex I are usually bulked or blended before going into international trade?
- Question 2b: Can you provide a qualitative or quantitative description of the bulking or blending procedures that happen between harvest and international trade of the raw or processed commodities listed in Annex I?

In case you have quantitative information on bulking or blending, it would be informative to know in what quantities (weight or volume the commodities are gathered from farms (or storage facilities or areas receiving the same pesticide treatment), from how many farms (or storage facilities or areas receiving the same pesticide treatment) and in what quantities they are bulked or blended before going into international trade. For processed commodities it is of particular interest to know whether the internationally traded commodities are usually bulked or blended (over several farms, storage facilities or pesticide treatment regimes) before, during or after processing and in what quantities.

Question 3: Any other descriptional, qualitative or quantitative information you may have on bulking or blending is welcome.

If available, please provide any information on the bulking or blending techniques and commercial practices of the case 3 commodities listed in Annex I and a good source reference. The bulking or blending information could be provided using the example provided in Annex II, but other formats are welcome as well.

References

EFSA 2015. Revisiting the International Estimate of Short-Term Intake (IESTI equations) used to estimate the acute exposure to pesticide residues via food, 8/9 September 2015, Geneva, Switzerland, EFSA Supporting publication **2015**:EN-907. https://www.efsa.europa.eu/en/supporting/pub/en-907

CCPR50 (2018). Report of CCPR50, Haikou, China, 9-14 April 2016, REP18/PR, http://www.fao.org/fao-who-codexalimentarius/meetings-reports/detail/en/?meeting=CCPR&session=50

ANNEX I: Case 3 commodities for which bulking or blending information is request

Case 3 commodities for which bulking or blending information is requested

Case 3 commodities for which bulking or blending information is needed:	Further information on current JMPR procedures
Dry pulses (RAC): VD 0071 Beans (dry) VD 0523 Broad bean (dry) (VD 0541 Soya bean (dry) VD 0072 Peas (dry) VD 0524 Chick-pea (dry) VD 0533 Lentil (dry)	In the current JMPR IESTI model dry pulses are treated in two ways: pre-harvest treatment = case 3 post-harvest treatment = case 1
Cereal grains (RAC): GC 0650 Rye GC 0654 Wheat GC 0640 Barley GC 0641 Buckwheat GC 0647 Oats GC 0649 Rice GC 0646 Millet GC 0651 Sorghum grain GC 0645 Maize (corn)	In the current JMPR IESTI model cereal grains are treated in two ways: pre-harvest treatment = case 3 post-harvest treatment = case 1
Oilseeds (RAC): SO 0090 Mustard seed SO 0495 Rape seed SO 0691 Cotton seed SO 0693 Linseed (Flax-seed) SO 0696a Palm kernels SO 0696b Palm fruit SO 0697 Peanut, shelled SO 0698 Poppy seed SO 0699 Safflower seed SO 0700 Sesame seed SO 0702 Sunflower seed - Borage seeds - Cucurbitaceae seeds	In the current JMPR IESTI model oilseeds are treated in two ways: pre-harvest treatment = case 3 post-harvest treatment = case 1
Treenuts (RAC) TN 0295 Cashew nut TN 0660 Almonds TN 0660 Almonds TN 0662 Brazil nut TN 0664 Chestnuts TN 0666 Hazelnut TN 0669 Macadamia nut TN 0672 Pecan TN 0673 Pine nut TN 0675 Pistachio nut TN 0678 Walnut	In the current JMPR IESTI model treenuts (nutmeat) are treated as case 1 commodities. The case 1 classification used by the JMPR is challenged because treenuts are industrially bulked or blended (over several farms or pesticide treatment regimes). The unit weight of a coconut is much higher than 25 g, for which case 2 applies. TN 0665 Coconut
VR 0596 Sugar beet (RAC)	The unit weigth of a sugarbeet is much higher than 25 g, for which case 2 applies. However, as raw sugarbeets are not consumed, only the extracted sugar, sugarbeets are treated as case 3 in the current JMPR IESTI model.
GS 0659 Sugar cane (RAC)	The unit weigth of a sugarcane is much higher than 25 g, for which case 2 applies. However, as raw sugarcanes are not consumed, only the extracted sugar, sugar cane is treated as case 3 in the current JMPR IESTI model.
SB 0715 Cocoa beans (RAC)	Cocoa beans (RAC) are roasted. Various products are prepared: cocoa mass, cocoa powder, cocoa butter. Cocoa beans and its products are treated as case 3 in the current JMPR IESTI model.

Case 3 commodities for which bulking or blending information is needed:	Further information on current JMPR procedures
SM 0716 Coffee beans (RAC)	Green coffee beans (RAC) are roasted. Coffee beans and its products are treated as case 3 in the current JMPR IESTI model.
DH 1100 Hops, dry (RAC)	In the current JMPR IESTI model dry hops are treated as case 3 commodities.
Dried tea DT 1114 Tea, green, black (RAC)	In the current JMPR IESTI model dried tea is treated as case 3 commodity.
Dried herb teas DT 0446 Roselle (RAC) DT 1110 Camomile (RAC) DT 1113 Mate (RAC) - Rooibos leaves (RAC) - Valerian root (RAC)	In the current JMPR IESTI model dried herb teas are treated as case 3 commodities.
Canned fruits FC 0003 Subgroup of Mandarins FC 0005 Subgroup of Grapefruits FT 0337 Guava FI 0345 Mango FI 0350 Papaya FI 0353 Pineapple FI 0341 Kiwifruit	Canned fruits, which are divided in parts or cut to pieces before being canned, are treated as case 3 in the current JMPR IESTI model. Canned fruits, which can be derived from a single fruit because whole fruits or fruit halves are canned, are treated as case 1 or case 2 in the current JMPR IESTI model, depending on the weight of the canned fruit units. These commodities concern: DM 0305 Table olives FB 0020 Blueberries FB 0021 Currants, black, red, white FB 0264 Blackberries FB 0265 Cranberry FB 0269 Grapes FB 0272 Raspberries, red, black FB 0275 Strawberry FI 0343 Litchi FP 0230 Pear FS 0013 Subgroup of Cherries FS 0014 Subgroup of Plums FS 0240 Apricot FS 0245 Nectarine FS 0247 Peach Some of these case 1 and case 2 classifications used in the JMPR IESTI model are challenged. Canned pineapple is cut to pieces or slices before being canned and is treated as case 3 in the current JMPR IESTI model because it does not refer to the original unit weight. However, canned pineapple could also be treated as case 2, because a single pineapple can end up in a single can. Canned/preserved table olives and canned litchis still represent the original fruits and can still be considered as individual units (U<25 g) and hence are considered case 1 in the current JMPR IESTI model as is the RAC. However, canned/preserved table olives and canned litches could also be treated as case 3 because the commodities are industrially bulked or blended (over several farms or pesticide treatment regimes).
Canned vegetables VA 0381 Garlic VA 0385 Onion, bulb VA 0384 Leek VB 0041 Cabbages, head VC 0431 Squash, Summer VC 0046 Melons VO 0440 Egg plant (Aubergine) VL 0476 Endive (i.e. Escarole) VL 0502 Spinach	Canned vegetables, which are divided in parts or cut to pieces before being canned, are treated as case 3 in the current JMPR IESTI model. Canned vegetables that can be derived from a single vegetable because whole vegetables or vegetable halves are canned are treated as case 1 or case 2 in the current JMPR IESTI model, depending on the weight of the canned vegetable. These commodities concern: VB 0402 Brussels sprouts VF 0449 Fungi, edible, except mushrooms (mainly wild) VF 0450 Mushrooms (cultivated)

Case 3 commodities for which bulking or blending information is needed:	Further information on current JMPR procedures
VL 0480 Kale VR 0574 Beetroot VR 0578 Celeriac VR 0498 Salsify (Oyster plant) VR 0497 Swede (Rutabaga) VS 0624 Celery VS 0622 Bamboo shoots GC 1275 Sweet corn kernels HH 0624 Celery leaves HS 0784 Ginger, root	VL 0269 Grape leaves VO 0445 Peppers, sweet (incl. pimiento) VO 0448 Tomato VP 0061 Green beans with pods (immature) VP 0062 Green beans without pods (succulent seeds) VP 0064 Peas without pods (succulent seeds) VP 0523 Broad bean without pods (succulent seeds) VR 0577 Carrot VR 0589 Potato VS 0620 Artichoke globe VS 0621 Asparagus VS 0626 Palm hearts GC 3081 Baby corn Some of these case 1 and case 2 classifications used in the JMPR IESTI model are challenged. Canned green peas without pods still represent the original seeds and can still be considered as individual units (U<25 g) and hence are considered case 1 in the current JMPR IESTI model as is the RAC. However, canned green peas without pods could also be treated as case 3 because the commodity is industrially bulked or blended (over several farms or pesticide treatment regimes). Canned carrots are generally small (whole) carrots and these can still be considered as individual units (U<25 g) and hence are considered case 1 in the current JMPR IESTI model. However, canned carrots could also be treated as case 3 because the commodity is industrially bulked or blended (over several farms or pesticide treatment regimes).
Canned pulses VD 0071 Beans (dry) VD 0523 Broad bean (dry) VD 0072 Peas (dry) (Pisum spp) VD 0524 Chick-pea (dry) VD 0533 Lentil (dry)	In the current JMPR IESTI model canned pulses are treated in two ways: pre-harvest treatment = case 3 post-harvest treatment = case 1
Dried fruits FI 0327 Banana FI 0345 Mango FI 0353 Pineapple FI 0350 Papaya FT 0305 Table olives	Dried fruits which are divided in parts or cut to pieces before being dried are treated as case 3 in the current JMPR IESTI model. Dried fruits that can be derived from a single fruit (because the original fruit or the fruit halve is dried), are treated as case 1 or case 2 in the current JMPR IESTI model, depending on the weight of the dried fruit. These commodities concern: DF 0014 Subgroup of Plums (i.e. prunes) DF 0226 Apple DF 0240 Apricot DF 0269 Grapes (i.e. raisins, currants, sultanas) DF 0295 Date DF 0297 Fig FB 0020 Blueberries FB 0021 Currants, black, red, white FB 0264 Blackberries FB 0265 Cranberry FB 0272 Raspberries, red, black FB 0275 Strawberry FB 1235 Table grapes (i.e. raisins, currants, sultanas) FI 0343 Litchi FP 0230 Pear FP 0307 Persimmon, Japanese (i.e. Kaki fruit) FS 0013 Subgroup of Cherries FS 0245 Nectarine FS 0247 Peach

Case 3 commodities for which bulking or blending information is needed:	Further information on current JMPR procedures
	FT 0289 Carambola VF 0449 Fungi, edible, except mushrooms (mainly wild) VF 0450 Mushrooms (cultivated) VO 0444 Peppers, chili VO 0448 Tomato VO 2704 Goji berry VP 0061 Beans with pods VP 0064 Peas without pods (succulent seeds) Some of these case 1 and case 3 classifications used in the JMPR IESTI model are challenged. Dried grapes (raisins, currants and sultanas) are derived from grape berries and a such the berry is not cut into pieces and can still be considered an individual unit (U<25 g) and hence is considered case 1 in the current JMPR IESTI model. However, dried grapes could also be treated as case 3 because the commodity is industrially bulked or blended (over several farms or pesticide treatment regimes). Dried cranberries still represents the original berries and can still be considered an individual unit (U<25 g) and hence is considered case 1 in the current JMPR IESTI model as is the RAC. However, dried cranberries could also be treated as case 3 because the commodity is industrially bulked or blended (over several farms or pesticide treatment regimes).
Dried vegetables VR 0587 Parsley, turnip-rooted VA 0381 Garlic VA 0385 Onion, bulb VA 0384 Leek VB 0400 Broccoli VB 0404 Cauliflower VB 0041 Cabbages, head VC 0431 Squash, Summer VC 0046 Melons VO 0445 Peppers, sweet VO 0440 Egg plant VL 0465 Chervil VL 0502 Spinach VL 0480 Kale VR 0577 Carrot VR 0578 Celeriac VR 0588 Parsnip VR 0506 Turnip, garden VR 0589 Potato VS 0621 Asparagus GC 0447 Sweet corn (on-the-cob) GC 1275 Sweet corn (kernels)	Dried vegetables which are divided in parts or cut to pieces before being dried are treated as case 3 in the current JMPR IESTI model. Dried vegetables that can be derived from a single commodity (because the original vegetable is dried), are treated as case 1 or case 2 in the current JMPR IESTI model, depending on the weight of the dried commodity. These commodities concern: VF 0449 Fungi, edible, except mushrooms (mainly wild) VF 0450 Mushrooms (cultivated) VO 0444 Peppers, chili VO 0448 Tomato VO 2704 Goji berry VP 0061 Beans with pods (immature pods with seeds) VP 0064 Peas without pods (succulent seeds)
Dried herbs and dried spices HH 0624 Celery leaves DH 0722 Basil DH 0723 Bay leaves HH 0733 Hyssop DH 0736 Marjoram DH 0738 Mints HH 0740 Parsley DH 0741 Rosemary DH 0743 Sage HH 0745 Savory, summer, winter HH 0749 Tarragon	Herbs and spices are divided in parts or cut to pieces before being dried and are treated as case 3 in the current JMPR IESTI model. Some dried spices are ground to powders before being traded.

Case 3 commodities for which bulking or blending information is needed:		Further information on current JMPR procedures
DH 0750	Thyme	
HH 0756	Coriander leaves	
HH 0761	Lemongrass	
HS 0783	Galangal, rhizomes	
HS 0794	Turmeric, root	
HS 0784	Ginger, root	
Fruit juices		No unit weight can be assigned to fruit juices and they are treated as case 3 in the current JMPR IESTI model.
FC 0204	Lemon	
FC 0205	Lime	
FC 0003	Subgroup of Mandarins	
JF 0004	Subgroup of Oranges	
FC 0005	Subgroup of Pummelo	
JF 0226	Apple	
FP 0230	Pear	
FP 2220	Azarole	
FS 0013	Subgroup of Cherries	
FS 0240	Apricot	
FS 0245	Nectarine	
FS 0247	Peach	
FS 0014	Subgroup of Plums	
FB 0272	Raspberries, red, black	
FB 0264	Blackberries	
FB 0020	Blueberries	
FB 0021	Currants, black,	
FB 0273	Rose hips	
FB 0267	Elderberries	
JF 0269	Grapes	
FB 1236	Wine grapes	
FB 0275	Strawberry	
FB 0265	Cranberry	
FT 0287	Barbados cherry (acerola)	
FT 0338	Guava	
FI 0343	Litchi	
FI 0327	Banana	
FI 0345	Mango	
FI 0350	Papaya	
JF 0341	Pineapple	
FI 0365	Soursop (Guanabana)	
FI 0351	Passion fruit (maracuja)	
FI 0355	Pomegranate	
FI 0341	Kiwifruit	
FI 2483	Cupuaçu	
Vegetable and herb juices		No unit weight can be assigned to vegetable and herb juices and they are treated as case 3 in the current JMPR IESTI model.
VA 0385	Onion, bulb	
VC 0424	Cucumber	
VC 0429	Pumpkins	
VC 0046	Melons	
VC 0432	Watermelon	
JF 0448	Tomato	
VO 0445	Peppers, sweet	
VL 0510	Cos lettuce	
VL 0482	Lettuce, head	
VL 0483	Lettuce, leaf	
VL 0502	Spinach	
VR 0574	Beetroot	
VR 0577	Carrot	

Case 3 commodities for which bulking or blending information is needed:		Further information on current JMPR procedures
VR 0578	Celeriac	
VS 0624	Celery	
HH 0722	Basil	
HH 0738	Mints	
HH 0740	Parsley	
Jams, jellies, marmalades		No unit weight can be assigned to jams, jellies and marmalades and they are treated as case 3 in the current JMPR IESTI model.
FC 0204	Lemon	
FC 0003	Subgroup of Mandarins	
FC 0004	Subgroup of Oranges	
FP 0226	Apple	
FP 0231	Quince	
FS 0013	Subgroup of Cherries	
FS 0014	Subgroup of Plums	
FS 0240	Apricot	
FS 0245	Nectarine	
FS 0247	Peach	
FB 0264	Blackberries	
FB 0272	Raspberries, red, black	
FB 0020	Blueberries	
FB 0021	Currants, black, red,	
FB 0273	Rose hips	
FB 0267	Elderberries	
FB 0265	Cranberry	
FB 0275	Strawberry	
FT 0297	Fig	
FI 0353	Pineapple	
HS 0784	Ginger, root	
Essential oils		No unit weight can be assigned to oils and they are treated as case 3 in the current JMPR IESTI model.
FC 0204	Lemon	
FC 0205	Lime	
FC 0004	Subgroup of Oranges	
FC 0005	Subgroup of Pummelo	
Olive oil		No unit weight can be assigned to oils and they are treated as case 3 in the current JMPR IESTI model.
OR 0305	Olives for oil extraction	
Refined oils		No unit weight can be assigned to oils and they are treated as case 3 in the current JMPR IESTI model.
OR 0541	Soya bean (dry)	
GC 0649	Rice (bran oil)	
OR 0645	Maize (corn)	
TN 0295	Cashew nut	
TN 0660	Almonds	
OR 0665	Coconut	
TN 0672	Pecan	
TN 0678	Walnut	
OR 0495	Rape seed	
OR 0691	Cotton seed	
SO 0693	Linseed (Flax-seed)	
OR 1240	Palm kernels	
OR 0696	Palm fruit	
OR 0697	Peanut, shelled	
SO 0698	Poppy seed	
OR 0699	Safflower seed	
OR 0700	Sesame seed	
OR 0702	Sunflower seed	
-	Borage seeds	
-	Cucurbitaceae seeds	
-	Grape seed	
TN 0669	Macadamia nut	

Case 3 commodities for which bulking or blending information is needed:	Further information on current JMPR procedures
Industrially prepared sauce/puree FP 0226 Apple FP 0230 Pear FS 0014 Subgroup of Plums FS 0240 Apricot FB 0272 Raspberries, red, black FB 0020 Blueberries FB 0021 Currants, black, red FB 0265 Cranberry FB 0275 Strawberry FI 0369 Tamarind (sweet) FI 0327 Banana FI 0345 Mango VS 0627 Rhubarb VO 0448 Tomato	The large portions derived from food surveys relate to sauce/puree that has been bought in a shop and hence represent industrial procedures. No unit weight can be assigned to sauce/puree and hence sauce/puree is treated as case 3 in the current JMPR IESTI model. The case 3 classification used in the JMPR IESTI model is challenged. Sauce/puree does not necessarily imply industrial processing, but can also relate to household processing. When household processing is taken into account, case 1 would be more appropriate.
Industrially prepared paste VO 0448 Tomato VO 0444 Peppers, chili	The large portions derived from food surveys relate to paste that has been bought in a shop and hence represent industrial procedures. No unit weight can be assigned to paste and and hence paste is treated as case 3 in the current JMPR IESTI model.
Wine FB 0269 Grapes FB 1236 Wine grapes	A single wine bottle does not contain the wine from a single grape bunch. No unit weight can be assigned to wine and wine is therefore treated as case 3 in the current JMPR IESTI model. The case 3 classification used in the JMPR IESTI model is challenged. Case 3 would postulate that wine grapes or wine from different producers are bulked/pooled. Wine could also be treated as case 1 because it is not unlikely that wine is coming from one vineyard, and thus, the HR would be a more appropriate estimator for the residues in wine.
Industrially frozen FS 0245 Nectarine FS 0247 Peach VA 0381 Garlic VA 0385 Onion, bulb VA 0384 Leek VB 0400 Broccoli VB 0404 Cauliflower VB 0041 Cabbages, head VC 0431 Squash, Summer VO 0445 Peppers, sweet) VL 0476 Endive (i.e. Escarole) VL 0502 Spinach VL 0480 Kale (Borecole, Collards) VR 0574 Beetroot VR 0577 Carrot VR 0578 Celeriac VR 0589 Potato VS 0621 Asparagus GC 0447 Sweet corn (on-the-cob) GC 1275 Sweet corn (kernels) HH 0624 Celery leaves HH 0740 Parsley	The large portions derived from food surveys relate to frozen commodities that have been bought in a shop and hence represent industrial procedures. Fruits and vegetables are generally cut to pieces and blanched before being frozen industrially. Units weight cannot be assigned to such frozen commodities and the listed frozen commodities are therefore treated as case 3 in the current JMPR IESTI model. Frozen fruits and vegetables that can be derived from a single commodity (because the original fruit or vegetable is frozen), are treated as case 1 or case 2 in the current JMPR IESTI model, depending on the weight of the frozen commodity. These commodities concern: FB 0020 Blueberries FB 0275 Strawberry VB 0402 Brussels sprouts VP 0061 Beans with pods: (immature pods + succulent seeds) VP 0062 Beans without pods:(succulent seeds) VP 0063 Peas with pods: (immature pods + succulent seeds) VP 0064 Peas without pods (succulent seeds) VP 0523 Broad bean without pods (succulent seeds) The case 3 classification used in the JMPR IESTI model is challenged. Frozen commodities do not necessarily imply industrial processing, but can also relate to household processing. When household processing is taken into account, case 1 would be more appropriate.
Sauerkraut VB 0041 Cabbages, head	Cabbages are cut to pieces before being transformed into sauerkraut.

Case 3 commodities for which bulking or blending information is needed:	Further information on current JMPR procedures
Industrial deep-fried – French fries VR 0589 Potato	The large portions derived from food surveys relate to French fries that have been bought in a shop and hence represent industrial procedures. Potatoes are cut to pieces before being transformed into French fries.
Industrial deep-fried – Crisps VR 0589 Potato	The large portions derived from food surveys relate to crisps that have been bought in a shop and hence represent industrial procedures. Potatoes are cut to thin slices before being transformed into crisps.
Industrial pickled VA 0384 Leek VB 0041 Cabbages, head VC 0424 Cucumber VO 0445 Peppers, sweet VL 0466 Chin cabbage (Pak-choi) VR 0574 Beetroot VR 0577 Carrot VL 0468 Flowering white cabbage VL 0485 Mustard greens	The large portions derived from food surveys relate to pickles that have been bought in a shop and hence represent industrial procedures. Pickled vegetables which are divided in parts or cut to pieces before being dried are treated as case 3 in the current JMPR IESTI model. Pickled vegetables that can be derived from a single commodity (because the original vegetable is pickled), are treated as case 1 or case 2 in the current JMPR IESTI model, depending on the weight of the pickled commodity. These commodities concern: HS 0773 Caper buds VA 0385 Onion, bulb VC 0425 Gherkin
Starch VR 0573 Arrowroot VR 0463 Cassava (Manioc) VR 0589 Potato VR 0504 Tannia	No unit weight can be assigned to starch and starch is treated as case 3 in the current JMPR IESTI model.
Coconut milk TN 0665 Coconut	No unit weight can be assigned to coconut milk and it is treated as case 3 in the current JMPR IESTI model.
Butter/paste SO 0697 Peanut, shelled SO 0700 Sesame seed DM 1215 Cocoa beans	No unit weight can be assigned to butter/paste and it is treated as case 3 in the current JMPR IESTI model.
Miso, soya sauce and tofu VD 0541 Soya bean (dry)	No unit weight can be assigned to miso, soya sauce and tofu and it is treated as case 3 in the current JMPR IESTI model.
Milk VD 0541 Soya bean (dry) GC 0650 Rice	No unit weight can be assigned to milk and it is treated as case 3 in the current JMPR IESTI model.
Flour of pulses and oilseeds VD 0541 Soya bean (dry) VD 0072 Peas (dry) VD 0524 Chick-pea (dry) SO 0090 Mustard seed	No unit weight can be assigned to flour and it is treated as case 3 in the current JMPR IESTI model.
Flour of fruits and vegetables FT 0291 Carob VR 0589 Potato VR 0504 Tannia (Tanier, Yautia) VR 0463 Cassava (Manioc) VR 0508 Sweet potato	No unit weight can be assigned to flour and it is treated as case 3 in the current JMPR IESTI model.
Bran, germ, grits, flour, starch GC 0640 Barley GC 0641 Buckwheat GC 0647 Oats GC 0649 Rice GC 0645 Maize (corn) GC 0646 Millet GC 0650 Rye GC 0651 Sorghum grain GC 0654 Wheat	No unit weight can be assigned to cereal milling products and they are treated as case 3 in the current JMPR IESTI model.

Case 3 commodities for which bulking or blending information is needed:	Further information on current JMPR procedures
Beer and malt GC 0650 Rye GC 0654 Wheat GC 0649 Rice GC 0646 Millet GC 0651 Sorghum grain GC 0645 Maize (corn) GC 0640 Barley	No unit weight can be assigned to beer and malt and they are treated as case 3 in the current JMPR IESTI model.
Flakes GC 0650 Rye GC 0654 Wheat GC 0640 Barley GC 0641 Buckwheat GC 0647 Oats GC 0645 Maize (corn)	In the current JMPR IESTI model flakes are treated as case 3 commodities.

ANNEX II: Fictitious example of information requested

(Amounts and procedures do not represent reality, just meant as example how the information could be provided)

Commodity: Oranje juice for international trade and consumption

Oranje juice is usually bulked and blended before it is traded. Oranje juice for international trade and consumption is not derived from a single orange or a single farm. The following description should prove that.

Bulking of oranges facilitates efficient transport and efficient processing, while blending (in the sense of mixing) of the juice seems unavoidable in that process. Blending for a particular reason (e.g. quality or taste) is not performed.

Quantitative description of the bulking and blending procedures for orange juice that happen between harvest and trade:

Before processing, at the farm:

The size of the farms is such, that orange tree fields belonging to the same farm, have received the same pesticide treatment. Individual farms, each have their own pesticide treatment regime.

Oranjes are picked in the field and collected in 10 kg bins.

Bins are emptied in 1,000 kg (= 1 tonne) lorries.

Lorries are emptied in 10 tonne storage facilities at the farm.

A single farm may have 2-10 of these storage facilities (i.e. 20-100 tonne oranges/farm)

Storage facilities are emptied into 1 tonne lorries for transport to the industrial plant.

At the farm, some mixing of the oranges takes place. First when the 1 tonne harvest lorries are emptied in the larger storage facilities and then again when the storage facilities are emptied in the 1 tonne transport lorries.

During processing, at the industrial plant:

The 1 tonne transport lorries are weighted and oranges are checked for quality, to set the price for the farmer.

At a single day, the 1 tonne lorries from 5-10 different farms enter the factory in the order of appearance. The empty lorry will return to the same farm and collect another full lorry, until the assigned delivery amounts for that particular farm are transported.

The oranges are transported on conveyer belts and the 1 tonne quantities are generally not mixed in this process.

A total of 100 tonne oranges/day may be processed into juice. The juice is collected in large vessels with volumes of 5000 L for further pasteurization. The yield is generally 50%, so 5000 L is equivalent to 10 tonnes of oranges. As the oranges arrive in 1 tonne quantities from 5-10 different farms, the juice collection vessel will contain the juice from 5-10 different farms. Because of its liquid nature, the juice is mixed extensively.

The pasteurised juice is distributed over cardboards with a 1 L volume. As a single orange yields 50 ml of juice, a 1 L cardboard box may contain the juice of 20 oranges.

After processing, at distribution

The 1 L cardboards are packaged into pellets containing 20 cardboards boxes. The pellets will end up at different consumer sales centres. The 1 L cardboards will end up at the consumer. No further mixing takes place at distribution.

Quantitative information in tabulated form

Description of process	Quantities
Pesticide treatment	All orange fields/farm receive the same treatment
Orange harvest at the farm	10 kg bins 1 tonne lorries
Orange storage at the farm	10-20 tonne storage facilities
Orange transport	1 tonne lorries
Orange collection at the processing plant	100 tonne oranges/day in 1 tonne quantities in order of appearance of the lorries from 5-10 different farms/day
Orange mixing at the processing plant	Conveyor belts, no mixing between 1 tonne quantities
Juice collection	5000 L vessels Yield is 50%, 5000 L is equivalent to 10 tonne oranges, equivalent to 5-10 different farms
Juice distribution	5000 L vessel distributed in 1 L package
Juice for consumer	1 L package. Yield is 50%, so 1 L package is equivalent to 20 oranges

APPENDIX III

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ACRONYMS USED IN THIS PAPER

ARfD	Acute Reference Dose
bw	Body Weight
CAC	Codex Alimentarius Commission
CCP	Codex Contact Point
CCPR	Codex Committee on Pesticide Residues
CF	Conversion Factor (to convert from one residue definition to another)
CL	Circular Letter
CRD	Conference Room Document
CXL	Codex Maximum Residue Limit for a Pesticide As Adopted by CAC
EFSA	European Food Safety Authority
EU	European Union
EWG	Electronic Working Group
FAO	Food and Agriculture Organization
FCS	Food Consumption Surveys
GAP	Good Agricultural Practice
GEMS/Food	Global Environment Monitoring System - Food Contamination Monitoring and Assessment Programme
HR	Highest Residue (raw commodities)
HR-P	Highest Residue (processed commodities)
IESTI	International Estimate of Short-Term Intake
JMPR	Joint FAO/WHO Meetings on Pesticide Residues
LP	Large Portion
MRL	Maximum Residue Limit
PF	Peeling and/or Processing Factor
PPR Panel	Panel on Plant Protection Products and their Residues (
RAC	Raw Agricultural Commodity
RIVM	Dutch WHO Collaborating Centre on Chemical Food Safety
STMR	Supervised Trials Median Residue (raw commodities)
STMR-P	Supervised Trials Median Residue Value for Raw (processed commodities)
TOR	Terms of Reference
U	Unit Weight Value
WG	Working Group
V	Variability Factor
WHO	World Health Organization