

## PROCESSING FACTORS FOR DRIED COMMODITIES

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### Introduction

MRLs are established for the raw agricultural product (RAC) like table grapes. These MRLs are taken up in regulation EC 396/2005 and its amended versions: <https://eur-lex.europa.eu/collection/eu-law/consleg.html> (search in consolidated texts for last amended version). MRLs are not established for the corresponding dried commodity like raisins. According to article 20 of this MRL regulation enforcement laboratories may take “*into account changes in the levels of pesticide residues caused by processing and/or mixing*”. The MRL regulation EC 396/2005 refers to Annex VI for the processing factors to be used in such situations.

Currently, Annex VI does not exist and consequently there are no legal processing factors. This is of particular concern for the residue concentration in the dried commodities. These residue concentrations are often higher than in the corresponding RAC due to concentration of the residue through evaporation of water. As a consequence, the dried commodity may no longer comply with the MRL for the RAC. RIVM has developed instructions for laboratories how to act in such a situation. These instructions were endorsed by the Dutch pesticide residue consultation group in its June 2020 Meeting.

### Instructions for selection of processing factors for dried commodities

Use a step-wise approach for the selection of processing factors for dried products:

Step 1: Check whether there is a substance-specific processing factor for the dried commodity in question (see further information below). Use this substance-specific processing factor to calculate the MRL for the dried commodity in question.

Step 2: If there is no substance-specific processing factor for the dried commodity in question, check whether it is possible to derive a commodity-specific drying factor (see further information below). Use this commodity-specific drying factor to calculate the MRL for the dried commodity in question.

Step 3. If it is not possible to derive a commodity-specific drying factor use a default drying factor (see further information below) to calculate the MRL for the dried commodity in question.

### Processing factors for dried commodities

Processing factors for dried commodities can be represented by substance-specific processing factors, commodity-specific drying factors and default drying factors. What these factors represent, how they are derived and/or where they can be found is explained below.

#### *Substance-specific processing factors for drying*

Substance-specific processing factors for drying take into account concentration of the pesticide residue due to evaporation of water from the RAC during drying as well as thermal degradation of the pesticide residue as a result of the increase of temperature during drying and photolytic degradation of the pesticide residue as a result of sun light irradiation during drying. These substance-specific processing factors are obtained from processing studies conducted under GLP by the manufacturer of the active substance and they are assessed by residue experts at the time of authorisation of the plant protection product.

In 2018 EFSA has put together a database with substance-specific median processing factors for a number of active substance – commodity combinations, which were assessed in the EU. This database

is based on the residue definition for enforcement and substance-specific processing factors derived from this database are thus suitable to correct the MRLs for processed commodities, including those for dried commodities. This database is available on the EFSA website:

<http://www.efsa.europa.eu/en/supporting/pub/en-1508> and describes the situation until 1 September 2018.

As the 2018 EFSA database does not contain median processing factors for all pesticides, additional substance specific processing factors can be found in the EFSA Journals on the EFSA website: <http://www.efsa.europa.eu/en/publications> and JMPR reports and evaluations on the FAO website: <http://www.fao.org/agriculture/crops/core-themes/theme/pests/jmpr/jmpr-rep/en/>. In 2019, the Dutch pesticide residue consultation group concluded that substance-specific processing factors derived from the EFSA 2018 database supersede those from EFSA Journals and substance-specific processing factors derived from EFSA Journals supersede those from JMPR reports and evaluations. Based on these sources, RIVM has put together a list of substance-specific processing factors for priority substances in the Netherlands, including those for dried commodities. These are available on the RIVM website: <https://www.rivm.nl/en/chemkap/fruit-and-vegetables/processing-factors>. The MRL of the dried commodity can be calculated by multiplication of the MRL of the RAC (fresh) by the substance-specific processing factor for the corresponding dried commodity.

#### *Drying factors*

Drying factors only take into account concentration of the pesticide residue due to evaporation of water from the RAC during drying. They do not take into account degradation of the pesticide residue during drying. These drying factors are suitable for dietary risk assessment, as they overestimate the pesticide residue concentration in the dried commodity and thus do not underestimate the exposure to pesticides from dried commodities. Drying factors are less suitable to correct the MRL, because the pesticide residue concentration in the dried commodity may actually be lower than anticipated due to degradation. This means that such a dried commodity may pass the checks made by an enforcement laboratory although the pesticide application may not have been conducted according to Good Agricultural Practice. The Dutch pesticide residue consultation group concluded in its March 2012 Meeting that drying factors may be used to correct MRLs if there are no substance-specific processing factors available. The MRL of the dried commodity can be calculated by multiplication of the MRL of the RAC (fresh) by the drying factor for the corresponding dried commodity.

Commodity-specific drying factors are calculated based on the dry matter content in the starting material (RAC) and the dried commodity derived thereof and are thus specific for the drying process used by a certain producer of dried commodities. Dry matter contents for the starting material and the dried commodity thereof can be obtained from the producer of the dried commodity or they can be determined by the enforcement laboratory itself provided the laboratory possesses both the starting material and the dried commodity derived thereof. The commodity-specific drying factors can be calculated based on the following equation:

$$\text{Commodity-specific drying factor} = \% \text{ dry matter in dried commodity} / \% \text{ dry matter RAC}$$

Note that the percentage dry matter in the dried commodity is never equal to 100% but ranges between 75-95% (equivalent to a moisture content of 5-25%).

It is possible to add commodity-specific drying factors to the list, but they will only be accepted by the Dutch authorities if the following acceptance criteria are met. The commodity-specific drying factors should be accompanied by a well-documented report. This report should contain dry matter contents for the RAC and dried products derived thereof for at least four batches of the dried products. The four batches should be independent, this means that the RACs should be obtained from different locations and/or harvest seasons. The report should contain information which treatments the RAC has undergone between the time of harvest and time of trade of the dried product. Storage conditions

and any handling of the commodities between harvest and time of trade should be reported. The analytical method used to determine the dry matter content in the RAC and dried commodities should be fully described and validated and the analyses need to be performed under GLP. All data (processing, storage conditions, dry matter method description, results and validations) need to be described in a report obtained under GLP. To be able to share the results with EFSA, the report should be publicly available and preferably be written in English.

Default drying factors are based on the dry matter content in the starting material (RAC) and the dried commodity derived thereof for the most common dried products. Default drying factors are listed in OECD guidance no 96 of July 2008 (ENV/JM/MONO(2008)23) and are available on the OECD website:

<http://www.oecd.org/env/ehs/testing/seriesontestingandassessmenttotheregpesticidesresiduechemistry.htm>.

As the 2008 OECD list does not contain drying factors for all dried commodities, additional default drying factors were obtained from the CPAP (Conversion to Primary Agricultural Product) model used in the Dutch Food Consumption Surveys to convert foods to RACs. These CPAP factors are listed in RIVM report 320005006/2010 available on the RIVM website: [www.rivm.nl](http://www.rivm.nl). RIVM has put together a list of default drying factors for various commodities These are available on the RIVM website: <https://www.rivm.nl/en/chemkap/fruit-and-vegetables/processing-factors>