

PESTICIDE GUIDE ON DEALING WITH RESIDUE OF PESTICIDES IN FEED MATERIALS

PURPOSE

This document “*Pesticide guide*” describes how analysis results regarding residue of pesticide(s) in feed materials intended for the Dutch market, are assessed.

INTRODUCTION

The “*Pesticide guide*” is developed by the MRL meeting by the following parties¹:

Parties	Scope	Website
	Compound feed, premixtures/additives, calf milk powder and wet products	www.nevedi.nl
	Trade in grains, seeds and pulses	www.graan.com
	Wet feed	www.opnv.nl
	Processing oilseeds, refining of vegetable oils and fats	www.vernof.nl
	Production, processing and trade of oils and fats	www.mvo.nl
	Feed Specialties, animal health products	www.vddn.nl
	Production and trade in feed for direct delivery to farmers	www.securefeed.eu

The *Pesticide guide* has been coordinated with the NVWA and shared with the Dutch Ministry of Agriculture, Nature and Food Quality and the Dutch Ministry of Health, wellbeing and sports.

¹ The copyright of the *Pesticide guide* lies with SecureFeed, as does the management of the *Pesticide guide*.

HISTORY OF THE DOCUMENT

Version	Version completion date	General	Changes	Publication date
3.0	21-03-2022	Update	<p>Work method: included new interpretation of measurement uncertainty NVWA</p> <p>New chapter definitions</p> <p>Scheme III: Reference to annexes regarding processing factors</p> <p>Scheme IV: Reference to required argumentation for use of annex 1 and possible request of risk assessment by NVWA</p> <p>Scheme V: mention processing factor and derived MRL in scheme</p> <p>Annex 2: correction dead links and addition new links (MRL tool, wet dieren (Dutch), MRL interpretation NVWA, future footnote 1 product list, performance criteria GMP)</p>	Tbd
2.1	13-01-2022	Update of links to legislation / EU pesticide database	Annex 2: correction of dead links	2-2022
2.0	26-08-2019	Final version for publication on website	Adjustments following parties in the MRL meeting	26-9-2019

WORK METHOD

For the proper use of the *Pesticide guide* it is important to follow the following general rules:

1. Start every assessment at the beginning of the *Pesticide guide*, do not skip any steps. The assessment is a “peel-off model” in which options are increasingly eliminated. Starting the assessment at a random point in the *Pesticide guide* could lead to an incorrect assessment;
2. When an animal feed is unsafe and/or a legal limit is exceeded, the NVWA should be notified. Follow the guidelines of the NVWA (<https://www.nvwa.nl/onderwerpen/diervoeder/melden-onveilige-diervoeders>) and the notification guidelines of other organisations involved.
3. Sources of information that can help with pesticide assessment are listed in Annex 2. Always check whether the relevant link still leads to the most recent version of a source. Notify the manager of the *Pesticide guide* (monitoring@securefeed.eu) when links are no longer functioning or information is outdated. Substantive comments on the *Pesticide guide* can be submitted to your branch organization (specified on the cover page), so they can be discussed during periodic consultations of parties involved in the development of the *Pesticide guide*.
4. In cases not covered by the *Pesticide guide* the company that had the sample analysed (this can also be a company which sends a sample within a collective monitoring programme) shall assess the analysis results of pesticide(s) and the suitability of the relevant batch of feed material as feed;

“Anyone who deals with feed must immediately notify the NVWA if he / she finds or suspects that the feed exceeds legal limits, endangers human or animal health or is harmful to the environment”. The legal basis for this is article 5.15 of the Dutch law Wet Dieren (<https://wetten.overheid.nl/BWBR0030250>).
5. The collaborating parties in the MRL consultation have drawn up the *Pesticide guide* with the greatest possible care. However, this does not relieve the user from his own responsibility to correctly apply the legislation. The company is always primarily responsible for food safety. The *Pesticide guide* only aims to provide a guide on how to deal with a pesticide analysis result based on the current legislation. Therefore, the use of the *Pesticide guide* is entirely at one’s own risk. The collaborating parties cannot be held liable for the consequences of the use of the *Pesticide guide* in any way.
6. The *Pesticide guide* is coordinated with the competent authorities, but is not official legislation. No rights can therefore be derived from the results obtained with the use of the *Pesticide guide*.

DEFINITIONS

Pesticide analysis result (pesticide residue level): the result of the analysis as reported to the laboratory. The analysis result is to be corrected when not in the correct format to judge against legislation (88%DM for EU Dir 2002/32 pesticides, MRL definition for EU Reg 396/2005 pesticides), see annex 1. An analysis result that is part of a legislated sum, does not have to be judged separately if the sum is already judged.

CMR substances: Substances with certain characteristics, which can be found under the classification (“Classification (Reg. 1272/2008)”) in the ‘Active substances’ section in the EU Pesticide Database (link provided in annex 2). This classification is leading. If one or more of the terms: Muta. 1A, Muta 1B, Carc. 1A, Carc. 1B, Repr. 1A, Repr. 1B is mentioned, measurement uncertainty may not be taken into account when comparing results to MRL. The “Toelichting pesticidewijzer” (Dutch) provides examples of CRM substances, which are generally not allowed anymore as crop protection agent in the EU.

2002/32 pesticide: limits of these pesticides are given in [Directive 2002/32/EG, Annex I, section IV.](#)

When comparing pesticide analysis result to the limits, measurement uncertainty may not be taken into account.

- Aldrin
- Dieldrin
- Camphechlor (toxaphene) – sum of indicator congeners CHB 26, 50 and 62
- Chlordane (sum of cis- and trans-isomers and of oxychlordane, expressed as chlordane)
- DDT (sum of DDT-, DDD- (or TDE-) and DDE-isomers, expressed as DDT)
- Endosulfan (sum of alpha- and beta-isomers and of endosulfansulphate expressed as endosulfan)
- Endrin (sum of endrin and of delta-keto-endrin, expressed as endrin)
- Heptachlor (sum of heptachlor and of heptachlorepoxyde, expressed as heptachlor)
- Hexachlorobenzene (HCB)
- Hexachlorocyclohexane (HCH)
 - alpha-isomers
 - beta-isomers
 - gamma-isomers

Footnote 1 products: MRLs do not apply to products or part of products that by their characteristics and nature are used exclusively as ingredients of animal feed, until separate MRLs are set in the specific category 1200000 (footnote 1 Annex 1 Regulation EG 396/2005 as defined in Regulation (EU) 2018/62).

For such “footnote 1 products” applies that the product should be judged as not unsafe by means of risk assessment. Next to that argumentation should be provided that product is by characteristics and nature used exclusively as ingredients of animal feed, i.e. the footnote applies.

Annex 2 of this document refers to tools, which can be used for risk assessment.

Scheme I - pesticide listed in Dir. 2002/32 EG	Explanation
<pre> graph TD Start([Start]) --> Step1([Feed material with pesticide analysis result exceeding detection limit]) Step1 --> Dec1{1. Pesticide included in Annex I, section IV of Dir. 2002/32/EC?} Dec1 -- NO --> Step2([Feed material with pesticide analysis result exceeding detection limit, pesticide not included in Dir. 2002/32/EC]) Step2 --> A((A)) Dec1 -- YES --> Step3[2. Determine pesticide level based on 88% dry matter] Step3 --> Dec2{3. Level of pesticide (88% dry matter) <= maximum level?} Dec2 -- NO --> Step4([Product does not meet standard]) Step4 --> H((H)) Dec2 -- YES --> Step5([Product meets standard]) </pre>	<p>I. Pesticide included in Directive 2002/32/EG, Undesirable substances in feed, annex I, department IV</p> <p>1. When a pesticide analysis result above the detection limit is reported, check whether the pesticide involved is included in Directive 2002/32/EG, annex I, section IV. → If this is not the case, Directive 2002/32 does not apply to this pesticide. Proceed with the <i>Pesticide guide</i> at item A. → If this is the case, go to step 2.</p> <p>2. Calculate the detected pesticide level based on 88% dry matter. The maximum level of a pesticide in directive 2002/32 is expressed in mg pesticide per kg of feed with a moisture level of 12%. This is equivalent to mg pesticide per kg feed with 88% dry substance. The calculation of the pesticide level based on 88% dry matter is explained in annex 1. Go to step 3.</p> <p>3. Check whether the pesticide level (88% ds) is smaller or equal to the maximum level specified in the relevant product group. → If this is the case, the analysed sample meets the standard and the associated batch of feed can be processed. The assessment can be completed. → If this is not the case, the batch does not meet the limit. Proceed with the <i>Pesticide guide</i> at item H.</p>

Scheme II - Pesticide and feed material listed in Reg. EC 396/2005	Explanation
<pre> graph TD Start((A)) --> D1{1. Is the feed included in Reg. EC 396/2005 (EU Pesticides database) as such?} D1 -- NO --> B((B)) D1 -- YES --> D2{2. Is the pesticide included in Reg. EC 396/2005 (EU Pesticides database)?} D2 -- NO --> C((C)) D2 -- YES --> D3{3. Is the pesticide analysis result ≤ MRL?} D3 -- YES --> End1([Product meets MRL]) D3 -- NO --> G((G)) </pre>	<p>Regulation 396/2005 together with its annexes, is very extensive. For that reason, in this section of the <i>Pesticide guide</i> reference is made to the EU Pesticide Database, in which EU legislation can be explored in a very user-friendly manner.</p> <p>1. Check whether the feed material is included in the EU Pesticide Database</p> <p>NOTE: For some feed materials (such as. Triticale, Spelt) the MRL of a “main product” apply (in case of Triticale and Spelt, this is Wheat). → If the feed material is not included in this database, this section does not apply for this feed material. Proceed with the <i>Pesticide guide</i> at item B. → If your feed material is listed in this database, please proceed to step 2.</p> <p>2. Check whether the pesticide is included in EU Pesticide Database</p> <p>→ If the detected pesticide is not included in this database, this section does not apply to this pesticide. Proceed with the <i>Pesticide guide</i> at item C. → If the detected pesticide is included in this database, please proceed to step 3.</p> <p>3. Check whether the detected pesticide is smaller or equal to the MRL.</p> <p>→ If this is the case, the analysed sample meets the MRL and the associated batch of feed can be processed. The assessment can be completed. → If this is not the case, also when measurement uncertainty is taken into account, the batch does not meet the MRL. Proceed with the <i>Pesticide guide</i> at item G</p>

Scheme III - Pesticide in Reg. 396/2005, feed material derived from product listed in Reg. 396/2005	Explanation
<pre> graph TD Start[Regulation EC 396/2005] --> D1{1. Is the feed derived from a product included in Reg. EC 396/2005 (EU Pesticides database)?} D1 -- NO --> D[D] D1 -- YES --> D2{2. Is the pesticide included in Reg. EC 396/2005 (EU Pesticides database)?} D2 -- NO --> E[E] D2 -- YES --> D3{3. Is the pesticide analysis result ≤ MRL of the product named in Reg. EC. 396/2005?} D3 -- YES --> End([Product meets MRL]) D3 -- NO --> Next[See next page] </pre>	<p>1. Check whether the feed material is derived from a product included in the EU Pesticide Database</p> <p>NOTE:</p> <ul style="list-style-type: none"> - For some products (e.g. spelt) the MRL of a "main product" (e.g. Spelt bran > Spelt > Wheat) apply. - Limits for grains apply to the grain (and products derived therefrom), not for other parts of the plant (straw, chaff, silage). To which product parts the MRL apply in a general sense, is specified in column 6 of annex I of Reg. EC nr. 396/2005 <p>→ If the start product is not included in the EU Pesticide database, this section does not apply to your feed material. Proceed with the <i>Pesticide guide</i> at item D.</p> <p>If the start product is included in this database, please check column 6 of annex I of Reg. EC no. 396/2005 whether the MRL apply to your product part.</p> <ul style="list-style-type: none"> → If the MRL do not apply to your product part, this section does not apply for your feed material. Proceed with the <i>Pesticide guide</i> at item D. → If the MRL do apply for your product part, please proceed to step 2. <p>2. Check whether the pesticide is included in EU Pesticide Database</p> <ul style="list-style-type: none"> → If the detected pesticide is not included in this database, this section does not apply for this pesticide. Proceed with the <i>Pesticide guide</i> at item E. → If the detected pesticide is included in this database? Go to step 3. <p>3. Check whether the detected pesticide level in the derived product (the feed material) is smaller or equal to the MRL for the start product.</p> <ul style="list-style-type: none"> → If this is the case, the analysed sample meets the MRL and the associated batch of feed can be processed. The assessment can be completed. → If this is not the case, also when measurement uncertainty is taken into account, please go to step 4 on the next page.

Scheme III (continued) - Pesticide in Reg. EC 396/2005, feed material derived from listed product	Explanation
<pre> graph TD Start([See previous page]) --> D3{3. Is the pesticide analysis result ≤ MRL of the product named in Reg. EC 396/2005?} D3 -- YES --> G([Product meets MRL]) D3 -- NO --> D4{4. Does the pesticide concentrate in the feed material derived from the product in Reg. EC 396/2005?} D4 -- YES --> D5{5. Pesticide analysis result ≤ concentration factor * MRL of the starting product?} D4 -- NO or UNKNOWN --> D6{6. Does the (derived) product also have food applications?} D5 -- YES --> G D5 -- NO --> D6 D6 -- YES --> G2([Product does not meet MRL]) D6 -- NO --> F([No MRL applicable Footnote 1*]) D6 --> F2([Feed material derived from product in annex I Reg. EC 396/2005. Pesticide included in Reg. EC 396/2005. No food application.]) F2 --> F G2 --> G3((G)) F --> G4((F)) </pre> <p>*: MRLs do not apply to products or part of products that by their characteristics and nature are used exclusively as ingredients of animal feed, until separate MRLs are set in the specific category 1200000 (footnote 1 Annex 1 Regulation EG 396/2005 as defined in Regulation (EU) 2018/62).</p>	<p>4. Check whether it is possible that the pesticide is concentrated in the feed material derived from the product in Reg. EC 396/2005. This can be the case when:</p> <ul style="list-style-type: none"> • the pesticide is fat-soluble and the feed material contains more fat than the start product • the pesticide is water-soluble and the feed material is lower in fat than the start product • the feed material is drier than the start product <p>The concentration of a pesticide in a feed material relative to a start product is expressed with a concentration factor (also known as processing factor or transfer factor). The usual calculation of concentration factors is explained in Annex 1. Sources of published concentration factors are given in Annex 2.</p> <p>→ If there are known concentration factors OR the product is a wet by-product or dried, proceed to step 5</p> <p>→ If there are no known concentration factors, proceed to step 6</p> <p>5. Check whether the detected pesticide level is less than or equal to the derived MRL (concentration factor * MRL of start product). If yes, the product can be processed and the assessment can be completed. If not, also when measurement uncertainty is taken into account, proceed to step 6.</p> <p>6. If there are no known concentration factors, the same MRL applies to derived products (feed material) as to the start product. At that time, it is important to determine whether the feed material also has food applications.</p> <p>→ If there are food applications, the batch does not meet the standard. Proceed with the <i>Pesticide guide</i> at item G</p> <p>→ If there are no food applications, this section does not apply for your feed material. Proceed with the <i>Pesticide guide</i> at item F.</p>

Scheme IV - Feed material not derived from product or excluded part in Vo. 396/2005	Explanation
<p>D</p> <p>Feed material not derived from a product in annex I Reg. EC 396/2005 OR excluded part of product in annex I EC Reg. 396/2005. Pesticide analysis result exceeds detection limit, pesticide not included in Dir. 2002/32/EC.</p> <p>Regulation 396/2005 art. 18 sub 1b.</p> <p>1. Is the analysis result \leq 0,01 mg/kg***?</p> <p>YES → Product can be used as feed</p> <p>NO → 2. The company decides to reject the batch?</p> <p>YES → 5. Report to NVWA and other parties involved → Product is not used as feed by the company***</p> <p>NO → 3. Draw up risk assessment</p> <p>4. Product safe to use as feed?</p> <p>YES → 6. Archive risk assessment → Risk assessment → 7. Product can be used as feed within the preconditions of the risk assessment. → END</p> <p>NO → 5. Report to NVWA and other parties involved → Product is not used as feed by the company***</p> <p>***: In principle, a rejected product is not used as or in animal feed, unless the NVWA provided permission (for example, if re-analysis shows laboratory error occurred in the first analysis, if cleaning of the lot is possible etc.)</p>	<p>The feed material is not derived from a product in annex 1 or is excluded part of a product in annex 1.</p> <ol style="list-style-type: none"> Check whether the pesticide analysis result is below the EU default value of 0.01 mg/kg (product base) **. <ul style="list-style-type: none"> → If this is the case, the associated batch of feed can be processed. The assessment can be completed. → If this is not the case, proceed to step 2. As a company, you can decide to reject a batch based on the analysis result without carrying out a risk assessment. In this case, you notify the NVWA and other parties involved that you have rejected the batch with the analysis result (see step 5). Draw up a risk assessment to assess whether it is safe to use the product as feed, see annex 2 for information sources. Next to that argumentation should be provided that product is by characteristics and nature used <u>exclusively</u> as ingredient of animal feed, i.e. the footnote applies. Judge product parts which are excluded of the MRL definition and in which underpinning the footnote 1 status is hard according to scheme III. <ul style="list-style-type: none"> → If this is not the case, the associated batch of feed cannot be safely processed as feed within the preconditions of the risk assessment. Proceed to step 5. → If this is the case, the associated batch of feed can be processed safely, in accordance with the restrictions as included in the risk assessment. Go to step 6. Notify NVWA and other parties involved. Archive the risk assessment so that it can be made available. The NVWA can ask for the risk assessment during an inspection of when they receive notification form the lab. Use the product within the preconditions of the risk assessment

<p>Scheme V – Pesticide not listed in Dir. 2002/32/EG and Reg. EC 396/2005 or pesticide analysis result exceeds MRL (derived) product Vo. 396/2005</p>	<p>Explanation</p>
<p>C</p> <p>Feed material in annex I Reg. EC 396/2005. Pesticide analysis result exceeds detection limit, pesticide not included in Dir. 2002/32/EC or Reg. EC 396/2005.</p> <p>E</p> <p>Feed material derived from a product in annex I Reg. EC 396/2005. Pesticide analysis result exceeds detection limit, pesticide not included in Dir. 2002/32/EC or Reg. EC 396/2005.</p> <p>Feed material (derived from) product in annex I Reg. EC 396/2005. Pesticide not included in Dir. 2002/32/EC or Reg. EC 396/2005.</p> <p>Regulation 396/2005 art. 18 sub 1b</p> <p>1. Is the Pesticide analysis result $\leq 0,01$ mg/kg**?</p> <p>YES</p> <p>Product can be used as feed</p> <p>NO</p> <p>H</p> <p>Product does not meet standard in Reg. 2002/32</p> <p>G</p> <p>Product does not meet MRL 396/2005</p> <p>2. Legal nonconformity?</p> <p>YES</p> <p>6. Report to NVWA and other parties involved.</p> <p>Product is not used as feed**</p> <p>** : Default MRL: 0,01 mg/kg for those products for which no specific MRL is set out in Annexes II or III, or for active substances not listed in Annex IV unless different default values are fixed for an active substance while taking into account the routine analytical methods available (EC Reg 36/2005 art. 18 sub 1b).</p> <p>***: In principle, a rejected product is not used as or in animal feed, unless the NVWA provided permission (for example, if re-analysis shows laboratory error occurred in the first analysis, if cleaning of the lot is possible etc.)</p>	<p>1. Check whether the pesticide level $\leq 0,01$ mg/kg** (product base).</p> <p>→ If this is the case, the associated batch of feed can be processed. The assessment can be completed.</p> <p>→ If this is not the case, the pesticide analysis result is above the default MRL which applies for a non-included pesticide on a product listed in annex I of Reg 396/2005 (EC Reg 396/2005, art. 18 lid 1b). Go to step 2.</p> <p>In case of derived products, you can take a concentration factor into account, as explained in scheme III, and judge against the applied MRL taken measurement uncertainty into account if applicable.</p> <p>2. The product does not meet legal limits. NVWA must be notified and the batch must be rejected:</p> <ul style="list-style-type: none"> - H: Products intended for feeding animals may not be put on the market and / or used if the content of undesirable substances is higher than the maximum levels laid down in Annex I of Directive 2002/32 (Directive 2002/32, Article 3) - C, E, G: If it is known that a product does not comply with the MRL, it cannot be processed or mixed with the same or other products for the purpose of placing it on the market as a food or feed, or feeding it to animals (in the context of Regulation 396/2005, article 19), unless permission has been obtained from the NVWA for this. <p>Go to step 6.</p> <p>NB: take into account exceptions in the legislation or common practice (national Dutch limits for piperonyl butoxide or metabolites of pesticides which are legislated), see Toelichting pesticidewijzer (Dutch).</p>

Scheme V (continued) – pesticide analysis result above MRL (derived) product Reg. 396/2005 in a feed material with only feed application	Explanation
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>*: MRLs do not apply to products or part of products that by their characteristics and nature are used exclusively as ingredients of animal feed, until separate MRLs are set in the specific category 1200000 (footnote 1 Annex 1 Regulation EG 396/2005 as defined Regulation (EU) 2018/62).</p> <p>***: In principle, a rejected product is not used as or in animal feed, unless the NVWA provided permission (for example, if re-analysis shows laboratory error occurred in the first analysis, if cleaning of the lot is possible etc.)</p> </div> <div style="width: 50%;"> <pre> graph TD Start((F)) --> NoMRL([No MRL applicable (Footnote 1*)]) NoMRL --> Dec3{3. The company decides to reject the batch} Dec3 -- YES --> Step6[6. Report to NVWA and other parties involved] Dec3 -- NO --> Step4[4. Draw up risk assessment] Step4 --> Dec5{5. Product safe to use as feed?} Dec5 -- NO --> Step6 Dec5 -- YES --> Step7[7. Inform NVWA about analysis result and risk assessment] Step7 -- OBJECTION NVWA --> Step6 Step7 --> Step8[8. Archive risk assessment and possible response NVWA] Step8 --> Step9[9. Product can be used as feed within the preconditions of the risk assessment] Step9 --> End((END)) Step6 --> ProductNotUsed([Product is not used as feed***]) </pre> </div> </div>	<ol style="list-style-type: none"> 3. For products with only feed application, no MRL applies. As a company, you can decide to reject a batch based on the analysis result without carrying out a risk assessment. Go to step 6. 4. Draw up a risk assessment to assess whether it is safe to use the product in or as feed, see annex 2 for information sources. 5. → If this is not the case, the associated batch of feed is not safe to process as feed within the preconditions of the risk assessment. Go to step 6. → If this is the case, the associated batch of feed can be safely processed in accordance with the limitations as included in the risk assessment. Go to step 7. 6. Notify the NVWA and other parties involved about the rejection based on unsuitability (based on legal limits), unsafety (based on risk assessment) or other reasons. If the notified product has already been processed in another feed (such as a compound feed) a risk assessment must also be drawn up for this other product. 7. Notify the NVWA about the analysis result and the risk assessment when you have assessed a product as safe. If you receive an objection from the NVWA, do not use the product as feed. 8. Archive the risk assessment and any response of the NVWA, so that it can be made available. 9. Use the product within the preconditions of the risk assessment.

Annex 1: Calculations with pesticide analysis results

Conversion to 88% DM (EU Dir. 2002/32 pesticides)

This conversion is done for pesticides in Directive 2002/32, because this directive provides pesticide limits based on 88% dry matter.

$$\text{Pesticide content (88\% ds)} = \frac{88}{\% \text{ dry matter in product}} * \text{pesticide analysis result}$$

Conversion pesticide analysis result to MRL definition (EU Reg. 396/2005 pesticides)

The MRL definition in Reg 396/2005 can contain active substances as well as metabolites.

Most labs only report detected substances and often according to MRL definition, so that it can be judged against MRLs in legislation.

If not the case, the pesticide analysis result should be converted before comparing against the legislation.

Pesticide analysis result according to MRL definition (expressed as substance A) = Pesticide Analysis Result substance A + Pesticide Analysis Result substance M * factor M

Your laboratory can perform this conversion for you.

Concentration factors

Concentration factor based on drying

The MRL in Regulation 396/2005 are on a product basis.

In scheme III, corrections can be made for drying (if not already included in the definition/normal state of the product) by applying a concentration factor.

$$\text{Concentration factor by drying} = \frac{\% \text{ dry matter in derived product}}{\% \text{ dry matter in product in Reg. EC 396/2005}}$$

Fat-based concentration factor (fat-soluble pesticide)

In the EU pesticide database (F) is sometimes shown after the name of a pesticide. This means that it is fat-soluble.

In scheme III, corrections can be made for fat solubility by applying a concentration factor.

$$\text{Concentration factor based on fat} = \frac{\% \text{ fat in derived product}}{\% \text{ fat in product in Reg. EC 396/2005}}$$

For more explanation, see the MVO explanation of concentration factors in annex 2

Concentration factors according to yield

Pesticide concentration can be higher in derived products than in the raw agricultural commodity, when pesticide is concentrated on the outside, e.g. in case of peelings.

This can be corrected by means of a yield factor.

$$\text{Concentration factor based on yield} = \frac{1}{\text{yield factor}} = \frac{\text{kg product (RAC)}}{\text{kg derived product}}$$

Yield factors can be available from branch organisations and/or requested by the producer of derived products.

Concentration factors according to measurements of specific pesticides on specific feed materials

EFSA and RIVM published concentration factors for a number of pesticide-product combinations (see annex 2)

$$\text{Concentration factor pesticide} = \frac{\text{pesticide residue } \left(\frac{\text{mg}}{\text{kg}}\right) \text{ in derived product}}{\text{pesticide residue } \left(\frac{\text{mg}}{\text{kg}}\right) \text{ in product (RAC)}}$$

Pesticide-product concentration factor is often not publicly available as many possible combinations of feed material and pesticide can be made.

A company can underpin their product is according to MRL based on private data and/or generic concentration factors in combination with the properties of the pesticide and the product, and provide this argumentation to NVWA to judge.

Annex 2: Information sources (last update: 18-02-2022)**National and international legislation and limits**

NAAM*	URL*
European feed legislation (via EU)	https://eur-lex.europa.eu/advanced-search-form.html?locale=en
Directive on Undesirable Substances in feed, Dir. 2002/32/EG	https://eur-lex.europa.eu/eli/dir/2002/32
Regulation setting maximum levels for pesticide residues in or on food and feed of vegetable and animal origin, Reg. (EC) nr. 396/2005	https://eur-lex.europa.eu/eli/reg/2005/396
Pesticide web, main page	https://ec.europa.eu/food/plant/pesticides/eu-pesticides-db_en
Pesticide web, search page pesticides and products (MRL)	https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/mrls/?event=search.pr
Pesticide web, search page products	https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/products/?event=search.pr
Pesticide web, search page active substances	https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/active-substances/?event=search.as
Regulation (EU) 2018/62 of January 17 th 2018 replacing Annex I of Regulation (EC) nr. 396/2005	https://eur-lex.europa.eu/eli/reg/2018/62
Regulation EC 178/2002 (Article 20)	https://eur-lex.europa.eu/eli/reg/2002/178
Dutch law Wet dieren (artikel 5.15)	https://wetten.overheid.nl/BWBR0030250
Dutch law Commodities Act Regulation on pesticide residues	http://wetten.overheid.nl/BWBR0003658/ Dutch legislation (contains limits for piperonyl butoxide)
Notification guidelines NVWA (Dutch)	https://www.nvwa.nl/onderwerpen/diervoeder/melden-onveilige-diervoeders
Notification guidelines MRL exceedances in animal feed NVWA (Dutch)	https://www.nvwa.nl/onderwerpen/diervoeder/melden-onveilige-diervoeders/meldplicht-mrl-overschrijdingen-in-diervoeder
Decision tree MRL exceedances in animal feed NVWA (Dutch)	https://www.nvwa.nl/onderwerpen/diervoeder/documenten/dier/diervoeder/diervoeder/publicaties/beslisboom-mrl-overschrijding-diervoeder
NVWA	List with NVWA accepted footnote 1 products (in development at NVWA, link follows)
Definition measurement uncertainty	See Expanded measurement uncertainty in GMP BA11 / TS 4.2
Codex Alimentarius, Codex Pesticides Residues in Food Online Database: main page	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/en/
Codex Alimentarius, Codex Pesticides Residues in Food Online Database: search page pesticides	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/pesticides/en/
Codex Alimentarius, Codex Pesticides Residues in Food Online Database: search page products	http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/commodities/en/

Note: always choose the consolidated version of EU legislation, which incorporates all changes that have been made over the years.

Published concentration factors

NAAM*	URL*
Concentration factors vegetable fats and oils (MVO): explanation	https://mvo.nl/themas/voedsel-diervoederveiligheid MVO notifying requirements on pesticide residues, available at https://files.enflow.nl/c88ab0bd-554b-4192-a54c-eacc6f5598d4/67812a2b-7ad6-4fb1-9d6d-2da2cb095b35/food-and-feed-safety/version-3-dec-2018-final-mvo-notifying-requirements-on-pesticides.pdf
Concentration factors vegetable fats and oils (MVO): factors	http://www.fediol.be/data/fediol_11SAF181_3578.pdf
EFSA European database on processing factors	https://doi.org/10.5281/zenodo.1488652
Processing factors for vegetable products RIVM (in particular fruit and vegetables)	https://www.rivm.nl/en/chemkap/fruit-and-vegetables/processing-factors

Sources of dry matter and fat contents (if not known from the sample itself)

NAAM*	URL*
Dutch Food Composition Database	Dutch Food Composition Database RIVM For dry matter contents of food
Centraal Veevoedkundig Bureau	http://www.cvbdiervoeding.nl/pagina/10081/downloads.aspx For dry matter content of feed materials

Risk assessment for consumers

NAAM*	URL*
Risk assessment for animals and consumers for footnote 1 products applied in compound feed (preferred option)	Pesticide Residue Risk Assessment Tool for footnote 1 products https://www.graan.com/page/156/mrl-tool
Risk assessment for the consumer when the maximum residue limit for pesticides is exceeded (MRL)	http://www.favv-afscab.be/plantaardigeproductie/gewasbeschermingsmiddelen/#PSTI Calculation PSTI at bottom (Dutch)