Review of the existing maximum residue levels for hymexazol according to Article 12 of Regulation (EC) No 396/2005

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Abstract

According to Article 12 of Regulation (EC) No 396/2005, EFSA has reviewed the maximum residue levels (MRLs) currently established at European level for the pesticide active substance hymexazol. To assess the occurrence of hymexazol residues in plants, processed commodities, rotational crops and livestock, EFSA considered the conclusions derived in the framework of Commission Regulation (EC) No 33/2008 as well as the European authorisations reported by Member States (including the supporting residues data). Based on the assessment of the available data, MRL proposals were derived and a consumer risk assessment was carried out. All information required by the regulatory framework was present and a risk to consumers was not identified.

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Summary

Hymexazol was included in Annex I to Directive 91/414/EEC on 1 June 2011 by Commission Directive 2011/5/EU, and has been deemed to be approved under Regulation (EC) No 1107/2009, in accordance with Commission Implementing Regulation (EU) No 540/2011, as amended by Commission Implementing Regulations (EU) No 541/2011 and No 2018/1266.

As the active substance was approved after the entry into force of Regulation (EC) No 396/2005 on 2 September 2008, the European Food Safety Authority (EFSA) is required to provide a reasoned opinion on the review of the existing maximum residue levels (MRLs) for that active substance in compliance with Article 12(1) of the aforementioned regulation.

As the basis for the MRL review, on 16 April 2018, EFSA initiated the collection of data for this active substance. In a first step, Member States were invited to submit by 16 May 2018 their national Good Agricultural Practices (GAPs) in a standardised way, in the format of specific GAP forms, allowing the designated rapporteur Member State (RMS), Austria, to identify the critical GAPs in the format of a specific GAP overview file. Subsequently, Member States were requested to provide residue data supporting the critical GAPs, within a period of 1 month, by 20 August 2018. On the basis of all the data submitted by Member States and by the EU Reference Laboratories for Pesticides Residues (EURL), EFSA asked the RMS to complete the Pesticide Residues Overview File (PROFile) and to prepare a supporting evaluation report. The PROFile and evaluation report, together with Pesticide Residues Intake Model (PRIMo) calculations were provided by the RMS to EFSA on 24 October 2018. Subsequently, EFSA performed the completeness check of these documents with the RMS. The outcome of this exercise including the clarifications provided by the RMS, if any, was compiled in the completeness check report.

Based on the information provided by the RMS, Member States and the EURL, and taking into account the conclusions derived by EFSA in the framework of Commission Regulation (EC) No 33/2008, EFSA prepared in July 2019 a draft reasoned opinion, which was circulated to Member States for consultation via a written procedure. Comments received by 27 August 2019 were considered during the finalisation of this reasoned opinion. The following conclusions are derived.

The metabolism of hymexazol in plant was investigated in primary crops. According to the results of the metabolism studies after seed treatment of sugar beet, the residue definition for enforcement and risk assessment can be proposed as hymexazol. The residue definition is restricted to seed pelleting of root and tuber vegetables. It is also applicable to rotational crops and processed commodities. For fruit crops, the residue definitions for enforcement and risk assessment derived in the peer review are still considered valid.

Fully validated analytical methods are available for the enforcement of the proposed residue definition in high water content commodities at the limit of quantification (LOQ) of 0.01 mg/kg. According to the EURLs, the same LOQ (0.01 mg/kg) is achievable by using a QuEChERS method in routine analyses.

Available residue trials data were considered sufficient to derive MRL proposals as well as risk assessment values for all commodities under evaluation, noting that the authorised use on fodder beets (feed item) might not be in line with the restrictions given in the conditions of approval.

Hymexazol is authorised for use on crops that might be fed to livestock. Livestock dietary burden calculations were therefore performed for different groups of livestock according to OECD guidance. Since the calculated dietary burdens for all groups of livestock were found to be below the trigger value of 0.1 mg/kg dry matter (DM), further investigation of residues as well as the setting of MRLs in commodities of animal origin is unnecessary.

Chronic and acute consumer exposure resulting from the authorised uses reported in the framework of this review was calculated using revision 3 of the EFSA PRIMo. The highest chronic exposure represented 0.05% of the acceptable daily intake (ADI) (NL child) and the highest acute exposure amounted to 0.2% of the acute reference dose (ARfD) (sugar beet roots). These calculations indicate that the use assessed under this review result in a consumer exposure lower than the toxicological reference values, and thus are unlikely to pose a risk to consumer’s health.
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Background

Regulation (EC) No 396/2005\(^1\) (hereinafter referred to as 'the Regulation') establishes the rules governing the setting and the review of pesticide maximum residue levels (MRLs) at European level. Article 12(1) of that Regulation stipulates that the European Food Safety Authority (EFSA) shall provide within 12 months from the date of the inclusion or non-inclusion of an active substance in Annex I to Directive 91/414/EEC\(^2\) a reasoned opinion on the review of the existing MRLs for that active substance. Hymexazol was included in Annex I to Council Directive 91/414/EEC on 1 June 2011 by Commission Directive 2011/5/EU\(^3\) which has been deemed to be approved under Regulation (EC) No 1107/2009\(^4\), in accordance with Commission Implementing Regulation (EU) No 540/2011\(^5\), as amended by Commission Implementing Regulations (EU) No 541/2011\(^6\) and No 2018/1266\(^7\). Therefore, EFSA initiated the review of all existing MRLs for that active substance.

By way of background information, in the framework of Commission Regulation (EC) No 33/2008\(^8\), Hymexazol was evaluated by Finland, as rapporteur Member State (RMS). Subsequently, a peer review on the initial evaluation of the RMS was conducted by EFSA, leading to the conclusions as set out in the EFSA scientific output (EFSA, 2010). The approval of Hymexazol is restricted to uses as a fungicide for seed pelleting of sugar beets in professional seed treatment facilities. Furthermore, according to the provisions of the approval directive, confirmatory information was requested, among others, as regards the nature of residues in root crops, to be submitted by 31 May 2013. The confirmatory data submitted by the applicant were considered addressed (European Commission, 2014).

According to the legal provisions, EFSA shall base its reasoned opinion in particular on the relevant assessment report prepared under Directive 91/414/EEC repealed by Regulation (EC) No 1107/2009. It should be noted, however, that, in the framework of Regulation (EC) No 1107/2009, only a few representative uses are evaluated, whereas MRLs set out in Regulation (EC) No 396/2005 should accommodate all uses authorised within the European Union (EU), and uses authorised in third countries that have a significant impact on international trade. The information included in the assessment report prepared under Regulation (EC) No 1107/2009 is therefore insufficient for the assessment of all existing MRLs for a given active substance.

To gain an overview of the pesticide residues data that have been considered for the setting of the existing MRLs, EFSA developed the Pesticide Residues Overview File (PROFile). The PROFile is an inventory of all pesticide residues data relevant to the risk assessment and MRL setting for a given active substance. This includes data on:

- the nature and magnitude of residues in primary crops;
- the nature and magnitude of residues in processed commodities;
- the nature and magnitude of residues in rotational crops;
- the nature and magnitude of residues in livestock commodities;
- the analytical methods for enforcement of the proposed MRLs.

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1 Regulation (EC) No 396/2005 of the European 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, 16.3.2005, p. 1-16.
2 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. Repealed by Regulation (EC) No 1107/2009.
3 Commission Directive 2011/5/EU of 20 January 2011 amending Council Directive 91/414/EEC to include hymexazol as active substance and amending Decision 2008/934/EC. OJ L 18, 21.1.2011, p. 34-37.
4 Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC. OJ L 309, 24.11.2009, p. 1-50.
5 Commission Implementing Regulation (EU) No 540/2011 of 25 May 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the list of approved active substances. OJ L 153, 11.6.2011, p. 1-186.
6 Commission Implementing Regulation (EU) No 541/2011 of 1 June 2011 amending Implementing Regulation (EU) No 540/2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the list of approved active substances. OJ L 153, 11.6.2011, p. 187-188.
7 Commission Implementing Regulation (EU) 2018/1266 of 20 September 2018 amending Implementing Regulation (EU) No 540/2011 as regards the extension of the approval periods of the active substances 1-decanol, 6-benzyladenine, aluminium sulfate, azadirachtin, bupirimate, carboxin, clothodim, cycloxydim, dazomet, dicofop, dithianion, dodine, fenazaquin, fluoreturon, flutriafol, hexythiazox, hymexazol, indolylbutyric acid, isoxaben, lime sulfur, metaldehyde, paclobutrazol, penconurion, sintofer, tau-fluvalinate and tebufenozide. OJ L 238, 21.9.2018, p. 81-83.
8 Commission Regulation (EC) No 33/2008 of 17 January 2008 laying down detailed rules for the application of Council Directive 91/414/EEC as regards a regular and an accelerated procedure for the assessment of active substances which were part of the programme of work referred to in Article 9(2) of that Directive but have not been included into its Annex I. OJ L 15, 18.1.2008, p. 5-12.
As the basis for the MRL review, on 16 April 2018, EFSA initiated the collection of data for this active substance. In a first step, Member States were invited to submit by 16 May 2018 their Good Agricultural Practices (GAPs) that are authorised nationally, in a standardised way, in the format of specific GAP forms. In the framework of this consultation, 15 Member States provided feedback on their national authorisations of hymexazol. Based on the GAP data submitted, the designated RMS, Austria, was asked to identify the critical GAPs to be further considered in the assessment, in the format of a specific GAP overview file. Subsequently, in a second step, Member States were requested to provide residue data supporting the critical GAPs by 20 August 2018.

On the basis of all the data submitted by Member States and the EU Reference Laboratories for Pesticides Residues (EURL), EFSA asked Austria to complete the PROFile and to prepare a supporting evaluation report. The PROFile and the supporting evaluation report, together with the Pesticide Residues Intake Model (PRIMo) calculations, were submitted to EFSA on 24 October 2018. Subsequently, EFSA performed the completeness check of these documents with the RMS. The outcome of this exercise including the clarifications provided by the RMS, if any, was compiled in the completeness check report.

Considering all the available information, EFSA prepared in July 2019 a draft reasoned opinion, which was circulated to Member States for commenting via a written procedure. All comments received by 27 August 2019 were considered by EFSA during the finalisation of the reasoned opinion.

The evaluation report submitted by the RMS (Austria, 2018), taking into account also the information provided by Member States during the collection of data, and the EURL report on analytical methods (EURL, 2018) are considered as main supporting documents to this reasoned opinion and, thus, made publicly available.

In addition, further supporting documents to this reasoned opinion are the completeness check report (EFSA, 2019a) and the Member States consultation report (EFSA, 2019b). These reports are developed to address all issues raised in the course of the review, from the initial completeness check to the reasoned opinion. Furthermore, the exposure calculations for all crops reported in the framework of this review performed using the EFSA Pesticide Residues Intake Model (PRIMo) and the PROFile as well as the GAP overview file listing all authorised uses are key supporting documents and made publicly available as background documents to this reasoned opinion. A screenshot of the report sheet of the PRIMo is presented in Appendix C.

Terms of Reference

According to Article 12 of Regulation (EC) No 396/2005, EFSA shall provide a reasoned opinion on:

- the inclusion of the active substance in Annex IV to the Regulation, when appropriate;
- the necessity of setting new MRLs for the active substance or deleting/modifying existing MRLs set out in Annex II or III of the Regulation;
- the inclusion of the recommended MRLs in Annex II or III to the Regulation;
- the setting of specific processing factors as referred to in Article 20(2) of the Regulation.

The active substance and its use pattern

Hymexazol is the ISO common name for 5-methylisoxazol-3-ol or 5-methyl-1,2-oxazol-3-ol (IUPAC). The chemical structure of the active substance and its main metabolites are reported in Appendix F.

The EU MRLs for hymexazol are established in Annex IIIA of Regulation (EC) No 396/2005. Codex maximum residue limits (CXLs) for hymexazol are not available. There are no MRL changes occurred since the entry into force of the Regulation mentioned above as amended by Commission Regulation (EC) No 149/2008. \(^9\)

For the purpose of this MRL review, all the uses of hymexazol currently authorised within the EU as submitted by the Member States during the GAP collection, have been reported by the RMS in the GAP overview file. The critical GAPs identified in the GAP overview file were then summarised in the PROFile and considered in the assessment. The details of the authorised critical GAPs for hymexazol are given in Appendix A. Although according to the conditions of approval of hymexazol, its use is restricted for seed pelleting of sugar beets, the RMS reported an authorised GAP for the active substance in fodder

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\(^9\) Commission Regulation (EC) No 149/2008 of 29 January 2008 amending Regulation (EC) No 396/2005 of the European Parliament and of the Council by establishing Annexes II, III and IV setting maximum residue levels for products covered by Annex I thereto. OJ L 58, 1.3.2008, p. 1–398.
beets. The RMS did not report any use authorised in third countries that might have a significant impact on international trade.

**Assessment**

EFSA has based its assessment on the following documents:

- the PROFile submitted by the RMS;
- the evaluation report accompanying the PROFile (Austria, 2018);
- the draft assessment report (DAR) and its addenda prepared under Council Directive 91/414/EEC (Finland, 2007);
- the additional report (AR) and its addenda prepared under Commission Regulation (EC) No 33/2008 (Finland, 2009, 2010);
- the confirmatory data addendum (Finland, 2014);
- the conclusion on the peer review of the pesticide risk assessment of the active substance hymexazol (EFSA, 2010);
- the review report on hymexazol (European Commission, 2014).

The assessment is performed in accordance with the legal provisions of the uniform principles for evaluation and authorisation of plant protection products as set out in Commission Regulation (EU) No 546/2011\(^\text{10}\) and the currently applicable guidance documents relevant for the consumer risk assessment of pesticide residues (European Commission, 1997a–g, 2000, 2010a,b, 2017; OECD, 2011, 2013).

More detailed information on the available data and on the conclusions derived by EFSA can be retrieved from the list of end points reported in Appendix B.

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 hymexazol was investigated in seed-treated sugar beets and drench-treated tomatoes (Finland, 2007), and assessed in the framework of the peer review (EFSA, 2010). In both studies, hymexazol was radiolabelled in the \([3-^{14}C]\)-ring of the molecule.

Tomato seedlings were treated twice with radiolabelled hymexazol at rates of 0.27 g a.s./plant (equivalent to 5.4 kg a.s./ha) or 0.81 g a.s./plant (equivalent to 16.2 kg a.s./ha). At harvest, total radioactive residues (TRRs) amounted to a maximum of 16.4 mg eq/kg at 27 days after treatment (DAT), in tomato fruit, at low application rate. The major constituents of the residue were hymexazol (17% TRR), hymexazol N-monoglucoside (36% TRR) and hymexazol O-glucoside (16% TRR) (Finland, 2007; EFSA, 2010). The compounds were present in a similar proportion in fruit following the two application rates.

The peer review concluded that the sugar beet metabolism study was not considered acceptable (EFSA, 2010). A new metabolism study in sugar beet was submitted in the confirmatory data addendum (Finland, 2014). Sugar beet seeds were pretreated with the formulated product, containing unlabelled hymexazol at 28.9 g a.s./100,000 seeds, and, on the day of sowing, the seeds were treated with a single dose of \([3-^{14}C\text{ ring-labelled}]\) hymexazol at 10 g a.s./100,000 seeds. A higher application rate, corresponding to approximately 44 g a.s./100,000 seeds, resulted in phytotoxic effects of the sugar beet crops.

Total radioactive residues (TRRs) in roots of sugar beets amounted to 0.0084 and 0.0019 mg eq/kg at 82 and 151 DAT, respectively. In foliage, TRR amounted to 0.0031 and 0.0005 mg eq/kg at 82 and 151 DAT, respectively. Given the low TRR recovered in roots and foliage, no further metabolite characterisation was attempted.

The metabolism in sugar beets was considered sufficiently elucidated after the submission of confirmatory data, supporting therefore the authorised use on sugar beets.

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\(^{10}\) 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, 11.06.2011, p. 127–175.
1.1.2. Nature of residues in rotational crops

Hymexazol is authorised on crops (sugar beet) that may be grown in rotation. The field DT$_{90}$ reported in the soil degradation study evaluated in the framework of the peer review was 37 days and no major or minor soil metabolites were formed indicating a low persistency of hymexazol in the soil (EFSA, 2010). However, in the field study, only one type of soil was tested, while in laboratory the maximum DT$_{90}$ reported from a variety of soils was 105 days, a value slightly above the trigger value of 100 days. Hence, further investigation in rotational crops is in principle required. In support of this, a soil dissipation study was submitted by the RMS (Austria, 2018) in the frame of this MRL review. Four independent field dissipation trials were carried out in northern European Union (NEU) after sowing sugar beet seeds coated with hymexazol at 28 g a.s/100,000 seeds. Soil core samples were separated into layers according to depth and analysed for residues. A transition factor of 0.15 was derived for the only sample exhibiting residue levels (0.0194 mg/kg dry soil) exceeding the LOQ. The RMS concluded that even in cases where residues of hymexazol in soil exceed 0.01 mg/kg, residues in succeeding sugar beet crop, applying the transition factor, are not expected to exceed levels of 0.01 mg/kg, in the event of re-sowing sugar beet following a crop failure scenario (Austria, 2018). This information has been considered in a supportive manner.

Considering that the available metabolism study on primary crops demonstrated that residues are not translocated (TRR < 0.01 mg eq/kg) from the root to the plant following seed treatment of sugar beets (see Section 1.1.1), that hymexazol is only authorised for seed pelleting of sugar beet, and the supporting information of the soil dissipation study, EFSA is of the opinion that significant residues in crops rotated following sugar beets, treated in compliance with the most critical GAP currently authorised, are not expected.

Therefore, in the framework of this MRL review, where only uses on sugar (and fodder) beet are authorised, further studies investigating the nature of hymexazol in rotational crops are not required. It should be noted, however, that this might be reconsidered in the future if further uses are granted or if new studies will be available at the time of the renewal of hymexazol.

1.1.3. Nature of residues in processed commodities

Studies investigating the nature of residues in processed commodities were assessed in the peer review (Finland, 2007; EFSA, 2010). The behaviour of hymexazol residues under representative hydrolysis conditions was investigated only for pasteurisation (20 min at 90°C, pH 4). Under these conditions, hymexazol was stable and glucoside conjugates were degraded to hymexazol. Hydrolysis studies simulating boiling/brewing/baking (60 min at 100°C, pH 5) and sterilisation (20 min at 120°C, pH 6) were not available. However, since in sugar (and fodder) beet, residues were below 0.01 mg/kg and the total theoretical maximum daily intake is far below 10% of the acceptable daily intake (ADI), further studies investigating the nature of residues in processed commodities are in principle not required.

1.1.4. Methods of analysis in plants

During the peer review, an analytical method based on high-performance liquid chromatography (HPLC) coupled to MS/MS was validated in high water content commodities, with an LOQ of 0.05 mg/kg. An independent laboratory validation (ILV) was also available (Finland, 2007; EFSA, 2010). In the framework of this MRL review, a multiresidue analytical method for hymexazol in high water content commodities using liquid chromatography with tandem mass spectrometry (LC-MS/MS), with an LOQ of 0.01 mg/kg was evaluated (Austria, 2018). The RMS informed EFSA that the ILV is currently in progress and will be provided for the renewal process. EFSA considers the ILV as desirable, but not essential, since the method is a multiresidue one, which has also been used in the residue trials with demonstrated robustness and reproducibility. During the completeness check, the EURLs provided validation details of a QuEChERS multiresidue analytical method, based on LC-MS/MS, with an LOQ of 0.01 mg/kg for the routine analysis of hymexazol in high water content commodities (EURL, 2018). During the Member States consultation, EURLs informed EFSA that hymexazol residues can be monitored in high acid and high oil content commodities as well as dry commodities by the use of a QuEChERS method (based on LC-MS/MS) with an LOQ of 0.05 mg/kg (EFSA, 2019b).
1.1.5. Stability of residues in plants

The storage stability of parent hymexazol was investigated in high water and tomato processed commodities, in the framework of the peer review (EFSA, 2010) and in new studies submitted under this MRL review (Austria, 2018).

The available studies demonstrated the storage stability of parent hymexazol for a period of 9 months in tomato fruit and puree, and of 21 months in juice, when stored at −20°C (EFSA, 2010). Regarding sugar beets, the studies submitted in the DAR (Finland, 2007), showed that hymexazol was already degraded to an 89% extent after 1 month. A new study with sugar beet roots and tops was made available for this MRL review, demonstrating the storage stability of parent hymexazol for up to 3 days (Austria, 2018).

1.1.6. Proposed residue definitions

In the peer review (EFSA, 2010), two representative uses were evaluated, sugar beet and tomato. The PRAPeR Expert Meeting TC 29 considered the metabolism study on sugar beet as not acceptable due to significant concerns on the storage stability of hymexazol and uncertainty regarding the method of application. Only the use on tomato was thus peer reviewed. The residue definitions derived for the enforcement (hymexazol) and risk assessment (hymexazol and glucoside conjugates—hymexazol-O-monoglucoside, hymexazol-O-diglucoside and hymexazol-N-monoglucoside, expressed as hymexazol) of fruit crops are still considered valid. Nevertheless, no uses on fruits or fruiting vegetables are authorised at the time of this MRL review.

The nature of residues in sugar beets was then evaluated in the framework of confirmatory data (European Commission, 2014; Finland, 2014) and considered sufficiently elucidated. According to the available studies, the residue definition for enforcement and risk assessment is proposed as hymexazol. The residue definition is restricted to seed pelleting of root and tuber vegetables. It is also applicable to rotational crops and processed commodities.

A sufficiently validated analytical method for the enforcement of the proposed residue definition at the LOQ of 0.05 mg/kg in high water content commodities was available in the EFSA conclusion (EFSA, 2010). In addition, a multiresidue method with an LOQ of 0.01 mg/kg is also available, but the ILV is still pending (Austria, 2018). According to the EURs, the LOQ of 0.01 mg/kg is achievable by using a QuEChERS method in routine analyses (EURL, 2018).

1.2. Magnitude of residues in plants

1.2.1. Magnitude of residues in primary crops

To assess the magnitude of hymexazol residues resulting from the reported GAPs, EFSA considered all residue trials reported by the RMS in its evaluation report (Austria, 2018). All residue trial samples considered in this framework were stored in compliance with the conditions for which storage stability of residues was demonstrated (3 days). Decline of residues during storage of the trial samples is therefore not expected.

The number of residue trials and extrapolations was evaluated in accordance with the European guidelines on comparability, extrapolation, group tolerances and data requirements for setting MRLs (European Commission, 2017).

For all crops under assessment, available residue trials are sufficient to derive MRL and risk assessment values, taking note of the following considerations:

- Sugar beet roots and tops: The number of residue trials (four) supporting the northern and southern outdoor GAPs is not compliant with the data requirements for sugar beets (eight trials). However, the reduced number of residue trials is considered acceptable in this case because all results were below the LOQ and a no residues situation is expected. Further residue trials are therefore not required.

1.2.2. Magnitude of residues in rotational crops

There were no studies investigating the magnitude of residues in rotational crops available for this review.

Nevertheless, based on the primary crops metabolism study and the soil dissipation study (see section 1.1.2), and considering that only uses for seed pelleting of sugar beet are currently authorised...
at the time of this MRL review, it can be concluded that hymexazol residue levels in rotational commodities are not expected to exceed 0.01 mg/kg, provided that hymexazol is applied in compliance with the GAPs reported in Appendix A.

1.2.3. Magnitude of residues in processed commodities

For sugar beets, the effect of industrial processing and/or household preparation was not assessed and it is not required given that residues in the raw agricultural commodity were below the LOQ in all trials available. Although no uses are currently authorised on tomatoes in the EU, studies on the effect of processing on the residue levels were conducted on tomato during the first approval process (Finland, 2007). An overview of all available processing studies is available in Appendix B.1.2.3. Limited processing factors (not fully supported by data) were derived for tomato juice, puree and canned fruit. Further processing studies are not required as they are not expected to affect the outcome of the risk assessment.

1.2.4. Proposed MRLs

The available data are considered sufficient to derive MRL proposals as well as risk assessment values for all commodities under evaluation. Tentative MRLs were also derived for feed crops (sugar beet tops and fodder beet roots and tops) in view of the future need to set MRLs in feed items. It is noted, however, that the use on fodder beet might not be in line with the restrictions given in the conditions of approval.

2. Residues in livestock

Hymexazol is authorised for use on sugar and fodder beets that might be fed to livestock. Livestock dietary burden calculations were therefore performed for different groups of livestock according to OECD guidance (OECD, 2013), which has now also been agreed upon at European level. The input values for all relevant commodities are summarised in Appendix D. Since the calculated dietary burdens for all groups of livestock were found to be below the trigger value of 0.1 mg/kg dry matter (DM), further investigation of residues as well as the setting of MRLs in commodities of animal origin is unnecessary. EURLs informed EFSA about the availability of sufficiently validated analytical methods for the monitoring of hymexazol in animal commodities (EURL, 2018; EFSA, 2019b).

3. Consumer risk assessment

Chronic and acute exposure calculations for all crops reported in the framework of this review were performed using revision 3 of the EFSA PRIMo (EFSA, 2017). Input values for the exposure calculations were derived in compliance with the decision tree reported in Appendix E. Hence, for those commodities where an MRL could be derived by EFSA in the framework of this review, input values were derived according to the internationally agreed methodologies (FAO, 2009). All input values included in the exposure calculations are summarised in Appendix D.

The exposure values calculated were compared with the toxicological reference values for hymexazol, derived by EFSA (2010). The highest chronic exposure was calculated for Dutch child, representing 0.05% of the ADI, and the highest acute exposure was calculated for sugar beet (root), representing 0.2% of the acute reference dose (ARfD). These calculations indicate that the use assessed under this review result in a consumer exposure lower than the toxicological reference values. Therefore, this use is unlikely to pose a risk to consumer’s health.

Conclusions

The metabolism of hymexazol in plant was investigated in primary crops. According to the results of the metabolism studies after seed treatment of sugar beet, the residue definition for enforcement and risk assessment can be proposed as hymexazol. The residue definition is restricted to seed pelleting of root and tuber vegetables. It is also applicable to rotational crops and processed commodities. For fruit crops, the residue definitions for enforcement and risk assessment derived in the peer review are still considered valid.

Fully validated analytical methods are available for the enforcement of the proposed residue definition in high water content commodities at the LOQ of 0.01 mg/kg. According to the EURLs, the same LOQ (0.01 mg/kg) is achievable by using a QuEChERS method in routine analyses.
Available residue trials data were considered sufficient to derive MRL proposals as well as risk assessment values for all commodities under evaluation, noting that the authorised use on fodder beets (feed item) might not be in line with the restrictions given in the conditions of approval.

Hymexazol is authorised for use on crops that might be fed to livestock. Livestock dietary burden calculations were therefore performed for different groups of livestock according to OECD guidance. Since the calculated dietary burdens for all groups of livestock were found to be below the trigger value of 0.1 mg/kg DM, further investigation of residues as well as the setting of MRLs in commodities of animal origin is unnecessary.

Chronic and acute consumer exposure resulting from the authorised uses reported in the framework of this review was calculated using revision 3 of the EFSA PRIMo. The highest chronic exposure represented 0.05% of the ADI (NL child) and the highest acute exposure amounted to 0.2% of the ARfD (sugar beet roots). These calculations indicate that the use assessed under this review result in a consumer exposure lower than the toxicological reference values, and thus are unlikely to pose a risk to consumer’s health.

**Recommendations**

MRL recommendations were derived in compliance with the decision tree reported in Appendix E of the reasoned opinion (see Table 1). The MRL value derived for the only food commodity under evaluation (sugar beet root) is sufficiently supported by data and is therefore proposed for inclusion in Annex II to the Regulation.

Minor deficiencies were identified in the assessment, but these deficiencies are not expected to impact either on the validity of the MRLs derived or on the national authorisations. The following data are therefore considered desirable but not essential:

- ILV for high water content commodities.

Pending the submission of the ILV, a risk management decision may still be taken on the LOQ for enforcement, since an analytical method sufficiently validated at the LOQ of 0.05 mg/kg is also available. It is highlighted that according to EURoLS, hymexazol can be monitored in high water content commodities with an LOQ of 0.01 mg/kg in routine analysis (EURL, 2018).

**Table 1:** Summary table

| Code number | Commodity | Existing EU MRL (mg/kg) | Existing CXL (mg/kg) | Outcome of the review MRL (mg/kg) | Comment |
|-------------|-----------|-------------------------|---------------------|-------------------------------|---------|
| Enforce. residue definition (existing): hymexazol | Sugar beet (root) | 0.1 | – | 0.01* | Recommended<sup>(a)</sup> |
| Enforce. residue definition (proposed): hymexazol | Other commodities of plant and/or animal origin | See Reg. 149/2008 | – | – | Further consideration needed<sup>(b)</sup> |

MRL: maximum residue level; CXL: codex maximum residue limit.

*: Indicates that the MRL is set at the limit of quantification.

(a): MRL is derived from a GAP evaluated at EU level, which is fully supported by data and for which no risk to consumers is identified; no CXL is available (combination H-I in Appendix E).

(b): There are no relevant authorisations or import tolerances reported at EU level; no CXL is available. Either a specific LOQ or the default MRL of 0.01 mg/kg may be considered (combination A-I in Appendix E).

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Abbreviations

- a.i. active ingredient
- a.s. active substance
- ADI acceptable daily intake
- AR additional report
- ARfD acute reference dose
- BBCH growth stages of mono- and dicotyledonous plants
### Appendix A – Summary of authorised uses considered for the review of MRLs

#### A.1. Authorised outdoor uses in northern EU

| Crop and/or situation | MS or country | F, G or I (a) | Pests or group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) (d) | Remarks |
|-----------------------|---------------|---------------|-----------------------------------|-------------|-------------|-------------------------------|----------------|---------|
| Sugar beets           | AT, BE, CZ, DE, FR, HU, NL, SE, UK | F             | Fungus disease | WS          | 700 g/kg | Seed treatment – general (see also comment field) | 0 to 0 | 1 | – | – | 28 g a.i./unit | n.a. | 1 unit = 100,000 seeds, maximum seedling rate: 1.5 unit/ha |
| Fodder beets          | CZ, DE, FR    | F             | Fungus disease | WS          | 700 g/kg | Seed treatment – general (see also comment field) | 0 to 0 | 1 | – | – | 28 g a.i./unit | n.a. | 1 unit = 100,000 seeds, maximum seedling rate: 1.5 unit/ha |

**MS:** Member State.

(a): Outdoor or field use (F), greenhouse application (G) or indoor application (I).

(b): CropLife International Technical Monograph no 2, 6th Edition. Revised May 2008. Catalogue of pesticide.

(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.
### A.2. Authorised outdoor uses in southern EU

| Crop and/or situation | MS or country | F G I(a) | Pests or group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days)(d) | Remarks |
|-----------------------|---------------|----------|-----------------------------------|-------------|-------------|-------------------------------|---------------|---------|
| Sugar beets           | ES, IT        | F        | Fungus disease                    | WS          | Seed treatment – general (see also comment field) | 0 to 0 | 1 | – | – | 28 g a.i./unit | n.a. | 1 unit = 100,000 seeds, maximum seedling rate: 1.5 unit/ha |

MS: Member State.
(a): Outdoor or field use (F), greenhouse application (G) or indoor application (I).
(b): CropLife International Technical Monograph no 2, 6th Edition. Revised May 2008. Catalogue of pesticide.
(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 (DAT) | Comment/Source |
|-----------------------------------|-------------|---------|----------------|----------------|---------------|
| Fruit crops                       | Tomato      | Soil drench: 2 × 5.4 kg a.s./ha or 2 × 16.2 kg a.s./ha, 15 days interval | 14 DAT<sub>1</sub> and 15, 21, 27, 33, 41 DAT<sub>2</sub> | [3-<sup>14</sup>C]-hymexazol (EFSA, 2010) |
| Root crops                        | Sugar beet  | Seed treatment: unlabelled 1 × 28.9 g a.s./100,000 seeds + labelled 1 × 10.0 g a.s./100,000 seeds | 82 and 151 DAT | [3-<sup>14</sup>C]-hymexazol (Finland, 2014) |

| Rotational crops (available studies) | Crop groups | Crop(s) | Application(s) | PBI (DAT) | Comment/Source |
|--------------------------------------|-------------|---------|----------------|----------|---------------|
| Root/tuber crops                     | –           | –       | –              | –        | Not available and not required |
| Leafy crops                          | –           | –       | –              | –        | Not available and not required |
| Cereal (small grain)                 | –           | –       | –              | –        | Not available and not required |

| Processed commodities (hydrolysis study) | Conditions                          | Stable?                  | Comment/Source |
|------------------------------------------|-------------------------------------|--------------------------|----------------|
|                                          | Pasteurisation (20 min, 90°C, pH 4) | Yes                      | Conjugates degraded to hymexazol (Finland, 2007) |
|                                          | Baking, brewing and boiling (60 min, 100°C, pH 5) | Not triggered | Residues in the RAC below LOQ |
|                                          | Sterilisation (20 min, 120°C, pH 6) | Not triggered | Residues in the RAC below LOQ |
Can a general residue definition be proposed for primary crops?

| Category | Commodity | T (°C) | Stability period | Compounds covered | Comment/Source |
|----------|-----------|--------|------------------|-------------------|----------------|
| High water content | Sugar beet roots | −20 | 3 Days | Hymexazol | Austria, 2018, EFSA, 2010 |
| | Sugar beet tops | −20 | 3 Days | Hymexazol | Austria, 2018, EFSA, 2010 |
| | Tomatoes | −20 | 9 Months | Hymexazol | Austria, 2018, EFSA, 2010 |
| Processed products | Tomato juice | −20 | 21 Months | Hymexazol | EFSA, 2010 |
| | Tomato puree | −20 | 9 Months | Hymexazol | EFSA, 2010 |

Rotational crop and primary crop metabolism similar?

| Category | Commodity | T (°C) | Stability period | Compounds covered | Comment/Source |
|----------|-----------|--------|------------------|-------------------|----------------|
| High water content | Sugar beet roots | −20 | 3 Days | Hymexazol | Austria, 2018, EFSA, 2010 |
| | Sugar beet tops | −20 | 3 Days | Hymexazol | Austria, 2018, EFSA, 2010 |
| | Tomatoes | −20 | 9 Months | Hymexazol | Austria, 2018, EFSA, 2010 |
| Processed products | Tomato juice | −20 | 21 Months | Hymexazol | EFSA, 2010 |
| | Tomato puree | −20 | 9 Months | Hymexazol | EFSA, 2010 |

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

| Commodity | Compounds covered | Comment/source |
|-----------|------------------|----------------|
| Sugar beet roots | Hymexazol | Austria, 2018, EFSA, 2010 |
| Sugar beet tops | Hymexazol | Austria, 2018, EFSA, 2010 |
| Tomatoes | Hymexazol | Austria, 2018, EFSA, 2010 |
| Tomato juice | Hymexazol | EFSA, 2010 |
| Tomato puree | Hymexazol | EFSA, 2010 |

Plant residue definition for monitoring (RD-Mo)

- Root and tuber vegetables: hymexazol (restricted to seed pelleting)
- Fruits and fruiting vegetables: hymexazol (restricted to soil treatment)

Plant residue definition for risk assessment (RD-RA)

- Root and tuber vegetables: hymexazol (restricted to seed pelleting)
- Fruits and fruiting vegetables: hymexazol and glucoside conjugates (hymexazol-O-monoglucoside, hymexazol-O-diglucoside and hymexazol-N-monoglucoside), expressed as hymexazol (restricted to soil treatment)

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

- High water content commodities (Austria, 2018):
  - Multiresidue method LC–MS/MS
  - LOQ = 0.01 mg/kg
  - Confirmation by monitoring 1 additional MRM transition
  - No ILV available (desirable)
- QuEChERS (LC–MS/MS) in routine analysis, LOQ = 0.01 mg/kg (high water content commodities) and 0.05 mg/kg (high acid and high oil content commodities, and dry commodities) (EURL, 2018; EFSA 2019b).

B.1.1.2. Stability of residues in plants
### B.1.2. Magnitude of residues in plants

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

| Commodity                          | Region/indoor\(^{(a)}\) | Residue levels observed in the supervised residue trials (mg/kg) | Comments/Source                                                                 | Calculated MRL (mg/kg) | HR\(^{(b)}\) (mg/kg) | STMR\(^{(c)}\) (mg/kg) |
|-----------------------------------|--------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------|-----------------------|------------------------|
| Sugar and fodder beet roots       | NEU                      | 4 × < 0.01                                                      | Trials on sugar beet performed with application rate within 25% deviation. Reduced data set deemed acceptable as a no residue situation is expected (Austria, 2018). Extrapolation to fodder beet root is applicable MRL\(_{OECD} = 0.01\) | 0.01\(^{*}\)          | 0.01                  | 0.01                   |
|                                   | SEU                      | 4 × < 0.01                                                      | Trials on sugar beet performed with application rate within 25% deviation. Reduced data set deemed acceptable as a no residue situation is expected (Austria, 2018) MRL\(_{OECD} = 0.01\) | 0.01\(^{*}\)          | 0.01                  | 0.01                   |
| Sugar and fodder beet tops        | NEU                      | 4 × < 0.01                                                      | Trials on sugar beet performed with application rate within 25% deviation. Reduced data set deemed acceptable as a no residue situation is expected (Austria, 2018). Extrapolation to fodder beet top is applicable MRL\(_{OECD} = 0.01\) | 0.01\(^{*}\)          | 0.01                  | 0.01                   |
|                                   | SEU                      | 4 × < 0.01                                                      | Trials on sugar beet performed with application rate within 25% deviation. Reduced data set deemed acceptable as a no residue situation is expected (Austria, 2018) MRL\(_{OECD} = 0.01\) | 0.01\(^{*}\)          | 0.01                  | 0.01                   |

GAP: Good Agricultural Practice; OECD: Organisation for Economic Co-operation and Development; MRL: maximum residue level.

*: Indicates that the MRL is proposed at the limit of quantification.

Mo: residue levels expressed according to the monitoring residue definition; RA: residue levels expressed according to risk assessment residue definition.

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

(c): Supervised trials median residue. The median residue for risk assessment (RA) 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.
### B.1.2.2. Residues in rotational crops

#### a) Overall summary

| Residues in rotational and succeeding crops expected based on confined rotational crop study? | No |
| Residues in rotational and succeeding crops expected based on field rotational crop study? | Not triggered |

Based on the primary crops metabolism study and the soil dissipation study, and considering that only uses for seed pelleting of sugar beet are currently authorised at the time of this review, significant residue levels of hymexazol are not expected in rotational commodities, provided that hymexazol is applied in compliance with the GAPS reported in Appendix A.

**GAP:** Good Agricultural Practice.

#### B.1.2.3. Processing factors

| Processed commodity | Number of valid studies(a) | Processing Factor (PF) | CFp(b) | Comment/Source |
|---------------------|---------------------------|------------------------|--------|----------------|
| Sugar beet, processed | – | – | – | Not relevant as no residues are expected in RAC |
| Tomato, juice | 1 | < 0.5 | 0.5 | Tentative\(^{(c)}\) (Finland, 2007) |
| Tomato, puree | 2 | > 1.4; 0.7 | 1.1 | Tentative\(^{(c)}\) (Finland, 2007) |
| Tomato, canned fruit | 1 | < 0.5 | 0.5 | Tentative\(^{(c)}\) (Finland, 2007) |

**PF:** Processing factor (Residue level in processed commodity expressed according to RD-Mo/Residue level in raw commodity expressed according to RD-Mo).

**CF\(_p\):** Conversion factor for risk assessment in processed commodity (Residue level in processed commodity expressed according to RD-RA/Residue level in processed commodity expressed according to RD-Mo).

(a): Studies with residues in the RAC at or close to the LOQ were disregarded (unless concentration may occur).

(b): Median of the individual conversion factors for each processing residues trial.

(c): A tentative PF is derived based on a limited data set.

### B.2. Residues in livestock

#### Relevant groups (subgroups)

| Dietary burden expressed in | Most critical subgroup\(^{(a)}\) | Most critical commodity\(^{(b)}\) | Trigger exceeded (Y/N) | Comments |
|----------------------------|---------------------------------|---------------------------------|-------------------------|----------|
| mg/kg bw per day | | | | |
| Median | Maximum | Median | Maximum | Most critical subgroup\(^{(a)}\) | Most critical commodity\(^{(b)}\) | Trigger exceeded (Y/N) | Comments |
| Cattle (all) | 0.0017 | 0.0017 | 0.04 | 0.04 | Cattle (dairy) | Beet, mangel, roots | No | – |
| Cattle (dairy only) | 0.0017 | 0.0017 | 0.04 | 0.04 | Cattle (dairy) | Beet, mangel, roots | No | – |
| Sheep (all) | 0.0006 | 0.0006 | 0.01 | 0.01 | Sheep (lamb) | Beet, sugar, tops | No | – |
| Sheep (ewe only) | 0.0004 | 0.0004 | 0.01 | 0.01 | Sheep (ram/ewe) | Beet, sugar, tops | No | – |
| Swine (all) | 0.0003 | 0.0003 | 0.01 | 0.01 | Swine (breeding) | Beet, mangel, roots | No | – |
| Poultry (all) | 0.0001 | 0.0001 | 0.00 | 0.00 | Poultry (layer) | Beet, sugar, tops | No | – |
### 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

Not available and not required.

#### B.2.1.2. Stability of residues in livestock

Not available and not required.

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

Not available and not required.

### B.3. Consumer risk assessment

#### ARFD

Highest IESTI, according to EFSA PRIMo (rev.3.0)

| Substance                          | Median | Maximum |
|------------------------------------|--------|---------|
| Poultry (layer only)               | 0.0001 | 0.0001  |

#### NESTI (% ARFD)

Assumptions made for the calculations

**Scenario EU1 (without risk mitigation measures):**

Sugar beet (roots): 0.2% of ARFD

#### ADI

0.17 mg/kg bw per day (EFSA, 2010)

**Scenario EU1 (without risk mitigation measures):**

0.05% ADI (NL child)

**Scenario EU1 (without risk mitigation measures):**

The calculation is based on the highest residue levels expected in raw agricultural commodities.

| Substance                          | Median | Maximum |
|------------------------------------|--------|---------|
| Poultry (layer only)               | 0.0001 | 0.0001  |

### Relevant groups (subgroups)

Dietary burden expressed in mg/kg bw per day and mg/kg DM

| Subgroup | Median | Maximum |
|----------|--------|---------|
| Poultry (layer only) | 0.0001 | 0.0001  |

---

(a): When one group of livestock includes several subgroups (e.g. poultry ‘all’ including broiler, layer and turkey), the result of the most critical subgroup 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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**ARFD**: acute reference dose; bw: body weight; **NESTI**: national estimated short-term intake; **PRIMo**: (EFSA) Pesticide Residues Intake Model; **ESTI**: international estimated short-term intake.

**ADI**: acceptable daily intake; bw: body weight; **NEDI**: national estimated daily intake; **PRIMo**: (EFSA) Pesticide Residues Intake Model; **TMDI**: theoretical maximum daily intake; **NTMDI**: national theoretical maximum daily intake.
Consumer exposure assessment through drinking water resulting from groundwater metabolite(s) according to SANCO/221/2000 rev.10 Final (25/02/2003)

### Metabolite(s)
Not assessed in this review

### ADI (mg/kg bw per day)
Not assessed in this review

### Intake of groundwater metabolites (% ADI)
Not assessed in this review

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### B.4. Proposed MRLs

| Code number | Commodity | Existing EU MRL (mg/kg) | Existing CXL (mg/kg) | Outcome of the review MRL (mg/kg) | Comment |
|-------------|-----------|-------------------------|----------------------|----------------------------------|---------|
| 900010      | Sugar beet (root) | 0.1                     | –                    | 0.01*                             | Recommended(a) |
|             | Other commodities of plant and/or animal origin | See Reg. 149/2008 | –                    | –                                 | Further consideration needed(b) |

MRL: maximum residue level; CXL: codex maximum residue limit.

*: Indicates that the MRL is set at the limit of quantification.
(a): MRL is derived from a GAP evaluated at EU level, which is fully supported by data and for which no risk to consumers is identified; no CXL is available (combination H–I in Appendix E).
(b): There are no relevant authorisations or import tolerances reported at EU level; no CXL is available. Either a specific LOQ or the default MRL of 0.01 mg/kg may be considered (combination A–I in Appendix E).
### Appendix C – Pesticide Residue Intake Model (PRIMo)

**PRIMo(EU)**

| Commodity/group of commodities | Calculated exposure (% of ADI) | Exposure resulting from | Input values |
|--------------------------------|--------------------------------|------------------------|--------------|
| **Grapefruits**                |                                |                        |              |
| **Sugar beet roots**           |                                |                        |              |

#### Toxicological reference values

| LOQs (mg/kg) | ADI (mg/kg bw per day) | ARfD (mg/kg bw) | Source of ADI | Year of evaluation |
|--------------|------------------------|-----------------|---------------|--------------------|
| 0.01         | 0.17                   | 0.5             | EFSA          | 2010               |

#### Exposure resulting from

The estimated long-term dietary intake (TMDI/NEDI/IEDI) was below the ADI. The long-term intake of residues of hymexazol is unlikely to present a public health concern.

### Normal mode

#### Chronic risk assessment: JMPR methodology (IEDI/TMDI)

The estimated long-term dietary intake (TMDI/NEDI/IEDI) was below the ADI.

The long-term intake of residues of hymexazol is unlikely to present a public health concern.

**Conclusion:**

The estimated long-term dietary intake (TMDI/NEDI/IEDI) was below the ADI.

The long-term intake of residues of hymexazol is unlikely to present a public health concern.
The acute risk assessment is based on the ARfD.

### IESTI new calculations:

| Commodity | MRL / input (mg/kg) | Exposure (µg/kg bw) | Highest % of ARfD/ADI |
|------------|---------------------|---------------------|----------------------|
| Sugar beets root | 0.01 / 0.12 | 0.1 | 0.2% |
| Sugar beets root | 0.01 / 0.12 | 0.44 | 0.2% |
| Sugar beets root | 0.01 / 0.12 | 1.1 | 0.09% |

For processed commodities, no exceedance of the ARfD/ADI was identified.

The calculation is performed with the MRL and the peeling/processing factor (PF), taking into account the residue in the edible portion and/or the conversion factor for the residue definition (CF). For case 2a, 2b and 3 calculations a variability factor of 3 is used. Since this methodology is not based on internationally agreed principles, the results are considered as indicative only.

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

### Conclusion:

| Results for children | No of processed commodities for which ARfD/ADI is exceeded (IESTI): |
|----------------------|---------------------------------------------------------------|
| IESTI                | Results for children                                          |
| ARfD                 |                                |

| Results for adult: | No of processed commodities for which ARfD/ADI is exceeded (IESTI): |
|--------------------|---------------------------------------------------------------|
| IESTI              | Results for adults                                           |
| ARfD               |                                |

No exceedance of the toxicological reference value was identified for any unprocessed commodity. A short-term intake of residues of hymexazol is unlikely to pose a risk for processed commodities, as 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                |
| **Risk assessment residue definition:** hymexazol |
| Beet, sugar, dried pulp | 0.01                   | STMR(a)                | 0.01                   | STMR(a)                |
| Beet, sugar, ensiled pulp | 0.01                   | STMR(a)                | 0.01                   | STMR(a)                |
| Beet, sugar, molasses   | 0.01                   | STMR(a)                | 0.01                   | STMR(a)                |
| Beet, mangel, roots     | 0.01                   | STMR                   | 0.01                   | HR                     |
| Beet, mangel, tops      | 0.01                   | STMR                   | 0.01                   | HR                     |
| Beet, sugar, tops       | 0.01                   | STMR                   | 0.01                   | HR                     |

STMR: supervised trials median residue; HR: highest residue.

*: Indicates that the input value is proposed at the limit of quantification.

(a): For dried and ensiled pulp and molasses, no default processing factor was applied because hymexazol is applied as seed treatment and residues are expected to be below the LOQ. Concentration of residues in these commodities is therefore not expected.

D.2. Consumer risk assessment

| Commodity                  | Chronic risk assessment | Acute risk assessment |
|----------------------------|-------------------------|-----------------------|
|                            | Input value (mg/kg)     | Comment               | Input value (mg/kg)     | Comment               |
| **Risk assessment residue definition:** hymexazol |
| Sugar beet roots           | 0.01*                   | STMR                  | 0.01*                   | HR                    |
| Fodder beet roots          | 0.01*                   | STMR                  | 0.01*                   | HR                    |
| Fodder beet tops           | 0.01*                   | STMR                  | 0.01*                   | HR                    |
| Sugar beet tops            | 0.01*                   | STMR                  | 0.01*                   | HR                    |

STMR: supervised trials median residue; HR: highest residue.

*: Indicates that the input value is proposed at the limit of quantification.
Appendix E – Decision tree for deriving MRL recommendations

Evaluation of the GAPs and available residues data at EU level

- GAP or DB > 0.1 mg/kg QM in EU?
  - Yes
    - MRL And RA derived in Section 3?
      - No
        - MRL fully supported by data?
          - Yes
            - Specific LOQ or default MRL?
              - No
                - Not considered for the RA.
              - Yes
                - Risk identified?
                  - Yes
                    - Median/highest values are included in the RA.
                  - No
                    - Tentative median/highest values are included in the RA.
          - Yes
            - Specific LOQ or default MRL?
              - No
                - Not considered for the RA.
              - Yes
                - Risk identified?
                  - Yes
                    - Median/highest values are included in the RA.
                  - No
                    - Tentative median/highest values are included in the RA.

Consumer risk assessment for GAPs evaluated at EU level – EU scenarios

- Not considered for the RA.
- Not considered for the RA.
- Current EU MRL is included in the RA.
- Tentative median/highest values are included in the RA.
- Median/highest values are included in the RA.
- Risk identified?
  - Yes
    - Median/highest values are included in the RA.
  - No
    - Fall-back MRL available?
      - Yes
        - MRL is recommended.
      - No
        - Not considered for the RA.
- Fall-back MRL available?
  - Yes
    - MRL is recommended.
  - No
    - Not considered for the RA.
- Fall-back MRL available?
  - Yes
    - MRL is recommended.
  - No
    - Not considered for the RA.

Recommendations resulting from EU authorisations and import tolerances

- Specific LOQ or default MRL?
  - Yes
    - Specific LOQ or default MRL?
      - Yes
        - Median/highest values are included in the RA.
      - No
        - Tentative median/highest values are included in the RA.
  - No
    - Specific LOQ or default MRL?
      - Yes
        - Median/highest values are included in the RA.
      - No
        - Tentative median/highest values are included in the RA.
- Fall-back MRL available?
  - Yes
    - MRL is recommended.
  - No
    - Not considered for the RA.
- Fall-back MRL available?
  - Yes
    - MRL is recommended.
  - No
    - Not considered for the RA.
- Fall-back MRL available?
  - Yes
    - MRL is recommended.
  - No
    - Not considered for the RA.
- MRL is recommended.

Comparison with CXLs
Comparison of the EU recommendation with the existing CXL

1. CXL available? Yes
   - RD comparable?
     - Yes
     - CXL higher?
       - Yes
       - CXL is included in the RA.
       - Codex median/highest residues are included in the RA.
     - No
     - Risk identified?
       - Yes
       - Codex median/highest residues are included in the RA.
       - Input values for the RA remain unchanged.
     - No
     - Risk identified?
       - Yes
       - Codex median/highest residues are included in the RA.
       - Input values for the RA remain unchanged.

2. No
   - RD comparable?
     - Yes
     - CXL higher?
       - Yes
       - CXL is included in the RA.
       - Codex median/highest residues are included in the RA.
     - No
     - Risk identified?
       - Yes
       - Codex median/highest residues are included in the RA.
       - Input values for the RA remain unchanged.
     - No
     - Risk identified?
       - Yes
       - Codex median/highest residues are included in the RA.
       - Input values for the RA remain unchanged.

Consumer risk assessment with consideration of the existing CXL

1. CXL supported by data?
   - Yes
     - Risk identified?
       - Yes
       - Codex median/highest residues are included in the RA.
       - Input values for the RA remain unchanged.
     - No
     - Risk identified?
       - Yes
       - Codex median/highest residues are included in the RA.
       - Input values for the RA remain unchanged.
   - No
     - Risk identified?
       - Yes
       - Codex median/highest residues are included in the RA.
       - Input values for the RA remain unchanged.
       - No

Recommendations with consideration of the existing CXL

1. (I) Maintain EU recommendation indicating that no CXL is available.
2. (II) Maintain EU recommendation indicating CXL is not compatible.
3. (III) Maintain EU recommendation indicating that CXL is covered.
4. (IV) Maintain EU recommendation; higher CXL is not safe for consumer.
5. (V) Maintain current CXL or EU recommendation?
   - Yes
     - CXL is recommended; EU recommendation is covered as well.
   - No
     - Risk identified?
       - Yes
       - Codex median/highest residues are included in the RA.
       - Input values for the RA remain unchanged.

Input values for the RA remain unchanged.

Risk identified?

Codex median/highest residues are included in the RA.

CXL is included in the RA.

RD comparable?

CXL higher?

CXL available?
Appendix F – Used compound codes

| Code/trivial name<sup>a</sup> | IUPAC name/SMILES notation/InChiKey<sup>b</sup> | Structural formula<sup>c</sup> |
|-------------------------------|-------------------------------------------------|-------------------------------|
| hymexazol                    | 5-methylisoxazol-3-ol                            | ![Structural formula](image1)  |
|                              | Cc1cc(O)no1                                       |                               |
|                              | KGVPNLBXTABS-UHFFFAOYSA-N                         |                               |
| hymexazol N-monoglucone      | 2-D-glucopyranosyl-5-methyl-1,2-oxazol-3(2H)-one | ![Structural formula](image2)  |
|                              | O[C@H]1C(O[C@H](CO)[C@@H](O)[C@@H]1O)N1OC(C)=C1=O |                               |
|                              | AJQPXMGLDMXYMI-QNRYFBKSSA-N                       |                               |
| hymexazol O-glucoside        | 5-methyl-1,2-oxazol-3-yl D-glucopyranoside       | ![Structural formula](image3)  |
|                              | O[C@H]1C(O[C@H](CO)[C@@H](O)[C@@H]1O)Oc1cc (C)on1 |                               |
|                              | MXURVUJOLZNZ-QNRYFBKSSA-N                        |                               |

<sup>a</sup>: The metabolite name in bold is the name used in the conclusion.

<sup>b</sup>: ACD/Name 2018.2.2 ACD/Labs 2018 Release (File version N50E41, Build 103230, 21 July 2018).

<sup>c</sup>: ACD/ChemSketch 2018.2.2 ACD/Labs 2018 Release (File version C60H41, Build 106041, 07 December 2018).