BfR compilation of processing factors for pesticide residues

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The level of pesticide residues in raw agricultural commodities might be altered by processing. Whenever possible, realistic consumer risk assessment should focus on “food as eaten”. Consideration must, therefore, be given to the typical household preparation and industrial processing procedures that many products undergo prior to consumption and feeding, respectively. The ratio of residue levels in the processed product and the respective raw product is called the processing factor and indicates whether the residue increases or decreases during a particular processing procedure.

Information on processing factors is often not available to the interested parties. Hence, the Federal Institute for Risk Assessment (BfR) provides a compilation of processing factors, last amended in September 2011, that is primarily intended for experts who are familiar with the risk assessment of pesticide residues in food and feed (e.g. experts from regulatory authorities involved in monitoring and surveillance or experts dealing with quality control or risk management). The BfR compilation has just been updated to include more data.

1 Background information on processing factors

Processing procedures include peeling, cooking, frying, drying, fermentation, pressing, milling, grinding and the preparation of sugar, juices, oils, beer and wine. Depending on the specific processing conditions and the pesticide’s physicochemical properties, the residues may increase or decrease during processing. Processing studies are conducted to determine the influence of processing on the nature and level of the pesticide residue in the raw product [1, 2].

These studies are mainly commissioned by industry in the context of pesticide authorisation and MRL setting procedures. They are primarily available to the involved authorities but are not accessible to the general public. Additional data concerning pulp/peel distributions are generated by retailers and the food processing industry and are not usually available at all. All these studies may be used to derive processing factors.

The term processing factor (PF) is defined as the residue level in the processed product divided by the residue level in the raw product. PF > 1 means an increase in the residue level during processing, PF < 1 indicates a decrease. If the residue level in the processed product is below the limit of quantification (LOQ), the numeric value of this LOQ is used to calculate the PF and a “smaller than” (<) symbol is placed in front of the calculated PF.

Residue data are often only available for raw products (e.g. grains, apples, grapes) but not for the corresponding processed products (e.g. flour, bran, beer, apple juice, purée, pomace, grape juice, wine, raisins). Maximum residue levels (MRLs) for pesticides are established for the raw commodities, too. If the residue level in a processed product is needed for risk assessment, the residue in the raw product could be simply multiplied by the appropriate PF. On the other hand, it might be necessary to assess a residue level which has been detected in a processed product. Dividing this level by the PF gives an impression of the corresponding residue level in the raw commodity and permits, for instance, verification of compliance with MRLs. It should be noted that it will never be possible to investigate all processes applied in the processing industry in respective laboratory processing studies. Hence the processing factors are normally not specific for one particular set of processing conditions.
2 Data included in the BfR compilation

Information on processing factors is often not available to the interested parties. BfR, therefore, provides a compilation of processing factors which can be made publicly available. The data have been collected from annually published reports and evaluations by the FAO/WHO Joint Meeting on Pesticide Residues (JMPR), from draft assessment reports (DAR) prepared in the European Pesticide Risk Assessment Peer Review programme (PRAPER), from Reasoned Opinions on the modification and/or the review of existing MRLs prepared by EFSA and from residue data which have been submitted within the framework of national authorisation procedures. Additional data concerning pulp/peel distribution have been provided by retailers and have been collected within the framework of national food monitoring programmes. BfR had access to the raw data (i.e. residue levels in raw and corresponding processed samples) and calculated processing factors for each individual pair of samples. If more than one PF was available for one combination of pesticide, raw product and processed product, the median is now displayed in the BfR compilation.

BfR does not assume any liability for the accuracy of the data.

3 Amendments to version 3.0 of the compilation

The main amendments to version 3.0 of the BfR compilation of processing factors for pesticide residues are the following:

- the processing factors from all JMPR evaluations, which have been published in 2009 an 2010, have now been included;
- the processing factors for recently assessed representative uses of pesticides, which have been included in Annex I of Directive 91/414/EC, have now been included;
- the processing factors derived from data which have been recently assessed by EFSA within the framework of the modification and/or the review of existing MRLs according to Reg (EC) No 396/2005 have now been included.

The BfR compilation currently contains 2033 food processing factors for 166 pesticides and 700 processing factors for feedstuffs for 136 pesticides. Periodic updates are envisaged.

4 References
