Modification of the existing maximum residue levels for folpet in barley, oat, rye and wheat

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Abstract

In accordance with Article 6 of Regulation (EC) No 396/2005, the applicant Adama Agriculture B.V on behalf of Adama Makhteshim Ltd submitted a request to the competent national authority in France to modify the existing maximum residue levels (MRL) for the active substance folpet in barley, oat, rye and wheat. The data submitted in support of the request were found to be sufficient to derive MRL proposals for these commodities. Adequate analytical methods for enforcement are available to control the residues of folpet and phthalimide in dry commodities at the validated limit of quantification (LOQ) of 0.01 mg/kg per analyte. Based on the risk assessment results, EFSA concluded that the short-term and long-term intake of residues resulting from the use of folpet according to the reported agricultural practices is unlikely to present a risk to consumer health.

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Keywords: folpet, cereals, fungicide, MRL, consumer risk assessment

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Summary

In accordance with Article 6 of Regulation (EC) No 396/2005, Adama Agriculture B.V on behalf of Adama Makhshim Ltd submitted an application to the competent national authority in France (evaluating Member State, EMS) to modify the existing maximum residue levels (MRLs) for the active substance folpet in barley, oat, rye and wheat. The EMS drafted an evaluation report in accordance with Article 8 of Regulation (EC) No 396/2005, which was submitted to the European Commission and forwarded to the European Food Safety Authority (EFSA) on 15 December 2016. To accommodate for the intended uses of folpet, the EMS proposed to modify the existing MRLs from 1 to 2 mg/kg in barley, from 0.07* to 2 mg/kg in oats, from 0.07* to 0.3 mg/kg in rye and from 0.4 to 0.3 mg/kg in wheat.

EFSA assessed the application and the evaluation report as required by Article 10 of the MRL regulation. EFSA identified data gaps and points which needed further clarification, which were requested from the EMS. On 1 March 2021 the EMS submitted the requested information in a revised evaluation report, which replaced the previously submitted evaluation report.

Based on the conclusions derived by EFSA in the framework of Directive 91/414/EEC, the data evaluated under previous MRL assessments and the additional data provided by the EMS in the framework of this application, the following conclusions are derived.

The metabolism of folpet following foliar application was investigated in crops belonging to the groups of fruit crops (grapes, avocados, tomatoes), root crops (potatoes) and cereals/grass (wheat).

Studies investigating the effect of processing on the nature of folpet (hydrolysis studies) demonstrated that the active substance degrades completely under the representative processing conditions into phthalimide and phthalic acid.

The crops under consideration may be grown in rotation with other crops. According to the soil degradation studies evaluated in the framework of the peer review, the DT90 values for folpet, phthalimide and the soil metabolites phthalic acid and phthalamic acid are below the trigger value of 100 days. Therefore, residues in rotational crops are not expected.

Based on the metabolic pattern identified in metabolism studies, hydrolysis studies, the toxicological significance of metabolites and degradation products, the residue definitions for plant products were proposed as 'sum of folpet and phthalimide, expressed as folpet' for enforcement and risk assessment. These residue definitions are applicable to primary crops, rotational crops and processed products.

EFSA concluded that for the crops assessed in this application, metabolism of folpet in primary and in rotational crops, and the possible degradation in processed products have been sufficiently addressed and that the previously derived residue definitions are applicable.

Sufficiently validated analytical methods based on high-performance liquid chromatography with tandem mass spectrometry (HPLC-MS/MS) are available to quantify residues in the crops assessed in this application according to the enforcement residue definition. The newly submitted method and its independent laboratory validation (ILV) enable quantification of folpet and phthalimide at or above 0.01 mg/kg (limit of quantification (LOQ)) per analyte in the crops assessed.

The available residue trials are sufficient to derive MRL proposals on the basis of the intended uses in cereals.

Tentative processing factors (PF) for beer, pot barley flour and pearl barley flour were derived from processing studies on barley and tentative PFs for wheat bran, wheat flour and bread were derived from processing studies on wheat.

As the crops under consideration and their by-products are used for feed purposes, a potential carry-over into food of animal origin was assessed. The calculated livestock dietary burden exceeded the trigger value of 0.1 mg/kg dry matter (DM) for all animal species. Therefore, the possible occurrence of folpet residues in commodities of animal origin was investigated. The nature of folpet residues in ruminants has been investigated during the EU pesticides peer review of folpet. As a similar metabolic pathway was found in rodents, the findings in ruminants can be extrapolated to pigs. The residue definition for both enforcement and risk assessment was proposed as 'phthalimide, expressed as folpet'.

A new metabolism study in poultry was submitted and assessed with the present MRL application. The results of the study showed that the parent is extensively metabolised in poultry and suggest a similar metabolic pathway between poultry and ruminants. Therefore, the residue definitions derived for ruminants are also applicable for poultry.

No feeding studies on phthalimide are available and are not required as, based on the estimated dietary burdens and metabolism studies in livestock, residues of phthalimide (expressed as folpet) are
not expected to occur at levels above the LOQ of 0.05 mg/kg. Therefore, there is currently no need to modify the existing MRLs in animal tissues, milk and eggs.

The toxicological profile of folpet was assessed in the framework of the EU pesticides peer review under Directive 91/414/EEC and the data were sufficient to derive an acceptable daily intake (ADI) of 0.1 mg/kg body weight (bw) per day and an acute reference dose (ARfD) of 0.2 mg/kg bw. The metabolite included in the residue definition is considered to be of similar toxicity as the parent active substance.

The consumer risk assessment was performed with revision 3.1 of the EFSA Pesticide Residues Intake Model (PRIMo). The short-term exposure assessment was performed for the commodities assessed in this application in accordance with the internationally agreed methodology. The calculations were based on the median residue values derived from supervised field trials (STMR) and show that the short-term exposure did not exceed the ARfD for any of the crops assessed in this application (up to 0.9% of the ARfD for wheat).

In the framework of the MRL review, a comprehensive long-term exposure assessment was performed, taking into account the existing uses at EU level. EFSA updated the calculation with the relevant STMR values derived from the residue trials submitted in support of this MRL application for barley, oat, rye and wheat; in addition, STMRs derived in the EFSA opinion published after the MRL review were used. The estimated long-term dietary intake was up to 8% of the ADI (NL toddler diet). The highest contribution of residues expected in the commodities assessed in this application to the overall long-term exposure was up to 0.9% of the ADI for wheat.

EFSA concluded that the proposed uses of folpet on barley, rye, oat and wheat will not result in a consumer exposure exceeding the toxicological reference values and, therefore, is unlikely to pose a risk to consumers’ health.

The peer review of the active substance in accordance with Regulation (EC) No 1107/2009 is ongoing and, therefore, the conclusions reported in this reasoned opinion might need to be reconsidered in the light of the outcome of the peer review.

EFSA proposes to amend the existing MRLs as reported in the summary table below.

Full details of all end points and the consumer risk assessment can be found in Appendices B to D.

| Code(a) | Commodity | Existing EU MRL (mg/kg) | Proposed EU MRL (mg/kg) | Comment/justification |
|---------|------------|-------------------------|-------------------------|-----------------------|
| 500010  | Barley     | 1 (ft.1)                | 2                       | The submitted data are sufficient to derive an MRL proposal for the SEU use. Risk for consumers unlikely. The data gap identified in the MRL review was sufficiently addressed (ft.1). |
| 500050  | Oat        | 0.07*                   | 2                       | The submitted data are sufficient to derive an MRL proposal for the SEU use. Risk for consumers unlikely. |
| 500070  | Rye        | 0.07*                   | 0.3                     | The submitted data are sufficient to derive an MRL proposal for the SEU use. Risk for consumers unlikely. |
| 500090  | Wheat      | 0.4 (ft.2)              | 0.3                     | The submitted data are sufficient to derive an MRL proposal for the SEU use. Risk for consumers unlikely. The data gap identified in the MRL review was sufficiently addressed (ft.2). The submitted data are based on the same GAP assessed under the MRL review and support a lower MRL proposal. |

MRL: maximum residue level; SEU: southern Europe; GAP: Good Agricultural Practice.
*: Indicates that the MRL is set at the limit of analytical quantification (LOQ).
(a): Commodity code number according to Annex I of Regulation (EC) No 396/2005.
(ft.1): The European Food Safety Authority identified some information on analytical methods as unavailable. When re-viewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 6 February 2018, or, if that information is not submitted by that date, the lack of it.
(ft.2): The European Food Safety Authority identified some information on residue trials and analytical methods as unavailable. When re-viewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 6 February 2018, or, if that information is not submitted by that date, the lack of it.
It is noted that the available metabolism study in poultry addresses the data gap identified in the MRL review requiring further investigation on the nature and magnitude of residues in poultry. Therefore, risk managers may consider deleting the corresponding footnotes in Regulation (EC) No 396/2005.
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Assessment

The European Food Safety Authority (EFSA) received an application to modify the existing maximum residue level (MRL) for folpet in barley, oat, rye and wheat. The detailed description of the intended uses of folpet, which are the basis for the current MRL application, is reported in Appendix A.

Folpet is the ISO common name for N-(trichloromethylthio)phthalimide (IUPAC). The chemical structures of the active substance and its main metabolites are reported in Appendix E.

Folpet was evaluated in the framework of Directive 91/414/EEC with Italy designated as rapporteur Member State (RMS) for the representative uses as a foliar application to winter wheat, tomatoes and wine grapes. The draft assessment report (DAR) prepared by the RMS has been peer reviewed by EFSA (EFSA, 2009). Folpet was approved for the use as fungicide on 1 October 2007.

The process of renewal of the first approval is currently ongoing.

The EU MRLs for folpet are established in Annexes II of Regulation (EC) No 396/2005. The review of existing MRLs according to Article 12 of Regulation (EC) No 396/2005 (MRL review) has been performed (EFSA, 2014) and the proposed modifications have been implemented in the MRL legislation. After completion of the MRL review, EFSA has issued one reasoned opinion on the modification of MRLs for folpet (EFSA, 2017). The proposals from this reasoned opinion has been considered in MRL regulations.

In accordance with Article 6 of Regulation (EC) No 396/2005, Adama Agriculture B.V on behalf of Adama Makhteshim Ltd submitted an application to the competent national authority in France (evaluating Member State, EMS) to modify the existing maximum residue levels (MRLs) for the active substance folpet in barley, oat, rye and wheat. The EMS drafted an evaluation report in accordance with Article 8 of Regulation (EC) No 396/2005, which was submitted to the European Commission and forwarded to EFSA on 15 December 2016. To accommodate for the intended uses of folpet, the EMS proposed to modify the existing MRL from 1 to 2 mg/kg in barley, from 0.07 to 2 mg/kg in oats, from 0.07 to 0.3 mg/kg in rye and from 0.4 to 0.3 mg/kg in wheat.

EFSA assessed the application and the evaluation report as required by Article 10 of the MRL regulation. EFSA identified data gaps and points which needed further clarification which were requested from the EMS. On 1 March 2021 the EMS submitted the requested information in a revised evaluation report (France, 2016), which replaced the previously submitted evaluation report.

EFSA based its assessment on the evaluation report submitted by the EMS (France, 2016), the draft assessment report (DAR) (and its addenda) (Italy, 2004, 2005, 2008) prepared under Council Directive 91/414/EEC, the Commission review report on folpet (European Commission, 2008), the conclusion on the peer review of the pesticide risk assessment of the active substance folpet (EFSA, 2009), the reasoned opinion on the MRL review according to Article 12 of Regulation (EC) No 396/2005 (EFSA, 2014), as well as the conclusions from a previous EFSA opinion on folpet (EFSA, 2017).

For this application, the data requirements established in Regulation (EU) No 544/2011 and the guidance documents applicable at the date of submission of the application to the EMS are applicable (European Commission, 1997a–g, 2000, 2010a,b, 2017; OECD, 2011, 2013). The assessment is performed in accordance with the legal provisions of the Uniform Principles for the Evaluation and the Authorisation of Plant Protection Products adopted by Commission Regulation (EU) No 546/2011.

As the renewal of the approval of the active substance folpet in accordance with Regulation (EC) No 1107/2009 is not yet finalised, the conclusions reported in this reasoned opinion may need to be reconsidered in the light of the outcome of the peer review.

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1 Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market. OJ L 230, 19.8.1991, p. 1–32.
2 Commission Directive 2007/5/EC of 7 February 2007 amending Council Directive 91/414/EEC to include captan, folpet, formetanate and methiocarb as active substances. OJ L 35, 8.2.2007, p. 11–17.
3 Regulation (EC) No 396/2005 of the Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC. OJ L 70, 16.03.2005, p. 1–16.
4 For an overview of all MRL Regulations on this active substance, please consult: [https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/active-substances/?event=search.as](https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/active-substances/?event=search.as)
5 Commission Regulation (EU) No 544/2011 of 10 June 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the data requirements for active substances. OJ L 155, 11.6.2011, p. 1-66.
6 Commission Regulation (EU) No 546/2011 of 10 June 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards uniform principles for evaluation and authorisation of plant protection products. OJ L 155, 11.6.2011, p. 127–175.
A selected list of end points of the studies assessed by EFSA in the framework of this MRL application including the end points of relevant studies assessed previously, is presented in Appendix B.

The evaluation report submitted by the EMS (France, 2016) and the exposure calculations using the EFSA Pesticide Residues Intake Model (PRIMo) are considered as supporting documents to this reasoned opinion and, thus, are made publicly available as background documents to this reasoned opinion.

1. **Residues in plants**

1.1. **Nature of residues and methods of analysis in plants**

1.1.1. **Nature of residues in primary crops**

The metabolism of folpet in primary crops following foliar application in crops belonging to the groups of fruit crops (grapes, avocados, tomatoes), root crops (potatoes) and cereals/grass (wheat) has been investigated in the framework of the EU pesticides peer review and the MRL review (EFSA, 2009, 2014). Folpet was extensively metabolised in all tested crops, especially in fruits and potatoes, to phthalimide, phthalamic acid and phthalic acid.

For the intended uses on barley, oat, rye and wheat, the metabolic behaviour in primary crops is sufficiently addressed.

1.1.2. **Nature of residues in rotational crops**

All crops under consideration may be grown in rotation with other crops. According to the soil degradation studies evaluated in the framework of the peer review, the DT90 values for folpet, phthalimide and the soil metabolites phthalic acid and phthalamic acid are expected to range between 1 and 94 days (under laboratory conditions) which are below the trigger value of 100 days. Additionally, the half-lives of folpet and phthalimide are < 3 days under field conditions (EFSA, 2009, 2014). According to the European guidelines on rotational crops (European Commission, 1997c), further investigation of residues in rotational crops is not required and relevant residues in rotational crops are not expected.

1.1.3. **Nature of residues in processed commodities**

The effect of processing on the nature of folpet residues was assessed in the MRL review (EFSA, 2014). Folpet was shown to degrade completely under the representative processing conditions into phthalimide and phthalic acid.

1.1.4. **Methods of analysis in plants**

Analytical methods for the determination of residues of folpet and phthalimide in plants were assessed during the MRL review (EFSA, 2014) and a more recent MRL application (EFSA, 2017).

A new multiresidue analytical method and an independent laboratory validation (ILV) were submitted for the enforcement of folpet and phthalimide in high protein content/dry commodities in the framework of the present application (France, 2016). The methods are based on high-performance liquid chromatography with tandem mass spectrometry (HPLC-MS/MS) (QuEChERS) and quantify residues of folpet and phthalimide at an limit of quantification (LOQ) of 0.01 mg/kg per analyte according with the residue definition for enforcement. The primary method is highly specific as it was validated at one primary and one confirmatory transition per analyte. Therefore, a confirmatory method is not required.

EFSA concludes that the new multiresidue method of analysis is sufficiently validated for the determination of residues of folpet and phthalimide in the crops under consideration (cereals) and allows quantifying residues at or above the LOQ of 0.01 mg/kg for each analyte. The method addresses the data gap identified in the MRL review with regard to a missing ILV for folpet and phthalimide in dry commodities. Therefore, risk managers may consider deleting the footnote in
Regulation (EC) No 396/2005 where missing information on analytical methods for folpet in barley and wheat is identified.\(^7\)

### 1.1.5. Storage stability of residues in plants

The storage stability of folpet and phthalimide were assessed in the framework of the MRL review (EFSA, 2014) and a more recent MRL application (EFSA, 2017). Detailed information on the studies evaluated previously was submitted with the present application (France, 2016) and addresses the minor deficiency identified in the MRL review related to a request for a detailed evaluation report of the storage stability study for phthalimide in high water content (tomatoes, apples and onions), high acid content (grapes) and dry commodities (wheat). Based on the detailed evaluation EFSA concluded that residues of phthalimide are stable at \(-18^\circ C\) when stored for up to 12 months in high water content commodities, up to 13 months in high acid content commodities and up to 18 months in dry commodities.

For the crops assessed in the framework of this application, it was demonstrated that residues in wheat grain and straw were stable under storage at \(-18^\circ C\) for at least 12 months for folpet and 18 months for phthalimide.

### 1.1.6. Proposed residue definitions

Based on the metabolic pattern identified in metabolism studies, the results of hydrolysis studies, the toxicological significance of metabolites and/or degradation products and the capabilities of enforcement analytical methods, the residue definitions for risk assessment and enforcement as proposed in the framework of the peer review (EFSA, 2009) were:

- sum of folpet and phthalimide, expressed as folpet.

The same residue definitions are applicable to rotational crops and processed products.

The residue definition for enforcement in plant commodities set in Regulation (EC) No 396/2005 is identical with the abovementioned residue definition.

EFSA concluded that for the intended uses these residue definitions are appropriate and applicable.

### 1.2. Magnitude of residues in plants

#### 1.2.1. Magnitude of residues in primary crops

In support of the proposed southern Europe (SEU) Good Agricultural Practice (GAP) on wheat, rye, barley and oat, the applicant submitted 10 residue trials on wheat, which were performed in the southern France over the growing seasons of 1995, 2001, 2009, 2012 and 2013 (591–786 g a.s./ha, two applications, 42-day PHI). Additionally, results from 10 residue trials on barley which were performed in the Southern France, Italy, and Spain over the growing seasons of 2002, 2008, 2009 and 2015 were submitted (691–795 g a.s./ha, two applications, 42-day PHI). Eight trials on wheat and 8 trials on barley were independent and compliant with the intended SEU GAPs. They were performed with foliar spray applications at growth stages BBCH 39–73 and 50% were decline studies. The proposed extrapolation of the results from wheat to rye and from barley to oat is acceptable (European Commission, 2017).

Sufficient data to support the northern Europe (NEU) GAP for barley were assessed in the framework of the MRL review (EFSA, 2014). The data can be extrapolated to oat as based on the same GAP (European Commission, 2017). Seven additional NEU GAP-compliant residue trials on barley were submitted with the present application. The studies were performed in the Northern France, the U.K., the Netherlands, Belgium, and Denmark over the growing season of 2009. The results from the new dataset support the previous EFSA assessment and the intended use for barley and oat in the NEU.

No new studies in support of the proposed NEU GAP on wheat and rye were submitted with the present application but this GAP is supported by 15 residue trials evaluated in the MRL review (EFSA, 2014).

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\(^7\) (ft) The European Food Safety Authority identified some information on analytical methods as unavailable. When reviewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 6 February 2018, or, if that information is not submitted by that date, the lack of it.
Samples were analysed for folpet and phthalimide according to the residue definition for enforcement and risk assessment. A conversion factor of 2.02 was used to convert phthalimide to folpet equivalents. The analytical methods used for the determination of folpet residues in the residue trial studies are based on gas chromatography (GC) and are validated with an LOQ of 0.01 mg/kg for folpet in cereal grain and straw and an LOQ of 0.05 mg/kg for phthalimide in cereal grain and straw. According to the assessment of the EMS, the methods used were sufficiently validated and fit for purpose. The samples of these residue trials were stored under conditions for which integrity of the samples has been demonstrated.

EFSA noted that the new SEU trials on wheat from the SEU address the data gap identified in the MRL review requiring additional trials in wheat to support the use of folpet in the SEU. Therefore, risk managers may consider deleting the footnote in Regulation (EC) No 396/2005 where missing information on residue trials for folpet in wheat is identified.8

1.2.2. Magnitude of residues in rotational crops

Studies on the magnitude of residues in rotational crops were not performed and are not required as the DT90 values for folpet, phthalimide and the soil metabolites phthalic acid and phthalamic acid are expected to range between 1 and 94 days (under laboratory conditions) (EFSA, 2009) which are below the trigger value of 100 days (European Commission, 1997c).

1.2.3. Magnitude of residues in processed commodities

Processing studies investigating the magnitude of residues in processed barley and wheat were submitted in this MRL application (France, 2016). The barley samples were analysed for the sum of folpet and phthalimide residues in line with the residue definition for enforcement and risk assessment. In the three available studies, residues of folpet and phthalimide in beer were below the LOQ and lower than the unprocessed grain in brewing malt and beer. The number and quality of the studies, however, are insufficient to derive a robust processing factor for the sum of folpet and phthalimide in beer as for the unprocessed grain only two studies gave quantified residues for folpet and only one for phthalimide.

In one study in pot barley and one study in pearl barley flour, residues of folpet and phthalimide were higher in the pot barley and pearl barley flour than in the unprocessed grain. Due to the limited dataset available for these commodities, the processing factors derived for folpet in pot barley flour and pearl barley flour are tentative.

In the wheat processing studies, residue trials were conducted with an exaggerated application rate (5N) and samples were analysed for the sum of folpet and phthalimide residues. Residues of folpet were found to increase slightly in bran, whereas phthalimide residues decreased. Overall, the total folpet residues expressed as 'sum of folpet and phthalimide expressed as folpet' did not concentrate in bran. In flour and bread, both folpet and phthalimide residues decreased following processing of wheat. Based on this limited data set only tentative processing factors could be derived for wheat bran, flour and bread.

The analytical method used for the determination of folpet residues in the studies on processing is based on GC and is validated with an LOQ of 0.01 mg/kg for folpet and an LOQ of 0.05 mg/kg for phthalimide. The samples of these studies were stored under conditions for which integrity of the samples has been demonstrated.

1.2.4. Proposed MRLs

The available data are considered sufficient to derive MRL proposals as well as risk assessment values for the commodities under evaluation (see Appendix B.1.2.1). In Section 3 EFSA assessed whether residues on these crops resulting from the intended uses are likely to pose a consumer health risk.

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8 (ft) The European Food Safety Authority identified some information on residue trials and analytical methods as unavailable.
When re-viewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 6 February 2018, or, if that information is not submitted by that date, the lack of it.
2. Residues in livestock

Barley, oat, rye and wheat grain, forages and by-products may be used for feed purposes. Hence, it was necessary to update the previous dietary burden calculation (EFSA, 2017) to estimate whether the intended use of folpet would have an impact on the residues expected in food of animal origin.

The input values for the exposure calculations for livestock are presented in Appendix D.1. The results of the dietary burden calculation are presented in Section B.2 and show that the trigger value of 0.1 mg/kg dry matter (DM) is exceeded for all livestock species. EFSA noted that wheat is a significant contributor to the poultry diet. Thus, the nature and magnitude of folpet residues in livestock was investigated further.

2.1. Nature of residues and methods of analysis in livestock

Metabolism studies in lactating goats have been assessed in the framework of the EU pesticides peer review and the EFSA MRL review (EFSA, 2009, 2014). The studies were performed for the parent only but were considered acceptable since folpet was extensively metabolised during the study to generate thiophosgene and phthalimide. Thiophosgene is further converted to thiazolidine and incorporated into natural products such as amino acids, sugars and fats whereas phthalimide is metabolised to phthalamic acid and phthalic acid. The latter one may dehydrate to phthalic anhydride, but this reaction is expected to be reversible and phthalic acid is likely to be formed again via hydrolysis in aqueous solutions. As a similar metabolic pathway was found in rodents, the findings in ruminants can be extrapolated to pigs (EFSA, 2014).

Based on the studies in ruminants, the following residue definition was derived for enforcement and risk assessment in animal commodities except honey: phthalimide expressed as folpet. The residue is not fat soluble (EFSA, 2009).

A new metabolism study in poultry was submitted with the present MRL application (France, 2016). Laying hens were dosed daily with 0.020 or 0.63 mg folpet/kg body weight (bw) per day (0.31 and 10 mg/kg feed per day) for 7 consecutive days with parent folpet labelled on the phenyl ring. In eggs and tissues, the total residues were less than 1% of the total radioactive residue (TRR). Apart from folpet (3.8% and 51% TRR in the low and high dose group respectively) the following metabolites were identified in the excreta for the low and high dose group respectively: phthalimide (4.9% and 5.4% TRR), phthalic acid (22.1% and 12.6% TRR), phthalamic acid (21.3% and 11.4% TRR) and phthalic anhydride (8.2% and 5.2% TRR). These results suggest a similar metabolic pathway between poultry and ruminants. Therefore, the residue definition derived for ruminants and pigs is also applicable for poultry commodities.

Although the metabolism study on poultry was performed for the parent only, EFSA considered the study acceptable as, following exposure to folpet, phthalimide is rapidly generated in vivo. These conclusions will need to be reconsidered in the light of the peer review for the renewal of the approval of folpet. The characteristics of the studies on the nature of residues in livestock are summarised in Appendix B.2.1.

Methods of analysis for the determination of phthalimide in products of animal origin have been considered by EFSA during the MRL review (EFSA, 2014). They are based on GC–MS and are validated at an LOQ of 0.05 mg/kg in animal tissues, milk and eggs. A detailed evaluation report of the reported analytical method for determination of phthalimide in animal matrices, however, was missing (EFSA, 2014). Details on the primary method and its ILV have been submitted with the present application (France, 2016). The EMS concluded that the primary method is not highly specific and, therefore, a confirmatory method would be required. However, as no MRLs are currently proposed for products of animal origin, additional data at this stage are not required.

Information from the study reports in ruminants and poultry suggests that samples were stored and analysed within a period of 6 months (France, 2016). Therefore, studies on the stability of samples under storage are not required (European Commission, 1997e).

2.2. Magnitude of residues in livestock

No feeding studies on phthalimide are available. Results from the metabolism study in poultry suggest that at the dose of 10 mg/kg feed for folpet, being the closest one to the maximum dietary burden for poultry, the estimated total residues are far below the LOQ (France, 2016). In the lactating goat metabolism study, results at dose levels of 14 mg/kg feed, being the closest one to the maximum dietary burden, showed that the total residues in meat muscle, fat and milk were below 0.01 mg folpet
eq/kg. Higher levels of total residues were found in liver (0.02 mg folpet eq/kg) and kidney (0.05 mg folpet eq/kg). In kidney, only 0.7% of these residues correspond to phthalimide (expressed as folpet) (EFSA, 2009, 2014).

Based on the above, residues of phthalimide (expressed as folpet) are not expected to occur in animal matrices at levels above the LOQ of 0.05 mg/kg, therefore, there is currently no need to modify the existing MRLs in animal tissues, milk and eggs from bovine, sheep, goats and poultry.

It is noted that the available metabolism study in poultry addresses the data gap identified in the MRL review requiring further investigation on the nature and magnitude of residues in poultry. Therefore, risk managers may consider deleting the corresponding footnote in Regulation (EC) No 396/20059.

3. Consumer risk assessment

EFSA performed a dietary risk assessment using revision 3.1 of the EFSA PRIMo (EFSA, 2018, 2019). This exposure assessment model contains food consumption data for different sub-groups of the EU population and allows the acute and chronic exposure assessment to be performed in accordance with the internationally agreed methodology for pesticide residues (FAO, 2016).

The toxicological profile of folpet was assessed in the framework of the EU pesticides peer review under Directive 91/414/EEC and the data were sufficient to derive an acceptable daily intake (ADI) of 0.1 mg/kg bw per day and an acute reference dose (ARfD) of 0.2 mg/kg bw (European Commission, 2008). The metabolite included in the risk assessment residue definition is considered to be of similar toxicity with the parent compound.

Short-term (acute) dietary risk assessment

The short-term exposure assessment was performed for the commodities assessed in this application in accordance with the internationally agreed methodology (FAO, 2016). The calculations were based on the median residue values derived from supervised field trials (STMR) and the complete list of input values can be found in Appendix D.2.

The short-term exposure did not exceed the ARfD for any of the crops assessed in this application (up to 0.9% of the ARfD for wheat). For commodities not included in the present MRL application the short-term exposure assessment was performed using the risk assessment values derived in previous EFSA reasoned opinions (HR values) which, for table grapes, indicated exceedance of the ARfD due to differences in the revised version PRIMo exposure estimates. Further refinement of the exposure estimates for this commodity may be possible, such as by the use of an alternative variability factor.

Long-term (chronic) dietary risk assessment

In the framework of the MRL review a comprehensive long-term exposure assessment was performed, taking into account the existing uses at EU level and a CXL in strawberries (EFSA, 2014). EFSA updated the calculation with the relevant STMR values derived from the residue trials submitted in support of this MRL application for barley, oat, rye and wheat grain; in addition, STMRs derived in the EFSA opinion published after the MRL review (EFSA, 2017) were used. The crops on which no uses were reported in the MRL review were excluded from the exposure calculation. The input values used in the exposure calculations are summarised in Appendix D.2.

The estimated long-term dietary intake was up to 8% of the ADI (NL toddler diet). The contribution of residues expected in the commodities assessed in this application to the overall long-term exposure is presented in more detail in Appendix B.3 (up to 0.9% of the ADI for wheat).

EFSA concluded that the long-term intake of residues of folpet resulting from the existing and the intended uses is unlikely to present a risk to consumer health.

For further details on the exposure calculations, a screenshot of the Report sheet of the PRIMo is presented in Appendix C.

4. Conclusion and Recommendations

The data submitted in support of this MRL application were found to be sufficient to derive MRL proposals for barley, oat, rye and wheat grains. The newly submitted method of analysis in dry commodities and its ILV address the data gap identified in the framework of the MRL review.

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9 The European Food Safety Authority identified some information on the nature and magnitude of residues as unavailable.

When re-viewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 6 February 2018, or, if that information is not submitted by that date, the lack of it.
(EFSA, 2014) with regard to a missing ILV and a confirmatory method for folpet and phthalimide in dry commodities. Additionally, the available metabolism study in poultry addresses the data gap identified in the MRL review requiring further investigation on the nature and magnitude of residues in poultry. Therefore, risk managers may consider deleting the footnotes in Regulation (EC) No 396/2005 where missing information on analytical methods for folpet in barley, residue trials and analytical methods for folpet in wheat and missing information on the nature and magnitude of residues in poultry are identified.

EFSA concluded that the proposed use of folpet on the crops under assessment will not result in a consumer exposure exceeding the toxicological reference values and, therefore, is unlikely to pose a risk to consumers’ health.

The MRL recommendations are summarised in Appendix B.4.

References

EFSA (European Food Safety Authority), 2009. Conclusion on the peer review of the pesticide risk assessment of the active substance folpet. EFSA Journal 2009;7(8):297r, 80 pp. https://doi.org/10.2903/j.efsa.2009.297r

EFSA (European Food Safety Authority), 2014. Review of the existing maximum residue levels for folpet according to Article 12 of Regulation (EC) No 396/2005. EFSA Journal 2014;12(5):3700, 55 pp. https://doi.org/10.2903/j.efsa.2014.3700

EFSA (European Food Safety Authority), Brancato A, Brocca D, De Lentdecker C, Erdos Z, Ferreira L, Greco L, Jarrah S, Kardassi D, Leuschner R, Lythgo C, Medina P, Miron I, Molinar, Nougadere A, Pedersen R, Reich H, Sacchi A, Santos M, Stanek A, Sturma J, Tarazona J, Theobald A, Vagenende B, Verani A and Villamar-Bouza L, 2017. Reasoned opinion on the modification of the existing maximum residue levels for folpet in apples and pears. EFSA Journal 2017;15(10):5041, 21 pp. https://doi.org/10.2903/j.efsa.2017.5041

EFSA (European Food Safety Authority), Brancato A, Brocca D, Ferreira L, Greco L, Jarrah S, Leuschner R, Medina P, Miron I, Nougadere A, Pedersen R, Reich H, Santos M, Stanek A, Tarazona J, Theobald A and Villamar-Bouza L, 2018. Guidance on use of EFSA Pesticide Residue Intake Model (EFSA PRIMo revision 3). EFSA Journal 2018;16(1):5147, 43 pp. https://doi.org/10.2903/j.efsa.2018.5147

EFSA (European Food Safety Authority), Anastassiadou M, Brancato A, Carrasco Cabrera L, Ferreira L, Greco L, Jarrah S, Kazocina A, Leuschner R, Magrans JO, Miron I, Pedersen R, Racyzk M, Reich H, Ruocco S, Sacchi A, Santos M, Stanek A, Tarazona J, Theobald A and Verani A, 2019. Pesticide Residue Intake Model– EFSA PRIMo revision 3.1 (update of EFSA PRIMo revision 3). EFSA supporting publication 2019;EN-1605, 15 pp. https://doi.org/10.2903/sp.efsa.2019.en-1605

European Commission, 1997a. Appendix A. Metabolism and distribution in plants. 7028/IV/95-rev., 22 July 1996.

European Commission, 1997b. Appendix B. General recommendations for the design, preparation and realization of residue trials. Annex 2. Classification of (minor) crops not listed in the Appendix of Council Directive 90/642/EEC. 7029/VI/95-rev. 6, 22 July 1997.

European Commission, 1997c. Appendix C. Testing of plant protection products in rotational crops. 7524/VI/95-rev. 2, 22 July 1997.

European Commission, 1997d. Appendix E. Processing studies. 7035/VI/95-rev. 5, 22 July 1997.

European Commission, 1997e. Appendix F. Metabolism and distribution in domestic animals. 7030/VI/95-rev. 3, 22 July 1997.

European Commission, 1997f. Appendix H. Storage stability of residue samples. 7032/VI/95-rev. 5, 22 July 1997.

European Commission, 1997g. Appendix I. Calculation of maximum residue level and safety intervals. 7039/VI/95-rev. 10.3, 13 June 1997.

European Commission, 2000. Residue analytical methods. For pre-registration data requirement for Annex II (part A, section 4) and Annex III (part A, section 5 of Directive 91/414. SANCO/3029/99-rev. 4.

European Commission, 2008. Review report for the active substance folpet. Finalised in the Standing Committee on the Food Chain and Animal Health at its meeting on 29 September 2006 in view of the inclusion of folpet in Annex I of Council Directive 91/414/EEC. SANCO/10032/2006-rev.5, 11 July 2008.

European Commission, 2010a. Classes to be used for the setting of EU pesticide Maximum Residue Levels (MRLs). SANCO 10634/2010-rev. 0, Finalised in the Standing Committee on the Food Chain and Animal Health at its meeting of 23–24 March 2010.

European Commission, 2010b. Residue analytical methods. For post-registration control. SANCO/825/00-rev. 8.1, 16 November 2010.

European Commission, 2017. Appendix D. Guidelines on comparability, extrapolation, group tolerances and data requirements for setting MRLs. 7525/VI/95-rev. 10.3, 13 June 2017.

10) The European Food Safety Authority identified some information on the nature and magnitude of residues as unavailable. When re-reviewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 6 February 2018, or, if that information is not submitted by that date, the lack of it.
FAO (Food and Agriculture Organization of the United Nations), 2016. Submission and evaluation of pesticide residues data for the estimation of Maximum Residue Levels in food and feed. Pesticide Residues. 3rd Edition. FAO Plant Production and Protection Paper 225, 298 pp.
France, 2016. Evaluation report on the modification of MRLs for folpet in cereals. December 2016, revised in February 2021, 96 pp. Available online: www.efsa.europa.eu
Italy, 2004. Draft assessment report on the active substance folpet prepared by the rapporteur Member State Italy in the framework of Council Directive 91/414/EEC, June 2004. Available online: www.efsa.europa.eu
Italy, 2005. Final addendum to the draft assessment report on the active substance folpet prepared by the rapporteur Member State Italy in the framework of Council Directive 91/414/EEC, compiled by EFSA, November 2005. Available online: www.efsa.europa.eu
Italy, 2008. Addendum to the draft assessment report on the active substance folpet prepared by the rapporteur Member State Italy in the framework of Council Directive 91/414/EEC, March 2008. Available online: www.efsa.europa.eu
OECD (Organisation for Economic Co-operation and Development), 2011. OECD MRL calculator: spreadsheet for single data set and spreadsheet for multiple data set, 2 March 2011. In: Pesticide Publications/Publications on Pesticide Residues. Available online:http://www.oecd.org
OECD (Organisation for Economic Co-operation and Development), 2013. Guidance document on residues in livestock. In: Series on Pesticides No 73. ENV/JM/MONO(2013)8, 04 September 2013.

Abbreviations

a.s. active substance
ADI acceptable daily intake
AR applied radioactivity
ARfD acute reference dose
BBCH growth stages of mono- and dicotyledonous plants
bw body weight
CF conversion factor for enforcement to risk assessment residue definition
CXL Codex maximum residue limit
DALA days after last application
DAR draft assessment report
DAT days after treatment
EMS evaluating Member State
FAO Food and Agriculture Organization of the United Nations
GAP Good Agricultural Practice
GC–MS gas chromatography with mass spectrometry
HR highest residue
IEDI international estimated daily intake
IESTI international estimated short-term intake
ILV independent laboratory validation
IPCS International Programme of Chemical Safety
ISO International Organisation for Standardisation
IUPAC International Union of Pure and Applied Chemistry
LC–MS/MS liquid chromatography with tandem mass spectrometry detector
LOQ limit of quantification
MRL maximum residue level
MS Member States
NEU northern Europe
OECD Organisation for Economic Co-operation and Development
PBI plant-back interval
PF processing factor
PHI preharvest interval
Pow partition coefficient between n-octanol and water
PRIMO (EFSA) Pesticide Residues Intake Model
PROFile (EFSA) Pesticide Residues Overview File
QuEChERS Quick, Easy, Cheap, Effective, Rugged, and Safe (analytical method)
RA risk assessment
RMS rapporteur Member State
SANCO Directorate-General for Health and Consumers
Modification of the existing MRLs for folpet in barley, oat, rye and wheat

SC  suspension concentrate
SEU  southern Europe
STMR  supervised trials median residue
TRR  total radioactive residue
WHO  World Health Organization
## Appendix A – Summary of intended GAP triggering the amendment of existing EU MRLs

| Crop and/or situation | NEU, SEU, MS or country | F, G or I(a) | Pests or group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days)(d) | Remarks |
|-----------------------|-------------------------|-------------|----------------------------------|-------------|------------|-------------------------------|--------------|---------|
|                       |                         |             |                                  | Type(b) | Conc. a.s. | Method kind                  | Range of growth stages & season(c) | Number min–max | Interval between application (days) | kg a.s./hl min–max | Water L/ha min–max | Rate | Unit |                        |
| Barley NEU F          |                         |             | *Rhynchosporium secalis*         | SC 500 g/L | Foliar treatment – Broadcast spraying | BBCH 30–59 | 2 | 7–10 | 0.1875–0.750 | 100–400 | 0.75 | kg a.s./ha | 42 |
| Oat NEU F             |                         |             | *Rhynchosporium secalis*         | SC 500 g/L | Foliar treatment – Broadcast spraying | BBCH 30–59 | 2 | 7–10 | 0.1875–0.750 | 100–400 | 0.75 | kg a.s./ha | 42 |
| Barley SEU F          |                         |             | *Rhynchosporium secalis*         | SC 500 g/L | Foliar treatment – Broadcast spraying | BBCH 30–59 | 2 | 7–10 | 0.1875–0.750 | 100–400 | 0.75 | kg a.s./ha | 42 |
| Oat SEU F             |                         |             | *Rhynchosporium secalis*         | SC 500 g/L | Foliar treatment – Broadcast spraying | BBCH 30–59 | 2 | 7–10 | 0.1875–0.750 | 100–400 | 0.75 | kg a.s./ha | 42 |
| Wheat NEU F           |                         |             | *Septoria*                       | SC 500 g/L | Foliar treatment – Broadcast spraying | BBCH 30–59 | 2 | 7–10 | 0.1875–0.750 | 100–400 | 0.75 | kg a.s./ha | 42 |
| Rye NEU F             |                         |             | *Septoria*                       | SC 500 g/L | Foliar treatment – Broadcast spraying | BBCH 30–59 | 2 | 7–10 | 0.1875–0.750 | 100–400 | 0.75 | kg a.s./ha | 42 |
| Wheat SEU F           |                         |             | Yellow rust, Brown rust, *Septoria* | SC 375 g/L | Foliar treatment – Broadcast spraying | BBCH 31–59 | 2 | 14 | 0.1875–0.750 | 100–400 | 0.75 | kg a.s./ha | 42 |

Same GAP assessed in the MRL review (EFSA, 2014)
| Crop and/or situation | NEU, SEU, MS or country | F, G or I (a) | Pests or group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) (d) | Remarks |
|-----------------------|--------------------------|---------------|-----------------------------------|-------------|----------------|---------------------------------|---------------|---------|
| Rye | SEU | F | Yellow rust, Brown rust, Septoria | SC | 375 g/L | Foliar treatment — broadcast spraying | BBCH 31–59 | 2 | 14 | 0.1875–0.750 | 100–400 | 0.75 | kg a.s./ha | 42 | |

MRL: maximum residue level; GAP: Good Agricultural Practice; NEU: northern European Union; SEU: southern European Union; MS: Member State; a.s.: active substance; SC: suspension concentrate.

(a): Outdoor or field use (F), greenhouse application (G) or indoor application (I).
(b): CropLife International Technical Monograph no 2, 7th Edition. Revised March 2017. Catalogue of pesticide formulation types and international coding system.
(c): Growth stage range from first to last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including, where relevant, information on season at time of application.
(d): PHI: minimum preharvest interval.
Appendix B – List of end points

B.1. Residues in plants

B.1.1. Nature of residues and methods of analysis in plants

B.1.1.1. Metabolism studies, methods of analysis and residue definitions in plants

| Primary crops (available studies) | Crop groups | Crop(s) | Application(s) | Sampling | Comment/Source |
|----------------------------------|-------------|---------|----------------|----------|----------------|
| Fruit crops (available studies)  | Grapes      | Foliar, 3 × 1.5 kg/ha, interval 30 days | 23 DALA | Active radiolabelled substance: Phenyl-UL-14C (foliar); Carbonyl-14C (soil) folpet (EFSA, 2009, 2014) |
|                                  | Avocados    | Foliar, 3 × 3.36 kg/ha, interval 21 days | 21, 97 DALA |
|                                  | Tomatoes    | Soil, 1 × 0.1 mg/plant | 1, 4, 7, 11 DAT |
| Root crops (available studies)   | Potatoes    | Foliar, 5 × 2 kg/ha, interval not reported | 2-4 h after 1st, 3rd and 5th appl.; 3, 7 DALA |
| Cereals/grass (available studies)| Wheat       | Foliar, 2 × 1.6 kg/ha, interval 24 days | 1 DAT, 1, 43, 81 DALA |

| Rotational crops (available studies) | Crop groups | Crop(s) | Application(s) | PBI (DAT) | Comment/Source |
|--------------------------------------|-------------|---------|----------------|-----------|----------------|
| Root/tuber crops                     |             | –       | –              | –         | Not triggered (EFSA, 2009, 2014) |
| Leafy crops                          |             | –       | –              | –         | –              |
| Cereal (small grain)                 |             | –       | –              | –         | –              |
| Other                                |             | –       | –              | –         | –              |

| Processed commodities (hydrolysis study) | Conditions | Stable? | Comment/Source |
|------------------------------------------|------------|--------|----------------|
| Pasteurisation (20 min, 90°C, pH 4)      | No         | Active radiolabelled substance: U-phenyl-14C-folpet |
| Baking, brewing and boiling (60 min, 100°C, pH 5) | No | Folpet completely degraded predominantly to phthalimide, (pasteurisation: 92% AR; baking, brewing/boiling: 58% AR) with levels of phthalic acid increasing with temperature and pH (baking, brewing/boiling: 42.2% AR; sterilisation 81% AR) (EFSA, 2014) |
| Sterilisation (20 min, 120°C, pH 6)      | No         | –      | –              |
| Other processing conditions             | –          | –      | –              |
Can a general residue definition be proposed for primary crops?

Yes

Rotational crop and primary crop metabolism similar?

Not applicable (permanent crops)

Residue pattern in processed commodities similar to residue pattern in raw commodities?

Yes

Plant residue definition for monitoring (RD-Mo)

Folpet (sum of folpet and phthalimide, expressed as folpet) (EFSA, 2009, 2014)

Plant residue definition for risk assessment (RD-RA)

Folpet (sum of folpet and phthalimide, expressed as folpet) (EFSA, 2009, 2014)

Methods of analysis for monitoring of residues (analytical technique, crop groups, LOQs)

HPLC–MS/MS
- High protein content/dry commodities (QuEChERS): Folpet and phthalimide: LOQ: 0.01 mg/kg. ILV available, confirmatory method not required as method highly specific (France, 2016).
- GC–MS
  - High water content commodities: Folpet (QuEChERS): LOQ 0.05 mg/kg. Confirmatory method and ILV available (EFSA, 2014). Phthalimide: LOQ 0.02 mg/kg. Confirmatory method and ILV available (EFSA, 2017).
  - High acid content commodities: Folpet (QuEChERS): LOQ 0.05 mg/kg. Confirmatory method and ILV available (EFSA, 2014). Phthalimide: LOQ 0.05 mg/kg. ILV available (EFSA, 2014).
  - High oil content commodities: Folpet (QuEChERS): LOQ 0.05 mg/kg. ILV available. Confirmatory method is missing and is required (data gap) (EFSA, 2014). Phthalimide: LOQ 0.05 mg/kg. ILV available. Confirmatory method is missing and is required (data gap) (EFSA, 2014).
  - Hops: Folpet: LOQ 0.05 mg/kg. ILV is missing and is required (data gap) (EFSA, 2014). Phthalimide: LOQ 0.1 mg/kg. ILV is missing and is required (data gap) (EFSA, 2014).

DALA: days after last application; DAT: days after treatment; PBI: plant-back interval; AR: applied radioactivity; HPLC–MS/MS: high performance liquid chromatography with tandem mass spectrometry; QuEChERS: Quick, Easy, Cheap, Effective, Rugged, and Safe (analytical method); LOQ: limit of quantification; ILV: independent laboratory validation; GC–MS: gas chromatography with mass spectrometry.
## B.1.1.2. Storage stability of residues in plants

| Plant products (available studies) | Category            | Commodity     | $T$ ($^\circ$C) | Stability period | Stability period | Compounds covered | Comment/Source |
|-----------------------------------|---------------------|---------------|-----------------|-----------------|-----------------|-------------------|---------------|
|                                   | High water content  | Tomatoes      | -18             | 18 Months       | Folpet           | EFSA (2014)       |
|                                   |                     |               | -18             | 12 Months       | Phthalimide     | EFSA (2014), France (2016) |
|                                   | Apples              |               | -18             | 12 Months       | Folpet           | EFSA (2014)       |
|                                   |                     |               | -18             | 12 Months       | Phthalimide     | EFSA (2014), France (2016) |
|                                   | Bulb onions         |               | -18             | 12 Months       | Folpet           | France (2016)     |
|                                   |                     |               | -18             | 12 Months       | Phthalimide     | France (2016)     |
|                                   | High acid content   | Grapes        | -18             | 15 Months       | Folpet           | EFSA (2014)       |
|                                   |                     |               | -18             | 13 Months       | Phthalimide     | EFSA (2014), France (2016) |
|                                   | Dry/High starch content | Wheat grain | -20             | 12 Months       | Folpet           | EFSA (2014)       |
|                                   |                     |               | -18             | 18 Months       | Phthalimide     | EFSA (2014), France (2016) |
|                                   | Others              | Wheat straw   | -18             | 12 Months       | Folpet           | EFSA (2014)       |
|                                   |                     |               | -18             | 18 Months       | Phthalimide     | EFSA (2014), France (2016) |
## B.1.2. Magnitude of residues in plants

### B.1.2.1. Summary of residues data from the supervised residue trials

| Commodity     | Region/Indoor(a) | Residue levels observed in the supervised residue trials (mg/kg)(b) | Comments/Source                                                                 | Calculated MRL (mg/kg) | HR(c) (mg/kg) | STMR (d) (mg/kg) | CF(e) |
|---------------|------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------|--------------|-----------------|-------|
| Barley, grain | NEU              | 0.04; 8 × < 0.11; < 0.11; 0.11; < 0.12; 0.22; < 0.23; < 0.30; 0.42; 0.87; 1.10 | Residue trials on barley compliant with GAP (data from MRL review (EFSA, 2014) and new values in bold). Extrapolation to oat possible. | 1.5                    | 1.10         | 0.11            | –     |
| Barley, grain | SEU              | < 0.11; 0.11; < 0.12; < 0.15; 0.21; 0.25; 0.35; 1.37               | Residue trials on barley compliant with GAP. Extrapolation to oat possible.       | 2                      | 1.37         | 0.18            | –     |
| Barley, straw | NEU              | < 0.13; < 0.15; 0.15; < 0.23; < 0.25; < 0.41; < 0.55; 1.0; < 1.2; 1.4; < 1.6; 1.7; 1.8; 3.6; 4.7; 5.3; 6.9; 12.0 | Residue trials on barley compliant with GAP (data from MRL review (EFSA, 2014) and new values in bold). Extrapolation to oat possible. | –                      | 12.0         | 1.3             | –     |
| Barley, straw | SEU              | 0.48; 0.61; 0.78; 1.50; 2.53; 3.09; 7.02; 14.23                   | Residue trials on barley compliant with GAP. Extrapolation to oat possible.       | –                      | 14.23        | 2.02            | –     |
| Wheat, grain  | NEU              | 13 × < 0.11; < 0.13; < 0.17                                      | Residue trials on wheat compliant with GAP (EFSA, 2014). Extrapolation to rye possible. | 0.2                    | 0.17         | 0.11            | –     |
| Wheat, grain  | SEU              | 3 × < 0.11; 4 × < 0.12; < 0.23                                   | Residue trials on wheat compliant with GAP. Extrapolation to rye possible.       | 0.3                    | 0.23         | 0.12            | –     |
| Wheat, straw  | NEU              | < 0.17; 2 × < 0.26; < 0.61; 0.67; 0.68; 0.73; < 0.76; 0.82; 1.1; 1.2; 1.6; 2.5; 4.6; 9.1 | Residue trials on wheat compliant with GAP (EFSA, 2014). Extrapolation to rye possible. | –                      | 9.10         | 0.76            | –     |
| Wheat, straw  | SEU              | 0.70; < 0.74; 0.76; 0.93; 1.28; 1.30; 1.86; 5.23                 | Residue trials on wheat compliant with GAP. Extrapolation to rye possible.       | –                      | 5.23         | 1.11            | –     |

GAP: Good Agricultural Practice; MRL: maximum residue level.

(a): NEU: Outdoor trials conducted in northern Europe, SEU: Outdoor trials conducted in southern Europe, Indoor: indoor EU trials, or Country code: if non-EU trials.

(b): Trials were analysed for the sum of folpet and phthalimide, expressed as folpet. A conversion factor of 2.02 was used to convert phthalimide to folpet equivalents. Results reported as <value do not necessarily suggest that total residues are lower the LOQ but rather express a range derived by the fact that at least one of the analytical results for the two analytes was below the LOQ whereas the other one gave quantifiable residues.

(c): Highest residue. The highest residue for risk assessment refers to the whole commodity and not to the edible portion.

(d): Conversion factor to recalculate residues according to the residue definition for monitoring to the residue definition for risk assessment.

(e): Conversion factor to recalculate residues according to the residue definition for monitoring to the residue definition for risk assessment.
B.1.2.2. Residues in rotational crops

Residues in rotational and succeeding crops expected based on confined rotational crop study?

| Processed commodity | Number of valid studies(a) | Processing Factor (PF) | Median PF(b) | CF_P(c) | Comment/ Source |
|---------------------|---------------------------|------------------------|--------------|--------|-----------------|
| Barley, beer        | 2                         | Folpet: < 0.13; < 0.17 | < 0.15       | –      | Tentative(d) (France, 2016) |
|                     | 1                         | Phthalimide: < 0.63    | –            | –      |                  |
|                     | 1                         | Sum of folpet and phthalimide, expressed as folpet equivalents: < 0.46 | – | – |                  |
| Barley, pot barley flour | 1                         | Folpet: 2.5            | –            | –      | Tentative(d) (France, 2016) |
|                     | 1                         | Phthalimide: ≥ 1.2     | –            | –      |                  |
|                     | 1                         | Sum of folpet and phthalimide, expressed as folpet equivalents: ≥ 1.4 | – | – |                  |
| Barley, pearl barley flour | 1                         | Folpet: 2.0            | –            | –      | Tentative(d) (France, 2016) |
|                     |                           | Phthalimide: ≥ 1.4     | –            | –      |                  |
|                     |                           | Sum of folpet and phthalimide, expressed as folpet equivalents: ≥ 1.5 | – | – |                  |
| Wheat, bran         | 1                         | Folpet: 1.3            | –            | –      | Tentative(d) (France, 2016) |
|                     |                           | Phthalimide: 0.69      | –            | –      |                  |
|                     |                           | Sum of folpet and phthalimide, expressed as folpet equivalents: 0.86 | – | – |                  |
| Wheat, flour        | 1                         | Folpet: 0.27           | –            | –      | Tentative(d) (France, 2016) |
|                     |                           | Phthalimide: < 0.38    | –            | –      |                  |
|                     |                           | Sum of folpet and phthalimide, expressed as folpet equivalents: < 0.35 | – | – |                  |
| Wheat, bread        | 1                         | Folpet: < 0.09         | –            | –      | Tentative(d) (France, 2016) |
|                     |                           | Phthalimide: < 0.38    | –            | –      |                  |
|                     |                           | Sum of folpet and phthalimide, expressed as folpet equivalents: < 0.30 | – | – |                  |

PF: processing factor.
(a): Studies with residues in the RAC at or close to the LOQ were disregarded (unless concentration may occur).
(b): PF for folpet, phthalimide and the sum of folpet and phthalimide expressed as folpet.
(c): Conversion factor for risk assessment in the processed commodity; median of the individual conversion factors for each processing residues trial.
(d): A tentative PF is derived based on a limited dataset.
B.2. **Residues in livestock**

Dietary burden calculation (OECD, 2013).

| Relevant groups | Dietary burden expressed in | Most critical diet<sup>(a)</sup> | Most critical commodity<sup>(b)</sup> | Trigger exceeded (Yes/No) | Previous assessment (EFSA, 2017) |
|-----------------|-----------------------------|----------------------------------|------------------------------------|----------------------------|----------------------------------|
|                 | mg/kg bw per day | Median | Maximum | mg/kg DM | Median | Maximum |
| Cattle (all diets) | 0.225 | 0.383 | 7.50 | 11.61 | Dairy cattle | Potato | Process waste | Yes | 9.14 |
| Cattle (dairy only) | 0.225 | 0.383 | 5.85 | 9.97 | Dairy cattle | Potato | Process waste | Yes | 7.49 |
| Sheep (all diets) | 0.268 | 0.554 | 8.03 | 16.26 | Ram/Ewe | Potato | Process waste | Yes | 11.32 |
| Sheep (ewe only) | 0.268 | 0.542 | 8.03 | 16.26 | Ram/Ewe | Potato | Process waste | Yes | 11.32 |
| Swine (all diets) | 0.084 | 0.084 | 3.64 | 3.64 | Swine (breeding) | Potato | Process waste | Yes | 3.62 |
| Poultry (all diets) | 0.075 | 0.128 | 1.06 | 1.86 | Poultry layer | Wheat | Straw | Yes | 1.82 |
| Poultry (layer only) | 0.065 | 0.128 | 0.96 | 1.86 | Poultry layer | Wheat | straw | Yes | 1.82 |

bw: body weight; DM: dry matter.

(a): When several diets are relevant (e.g. cattle, sheep and poultry ‘all diets’), the most critical diet is identified from the maximum dietary burdens expressed as ‘mg/kg bw per day’.

(b): The most critical commodity is the major contributor identified from the maximum dietary burden expressed as ‘mg/kg bw per day’.

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B.2.1. **Nature of residues and methods of analysis in livestock**

B.2.1.1. **Metabolism studies, methods of analysis and residue definitions in livestock**

| Livestock (available studies) | Animal | Dose (mg/kg bw per day) | Duration (days) | Comment/Source |
|-------------------------------|--------|-------------------------|-----------------|----------------|
| Laying hens                  | 0.02   | 7                       | Active radiolabelled substance (Folpet): U-<sup>14</sup>C-phenyl and <sup>14</sup>C-trichloromethyl (France, 2016) |
| Lactating ruminants          | 14     | 6                       | Goat            |
|                              | 24     |                         | Active radiolabelled substance (Folpet): U-<sup>14</sup>C-phenyl and <sup>14</sup>C-trichloromethyl (EFSA, 2014) |
|                              | 20     | 3                       | Goat            |
|                              |        |                         | Active radiolabelled substance (Folpet): <sup>14</sup>C-trichloromethyl (EFSA, 2014) |
| Laying hens, lactating ruminants |        |                         | Metabolism studies on phthalimide not available and not required as phthalimide is rapidly generated in vivo following exposure to folpet (EFSA, 2014; France, 2016). |
| Time needed to reach a plateau concentration in milk and eggs (days) | Milk: 4 days approx. | Italy (2004) |
| | Eggs: 3-6 days | Residual radioactivity reached a plateau within 3 days of dosing in egg white and within 5-6 days of dosing in egg yolk (France, 2016). |

| Metabolism in rat and ruminant similar | yes | EFSA (2014) |

| Can a general residue definition be proposed for animals? | yes | EFSA (2014) |

| Animal residue definition for monitoring (RD-Mo) | Phthalimide expressed as folpet (EFSA, 2009; France, 2016) |

| Animal residue definition for risk assessment (RD-RA) | Phthalimide expressed as folpet (EFSA, 2009; France, 2016) |

| Fat soluble residues | No | EFSA (2009) |

| Methods of analysis for monitoring of residues (analytical technique, matrix, LOQs) | Phthalimide: GC–MS – Animal tissues, milk and eggs, LOQ: 0.05 mg/kg. ILV available (EFSA, 2009, 2014; France, 2016). |

bw: body weight; d: day; LOQ: limit of quantification; GC–MS: gas chromatography with mass spectrometry; LOQ: limit of quantification; ILV: independent laboratory validation.

**B.2.1.2. Storage stability of residues in livestock**

No information on the stability of phthalimide under storage of animal commodities is available.

**B.2.2. Magnitude of residues in livestock**

Not required as, based on the estimated dietary burdens and metabolism studies in livestock, residues of phthalimide (expressed as folpet) are not expected to occur at levels above the LOQ of 0.05 mg/kg.
B.3. Consumer risk assessment

**ARfD**

| Commodity | Highest IESTI, according to EFSA PRIMo |
|-----------|----------------------------------------|
| Wheat     | 0.9% of ARfD                           |
| Barley    | 0.5% of ARfD                           |
| Rye       | 0.4% of ARfD                           |
| Oat       | 0.1% of ARfD                           |

**Assumptions made for the calculations**

Calculations performed with PRIMo revision 3.1. They are based on the median residue levels expected in the raw agricultural commodities (cereals) under assessment as derived from the submitted residue trials. For commodities not included in the present MRL application, the short-term exposure assessment was performed using the risk assessment values derived in previous EFSA reasoned opinions (HR values) which, for table grapes, indicated exceedance of the ARfD due to differences in the revised version PRIMo exposure estimates. Further refinement of the exposure estimates for this commodity may be possible, such as by the use of an alternative variability factor.

**ADI**

| Commodity | Highest IEDI, according to EFSA PRIMo |
|-----------|----------------------------------------|
| Wheat     | 8% ADI (NL toddler)                    |
|           | Contribution of crops assessed:        |
| Wheat     | 0.9% of ADI (GEMS/Food G06)            |
| Rye       | 0.7% of ADI (DK child)                 |
| Barley    | 0.2% of ADI (GEMS/Food G08)            |
| Oat       | 0.1% of ADI (FI 3 yr)                  |

**Assumptions made for the calculations**

Calculations performed with PRIMo revision 3.1. They are based on the median residue levels derived for raw agricultural commodities as derived from the submitted residue trials under this application and previous EFSA assessments (EFSA, 2014, 2017). The contributions of commodities where no GAP was reported in the framework of the MRL review (EFSA, 2014) were not included in the calculations.

**ARfD**: acute reference dose; **bw**: body weight; **IESTI**: international estimated short-term intake; **PRIMo**: (EFSA) Pesticide Residues Intake Model; **MRL**: maximum residue level; **HR**: highest residue; **ADI**: acceptable daily intake; **IEDI**: international estimated daily intake.

B.4. Recommended MRLs

| Code(a) | Commodity | Existing EU MRL (mg/kg) | Proposed EU MRL (mg/kg) | Comment/justification |
|---------|-----------|-------------------------|-------------------------|-----------------------|
| 500010  | Barley    | 1 (ft.1)                | 2                       | The submitted data are sufficient to derive an MRL proposal for the SEU use. Risk for consumers unlikely. The data gap identified in the MRL review was sufficiently addressed (ft.1). |
| 500050  | Oat       | 0.07*                   | 2                       | The submitted data are sufficient to derive an MRL proposal for the SEU use. Risk for consumers unlikely. |

**Enforcement residue definition**: Folpet (sum of folpet and phthalimide, expressed as folpet)
| Code\(^{(a)}\) | Commodity | Existing EU MRL (mg/kg) | Proposed EU MRL (mg/kg) | Comment/justification |
|----------------|------------|------------------------|-------------------------|-----------------------|
| 500070         | Rye        | 0.07*                  | 0.3                     | The submitted data are sufficient to derive an MRL proposal for the SEU use. Risk for consumers unlikely. |
| 500090         | Wheat      | 0.4 (ft.2)             | 0.3                     | The submitted data are sufficient to derive an MRL proposal for the SEU use. Risk for consumers unlikely. The data gap identified in the MRL review was sufficiently addressed (ft.2). The submitted data are based on the same GAP assessed under the MRL review and support a lower MRL proposal. |

MRL: maximum residue level; SEU: southern Europe.

*: Indicates that the MRL is set at the limit of analytical quantification (LOQ).

\((a)\): Commodity code number according to Annex I of Regulation (EC) No 396/2005.

\((ft.1)\): The European Food Safety Authority identified some information on analytical methods as unavailable. When re-viewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 6 February 2018, or, if that information is not submitted by that date, the lack of it.

\((ft.2)\): The European Food Safety Authority identified some information on residue trials and analytical methods as unavailable. When re-viewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 6 February 2018, or, if that information is not submitted by that date, the lack of it.
**Appendix C – Pesticide Residue Intake Model (PRIMo)**

**Folpet**

| Country | MRL (mg/kg) | Source of MRL | Year of evaluation |
|---------|-------------|---------------|--------------------|
| EC      | 0.1         | EC            | 2008               |

**Textual reference values**

| ADI (mg/kg bw per day) | Source of ADI |
|------------------------|---------------|
| 0.2                    | EC            |

**LOQs (mg/kg) range from:**

| LOQ (mg/kg) | Range |
|-------------|-------|
| 0.03        | 0.400.0 |

**Details – acute risk assessment**

- **ARfD (mg/kg bw):**
  - 0.05

**Details – chronic risk assessment**

- **chronic risk assessment:** JMPR methodology (IEDI/TMDI)
- **No of diets exceeding the ADI:** ---
- **Exposure resulting from commodities not under assessment:**

**Results:**

| Commodity/Group of Commodities | Exposure resulting from commodities not under assessment (µg/kg bw per day) |
|-------------------------------|---------------------------------------------------------------------|
| Potatoes                      | 6% 6.30 4% 0.6% 0.5%                                                  |
| Tomatoes                      | 3% 8%                                                              |
| Wheat                         | 6% 6.23 3% 1% 0.6%                                                  |
| Shredded Wheat                | 0.7% 6%                                                            |
| Milk: Cattle                  | 4% 4.25 1% 0.6% 0.5%                                                |
| Table grapes                  | 1% 5%                                                               |
| Wine grapes                   | 1% 5%                                                               |
| Table grapes                  | 1% 5%                                                               |
| Tomatoes                      | 1% 5%                                                               |
| Wheat                         | 1% 5%                                                               |
| Tomatoes                      | 1% 5%                                                               |
| Wheat                         | 1% 5%                                                               |
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| Wheat                         | 1% 5%                                                               |
| Tomatoes                      | 1% 5%                                                               |
| Wheat                         | 1% 5%                                                               |
| Tomatoes                      | 1% 5%                                                               |
| |
The acute risk assessment is based on the ARID. DISCLAIMER: Dietary data from the UK were included in PRIMO when the UK was a member of the European Union.

The calculation is based on the large portion of the most critical consumer group.

### Results for children

| Commodities       | MRL/input for RA (mg/kg) | Exposure (µg/kg bw) | IESTI | Highest % of ARfD/ADI | Commodities       | MRL/input for RA (mg/kg) | Exposure (µg/kg bw) |
|-------------------|--------------------------|---------------------|-------|-----------------------|-------------------|--------------------------|---------------------|
| 104% Table grapes | 62.25                    | 208                 |       |                       | 48% Table grapes  | 62.25                    | 97                  |
| 81% Tomatoes      | 5/2.8                    | 163                 |       |                       | 33% Wine grapes   | 20/2.8                   | 66                  |
| 18% Strawberries  | 5/2.2                    | 36                  |       |                       | 22% Tomatoes      | 5/2.8                    | 44                  |
| 13% Pears         | 0.30                     | 26                  |       |                       | 18% HOPS (dried)  | 400/192                  | 35                  |
| 13% Wine grapes   | 20/2.8                   | 26                  |       |                       | 10% Strawberries  | 5/2.2                    | 21                  |
| 13% Melons        | 0.40                     | 26                  |       |                       | 3% Melons         | 0.40/17                  | 6.7                 |
| 10% Apples        | 0.30                     | 20                  |       |                       | 3% Pears          | 0.30/19                  | 5.8                 |
| 8% Potatoes       | 0.06/0.1                 | 15                  |       |                       | 3% Apples         | 0.30/19                  | 5.3                 |
| 4% HOPS (dried)   | 400/192                  | 8.0                 |       |                       | 1% Potatoes       | 0.06/0.1                 | 3.0                 |
| 3% Milk: Cattle   | 0.05/0.05                | 6.2                 |       |                       | 1.0% Milk: Cattle | 0.05/0.05                | 1.9                 |
| 0.9% Wheat        | 0.30/12                  | 1.2                 |       |                       | 0.5% Wheat        | 0.30/12                  | 1.0                 |
| 0.6% Salts       | 0.04/0.04                | 1.2                 |       |                       | 0.5% Milk: Goat   | 0.05/0.05                | 0.92                |
| 0.6% Milk: Goat   | 0.05/0.05                | 1.2                 |       |                       | 0.4% Barley       | 2/0.18                   | 0.87                |
| 0.5% Barley       | 2/0.18                   | 1.0                 |       |                       | 0.4% Milk: Sheep  | 0.05/0.05                | 0.76                |
| 0.5% Radishes     | 0.04/0.04                | 0.98                |       |                       | 0.3% Poultry: Muscle | 0.05/0.05 | 0.59 |

### Results for adults

| Commodities       | MRL/input for RA (mg/kg) | Exposure (µg/kg bw) | IESTI | Highest % of ARfD/ADI | Commodities       | MRL/input for RA (mg/kg) | Exposure (µg/kg bw) |
|-------------------|--------------------------|---------------------|-------|-----------------------|-------------------|--------------------------|---------------------|
| 36% Wine grapes/juice | 20/1.66                 | 72                  |       |                       | 17% Wine grapes/juice | 20/1.66                  | 35                  |
| 7% Tomatoes/juice  | 5/0.7                    | 13                  |       |                       | 13% Wine grapes/wine | 20/2.8                   | 27                  |
| 5% Potatoes/dried  | 0.06/0.1                 | 9.3                 |       |                       | 8% Table grapes/raisins | 20/1.3                   | 16                  |
| 3% Tomatoes/sauce/puree | 5/0.7                   | 6.7                 |       |                       | 6% Hops/beer       | 400/33                   | 12                  |
| 3% Potatoes/dried (flakes) | 0.06/0.46               | 5.9                 |       |                       | 3% Tomatoes/sauce/puree | 5/0.7                    | 5.7                 |
| 2% Apples/juice    | 0.30/0.06                | 3.2                 |       |                       | 1.0% Apples/juice  | 0.30/0.06                | 2.0                 |
| 1.0% Pears/juice   | 0.30/0.06                | 2.0                 |       |                       | 0.6% Barleybeer    | 2/0.04                   | 1.3                 |
| 0.7% Wheat/milling (flour) | 0.30/12                | 1.5                 |       |                       | 0.4% Potatoes/chips | 0.06/0.1                 | 0.85                |
| 0.5% Salts/boiled  | 0.04/0.04                | 1.0                 |       |                       | 0.3% Potatoes/dried (flakes) | 0.06/0.66               | 0.58                |
| 0.3% Wheat/milling (wholemeal) | 0.30/0.12             | 0.67                |       |                       | 0.3% Wheat/bread/pizza | 0.30/0.12               | 0.53                |
| 0.3% Oat/boiled    | 0.20/0.18                | 0.65                |       |                       | 0.2% Wheat/pasta   | 0.30/0.12                | 0.46                |
| 0.3% Barley/cooked | 0.20/0.18                | 0.65                |       |                       | 0.2% Wheat/bread (wholemeal) | 0.30/0.12               | 0.42                |
| 0.3% Oat/milling (flakes) | 0.20/0.18            | 0.54                |       |                       | 0.2% Salts/boiled  | 0.04/0.04                | 0.33                |
| 0.2% Ry/boiled     | 0.30/0.12                | 0.44                |       |                       | 0.1% Oat/boiled    | 2/0.18                   | 0.27                |
| 0.2% Oat/milling (wholemeal)-bak | 0.30/0.12     | 0.42                |       |                       | 0.10% Table olives/canned | 0.15/0.15              | 0.19                |

### Conclusion:

The estimated short-term intake (IESTI) exceeded the toxicological reference value for 1 commodities.

For processed commodities, no exceedance of the ARfD/ADI was identified.
### Appendix D – Input values for the exposure calculations

#### D.1. Livestock dietary burden calculations

| Feed commodity       | Median dietary burden | Maximum dietary burden |
|----------------------|-----------------------|------------------------|
|                      | Input value (mg/kg)   | Comment                | Input value (mg/kg) | Comment |
| Barley straw         | 2.02                  | STMR                   | 14.23               | HR      |
| Oat straw            | 2.02                  | STMR                   | 14.23               | HR      |
| Rye straw            | 1.11                  | STMR                   | 9.10 HR (EFSA, 2014) |
| Triticale straw      | 1.11                  | STMR                   | 9.10 HR (EFSA, 2014) |
| Wheat straw          | 1.11                  | STMR                   | 9.10 HR (EFSA, 2014) |
| Potato culls         | 0.10                  | STMR (EFSA, 2014)      | 0.10 HR (EFSA, 2014) |
| Barley grain         | 0.18                  | STMR                   | –                   | –       |
| Oat grain            | 0.18                  | STMR                   | –                   | –       |
| Rye grain            | 0.12                  | STMR                   | –                   | –       |
| Triticale grain      | 0.12                  | STMR                   | –                   | –       |
| Wheat grain          | 0.12                  | STMR                   | –                   | –       |
| Apple, wet pomace    | 0.11                  | STMR × PF (1.83) (EFSA, 2017) | – | – |
| Brewer's grain       | 0.59                  | STMR × PF (3.3) (a)    | –                   | –       |
| Distiller's grain    | 0.40                  | STMR (EFSA, 2014) × PF (3.3) (a) | – | – |
| Potato, process waste| 2.00                  | STMR (EFSA, 2014) × PF (20) (b) | – | – |
| Potato, dried pulp   | 3.80                  | STMR (EFSA, 2014) × PF (38) (b) | – | – |
| Wheat, gluten meal   | 0.22                  | STMR × PF (1.8) (a)    | –                   | –       |
| Wheat, milled by-products | 0.84              | STMR × PF (7.0) (a) | –                   | –       |

**Risk assessment residue definition:** Sum of folpet and phthalimide, expressed as folpet.

(a): In the absence of processing factors supported by data for brewer's grain, distiller's grain, potato process waste, potato dried pulp, wheat gluten meal and wheat milled by-products, default processing factors (in bracket) were respectively included in the calculation to consider the potential concentration of residues in these commodities.

(b): For cereal and potato by-products default processing factors were included in the calculation to consider the potential concentration of residues in these feed items.

#### D.2. Consumer risk assessment

| Commodity      | Existing/proposed MRL (mg/kg) | Source/type of MRL | Chronic risk assessment | Acute risk assessment |
|----------------|-------------------------------|--------------------|------------------------|-----------------------|
| Barley grain   | 2 Proposed MRL                | 0.18               | STMR                   | 0.18 STMR             |
| Oat grain      | 2 Proposed MRL                | 0.18               | STMR                   | 0.18 STMR             |
| Rye grain      | 0.3 Proposed MRL              | 0.12               | STMR                   | 0.12 STMR             |
| Wheat grain    | 0.3 Proposed MRL              | 0.12               | STMR                   | 0.12 STMR             |
| Apples         | 0.3 EFSA (2017)               | 0.06               | STMR                   | 0.19 HR               |
| Pears          | 0.3 EFSA (2017)               | 0.06               | STMR                   | 0.19 HR               |
| Table grapes   | 6 EFSA (2014)                 | 1.18               | STMR                   | 2.90 HR               |
| Wine grapes    | 20 EFSA (2014)                | 1.66               | STMR × PF × 0.7 (refined input value for adults) | 2.80 HR × PF × 0.7 (refined input value for adults) |

**Risk assessment residue definition:** sum of folpet and phthalimide, expressed as folpet.
| Commodity                              | Existing/proposed MRL (mg/kg) | Source/type of MRL | Chronic risk assessment | Acute risk assessment |
|----------------------------------------|-------------------------------|--------------------|-------------------------|-----------------------|
|                                        | Input value (mg/kg)           | Comment            | Input value (mg/kg)(a)  | Comment               |
| Strawberries                           | 5                             | EFSA (2014)        | 1.30 STMR (tentative)   | 2.20 HR (tentative)   |
| Table olives                           | 0.15                          | EFSA (2014)        | 0.15 STMR (tentative)   | 0.15 HR (tentative)   |
| Potatoes                               | 0.06                          | EFSA (2014)        | 0.10 STMR (tentative)   | 0.10 HR (tentative)   |
| Radishes                               | 0.04                          | EFSA (2014)        | 0.04 STMR (tentative)   | 0.04 HR (tentative)   |
| Salsifies                              | 0.04                          | EFSA (2014)        | 0.04 STMR (tentative)   | 0.04 HR (tentative)   |
| Tomatoes                               | 5                             | EFSA (2014)        | 0.70 STMR (tentative)   | 2.8 HR (tentative)    |
| Melons                                 | 0.4                           | EFSA (2014)        | 0.03 STMR (tentative)   | 0.17 HR (tentative)   |
| Olives for oil production              | 0.15                          | EFSA (2014)        | 0.15 STMR (tentative)   | 0.15 HR (tentative)   |
| Hops                                   | 400                           | EFSA (2014)        | 82.00 STMR (tentative)  | 192 HR (tentative)    |

Risk assessment residue definition: phthalimide expressed as folpet

|                                                                 |
|-----------------------------------------------------------------|
| Tissues from terrestrial animals                                |
| 0.05 EFSA (2014) 0.05* STMR 0.05* HR                             |
| Milk                                                            |
| 0.05 EFSA (2014) 0.05* STMR 0.05* HR                             |
| Birds’ eggs                                                     |
| 0.05 EFSA (2014) 0.05* EU MRL 0.05* EU MRL                       |

STMR: supervised trials median residue; HR: highest residue; PF: processing factor.
*: Indicates that the MRL is set at the limit of analytical quantification (LOQ).
(a): Input values for the commodities which are not under consideration for the acute risk assessment are reported in grey.
## Appendix E – Used compound codes

| Code/trivial name | IUPAC name/SMILES notation/InChiKey\(^{(a)}\) | Structural formula\(^{(b)}\) |
|-------------------|-----------------------------------------------|-----------------------------|
| **Folpet**        | \(N-\text{(trichloromethylthio)}\)phthalimide  |
|                   | \(\text{ClC(Cl)(Cl)SN2C(=O)c1cccccc1C2=O}\)   |
|                   | HKIOYBQGHSTUDB-UHFFFAOYSA-N                  |
| **Phthalimide**   | colname="col2">1H-isooindole-1,3(2H)-dione   |
|                   | \(O=C1NC(=O)c2cccccc12\)                     |
|                   | XKJCHHZQLQNZHY-UHFFFAOYSA-N                  |
| **Phthalamic acid**| 2-carbamoylbenzoic acid                      |
|                   | \(\text{OC}(=O)c1cccccc1C(N)=O\)            |
|                   | CYMRPDYINXWJFU-UHFFFAOYSA-N                  |
| **Phthalic acid** | benzene-1,2-dicarboxylic acid                |
|                   | \(\text{OC}(=O)c1cccccc1C(=O)O\)            |
|                   | XNGIFLGASWRNHJ-UHFFFAOYSA-N                  |
| **Phthalic anhydride** | 2-benzofuran-1,3-dione                      |
|                   | \(O=C1OC(=O)c2cccccc12\)                     |
|                   | LGRFSURHDFAFJT-UHFFFAOYSA-N                  |
| **Thiazolidine**  | 1,3-thiazolidine                             |
|                   | \(\text{C1CNCS1}\)                          |
|                   | OGYGFUAIIOPWD-UHFFFAOYSA-N                   |
| **Thiophosgene**  | carbonothioyl dichloride                     |
|                   | \(\text{ClC(Cl)=S}\)                        |
|                   | ZWZWGITAIFPS-UHFFFAOYSA-N                    |

IUPAC: International Union of Pure and Applied Chemistry; SMILES: simplified molecular-input line-entry system; InChiKey: International Chemical Identifier Key.

\(^{(a)}\): ACD/Name 2019.1.3 ACD/Labs 2019 Release (File version N05E41, Build 111418, 3 September 2019).

\(^{(b)}\): ACD/ChemSketch 2019.1.3 ACD/Labs 2019 Release (File version C05H41, Build 111302, 27 August 2019).