Conclusion regarding the peer review of the pesticide risk assessment of the active substance

fenpropidin

finalised: 17 December 2007

(revision of 29 January 2008 with corrections of miscalculations in the aquatic risk assessment)

SUMMARY

Fenpropidin is one of the 79 substances of the third stage Part A of the review programme covered by Commission Regulation (EC) No 1490/2002[1]. This Regulation requires the European Food Safety Authority (EFSA) to organise a peer review of the initial evaluation, i.e. the draft assessment report (DAR), provided by the designated rapporteur Member State and to provide within one year a conclusion on the risk assessment to the EU-Commission.

Sweden being the designated rapporteur Member State submitted the DAR on fenpropidin in accordance with the provisions of Article 10(1) of the Regulation (EC) No 1490/2002, which was received by the EFSA on 24 June 2005. The peer review was initiated on 23 March 2006 by dispatching the DAR for consultation of the Member States and the sole applicant Syngenta Ltd. Subsequently, the comments received on the DAR were examined by the rapporteur Member State and the need for additional data was agreed on during a written procedure in January – February 2007. Remaining issues as well as further data made available by the notifier upon request were evaluated in a series of scientific meetings with Member State experts in May – June 2007.

A final discussion of the outcome of the consultation of experts took place with representatives from the Member States on 14 November 2007 leading to the conclusions as laid down in this report.

The conclusion was reached on the basis of the evaluation of the representative uses as a fungicide on cereals full details of the gap can be found in the attached end points.
The representative formulated product for the evaluation was "Tern 750 EC", an emulsifiable concentrate formulation (EC). Fenpropidin is a racemic mixture. It has been identified that more information is necessary to enable the impact of potential different isomer ratios on the risk assessments to be better characterised.

Adequate methods are available to monitor fenpropidin (and its salts expressed as fenpropidin) in products of plant origin, soil water and air and fenpropidin (and its salts expressed as fenpropidin)

[1] OJ No L 224, 21.08.2002, p. 25, as last amended by Regulation (EC) No 1095/2007 (OJ L 246, 21.9.2007, p. 19)

and CGA 289267[2] in products of animal origin. Only single methods for the determination of residues are available since a multi-residue-method like the German S19 or the Dutch MM1 is not applicable due to the nature of the residues.
Sufficient analytical methods as well as methods and data relating to physical, chemical and technical properties are available to ensure that quality control measurements of the plant protection product are possible. There is an outstanding data requirement for a sprayability study to address the poor emulsion stability of the formulation.

In mammalian toxicity testing, fenpropidin is acutely toxic via ingestion and inhalation (LD50 1452 mg/kg bw and LC50 1.22 mg/L). It is not acutely toxic via dermal route. It is irritant to skin and eyes but not corrosive. It is a skin sensitiser in both the Buehler and Maximization tests. Classification with Xn R20/22 (harmful by inhalation and if swallowed), Xi R38 (irritating to skin), R41 (risk of serious damage to eyes) and R43 (may cause sensitisation by skin contact) is proposed. According to a 28-day inhalation study showing irritating effects to the respiratory system, classification of fenpropidin as R37 ("irritating to the respiratory system")is warranted. The relevant NOAEL for short term toxicity in rats is 1.14 mg/kg bw/day, whereas in dogs is 2 mg/kg bw/day, based irritative effects and liver effects, respectively. Fenpropidin does not show any potential for genotoxicity, carcinogenicity, reproductive and potential toxicity. The relevant long term NOAEL is 2.27 mg/kg bw/day based on decreased body weight; maternal and offspring NOAELs are 8 and 18 mg/kg bw/day, respectively, whereas the reproductive NOAEL is 9 mg/kg bw/day. The relevant maternal and developmental NOAELs are 90 and 12 mg/kg bw/day in rats and rabbits, respectively. Fenpropidin showed a neurotoxic potential in the repeated dose studies, expressed as spinal chord demyelination at the maximum doses tested in a 90-day rat and 1-year dog study. The NOAELs were 5 mg/kg bw/day in dogs and 10.1 mg/kg bw/day in rats. The ADI, AOEL and ARfD are 0.02 mg/kg bw/day (SF 100). The operator exposure of fenpropidin in field crop scenario with a tractor mounted hydraulic boom sprayer shows exposure levels below the AOEL when appropriate PPE is worn (gloves during mixing/loading and sturdy footwear and coveralls during application). Workers and bystanders show exposure levels below the AOEL under worst case assessments (67% with PPE and 4.5%, respectively).

The metabolic pathway of fenpropidin in cereals has been elucidated. Several routes of metabolism have been identified but the metabolic pattern in wheat grain and straw at plant maturity is clearly dominated by the parent compound. Therefore the residue definition for risk assessment and monitoring in cereals is restricted to fenpropidin.
Supervised residue trials conducted in Northern Europe support the setting of MRLs of 0.1 mg/kg in wheat, rye and triticale and of 0.3 mg/kg in barley and oats. High residue levels were found in straw.
Under processing the nature of fenpropidin residues is not affected and residues are preferentially transferred to bran during the milling process. The transfer factor from barley to beer could not be determined exactly but is below 0.4.

[2] CGA 289267: 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid

A transfer of soil residues to rotational crops after cereal use is not expected.
A significant exposure of livestock mainly resulting from consumption of straw is expected. Animal metabolism studies in lactating goats and laying hens show that fenpropidin is extensively metabolised in livestock and a complex residue pattern is found in edible tissues. The residue definition for monitoring animal commodities consists in the sum of fenpropidin and one of its major animal metabolites (CGA 289267). For risk assessment, further major metabolites need to be considered and conversion factors between both definitions have been proposed. A feeding study in dairy cows has been conducted and can be used for MRL setting in animal products.
Chronic and acute consumer exposure assessments were conducted and, under restriction of an uncertainty related to the isomer ratio consumer is actually exposed to, did not show any indication of dietary risk.

In soil under aerobic conditions fenpropidin exhibits moderate to high persistence and has the potential to accumulate when used in successive years. When it degrades it forms the major soil metabolite CGA 289267 (accounting for a maximum 10.6% of applied radioactivity (AR) at 8°C) which exhibits low to moderate persistence. Mineralisation of the benzylic bridge radiolabel to carbon dioxide accounted for 16-32% AR after 90-92 days (22°C). The formation of unextractable residues accounted for 9-19 % AR after 90-92 days. Fenpropidin is immobile or exhibits slight mobility in soil, CGA 289267 exhibits high to medium mobility in soil. There was no indication that adsorption of either fenpropidin or CGA 289267 was pH dependant.

In dark natural sediment water systems fenpropidin degraded exhibiting moderate to medium persistence to the metabolite CGA 289267 found primarily in the water of the system (maximum 13-14% AR). The terminal metabolite, CO_2, accounted for 11-60 % AR at 84 days (study end, benzylic bridge radiolabel). Unextracted sediment residues a minor sink representing around 8 % AR at study end. The necessary surface water and sediment exposure assessments were appropriately carried out using the agreed FOCUS scenarios approach for fenpropidin at steps 3 & 4, with spray drift mitigation being applied at step 4. For the metabolite CGA 289267 appropriate FOCUS step 3 calculations were carried out. These values are the basis for the risk assessment discussed in this conclusion. There is the potential for short range atmospheric deposition to surface water from fenpropidin that may volatilise at the time of application and from plant surfaces for around 24 hours after application.
The potential for groundwater exposure from the applied for intended uses by fenpropidin and its soil metabolite CGA 289267 above the parametric drinking water limit of 0.1 µg/L was concluded to be low in geoclimatic situations that are represented by all 9 FOCUS groundwater scenarios.

The first-tier risk assessment for birds resulted in TERs below the Annex VI trigger for the acute scenario in the Northern European GAP and in the long-term scenarios in the Northern and Southern European GAPs. Measured residue values and the focal skylark (*Alauda arvensis*) and yellowhammer (*Motacilla flava*) were agreed by the experts to be used in the refined risk assessment but not the suggested PT values. The acute TER for herbivorous birds was >10 based on maximum initial

measured residues. The meeting agreed to take into account in the long-term risk assessment that cereals would become not attractive as a food source for herbivorous birds and mammals soon after the first application when stem elongation starts. The reduction of residues in insects based on general considerations of growth of insect populations was not accepted since it was not based on measured residues. A more detailed consideration of insect populations in the relevant crop would be required before a scientifically sound and robust estimation of residue decline could be made. The FOCUS based interception factor of 0.5 for residues on weed seeds was rejected since weeds may have a similar or larger height as the crop during early cereal growth stages and extrapolation from deposition on soil surface was considered as not correct. A data gap was identified to refine the long-term risk assessment for herbivorous birds and insectivorous birds (Northern and Southern European uses).

The Annex VI trigger was met for insectivorous mammals but breached in the first-tier acute and long-term risk assessment for herbivorous mammals. The suggest PT to refine the risk was not sufficiently supported by data and hence rejected. However based on accepted measured residue values the refined risk assessment resulted in TERs above the trigger indicating a low risk from the representative uses evaluated.

The risk from secondary poisoning of earthworm- and fish-eating birds and mammals was assessed as low. The acute TERs for exposure to contaminated drinking water based on the 5-fold dilution of the sprayed solution resulted in TERs <10 for birds. Further information on the drinking behaviour of birds was not submitted leaving some uncertainty via this route of exposure. However the application is to cereals and hence the formation of leaf puddles is unlikely.

Algae were the most sensitive group of aquatic organisms driving the aquatic risk assessment. The risk assessment was based on an endpoint from a mesocosm study. The proposed NOEAEC of 6.8 µg fenpropin/L was not agreed because long-lasting effects on Chlorophyceae were observed at a concentration of 1.4 µg fenpropidin/L. The meeting agreed on a NOEC of 0.39 µg fenpropidin/L (based on mean measured initial concentrations). It was suggested by the meeting of experts that an assessment factor of 1-3 should be applied at Member State level depending on the representativeness of the mesocosm to the local environmental conditions in the agricultural landscape. In the updated addendum of September 2007 (not peer-reviewed) the RMS recalculated the TERs based on FOCUS step 4 PECsw. With a no-spray buffer zone of 50 metres the TERs were above 1 in all drainage scenarios out of 6 but below 1 in all run-off scenarios. No full FOCUS step 4 scenario resulted in TERs >3. The risk from metabolite CGA 289267 to aquatic organisms was assessed as low.

Predatory mites were the most sensititve group of non-target terrestrial arthropods tested. Extended laboratory studies indicated a high in-field risk but also a potential of recolonisation due to rapid residue decline. The available studies did not cover the off-field exposure rates for *Phytoseilus persimilis*. An in-field no-spray buffer zone of 5 metres is required to achieve a rate low enough to conclude on a low risk to predatory mites based on the available studies.

The acute risk to earthworms was assessed as low. The long-term TER for the Northern European use was calculated as 4.6. Since the TER value is not far below the trigger of 5 and the TER is based on

very conservative PECsoil calculations (accumulation for 20 years) the experts agreed that the long-term risk to earthworms is low. The risk from the major soil metabolite CGA 289267 was assessed as low.

The risk to bees, other soil non-target macro-organisms (collembola), soil non-target micro-organisms, biological methods of sewage treatment was assessed as low for the representative uses in cereals.

Key words: fenpropidin, peer review, risk assessment, pesticide, fungicide

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BACKGROUND

Commission Regulation (EC) No 1490/2002 laying down the detailed rules for the implementation of the third stages of the work program referred to in Article 8(2) of Council Directive 91/414/EEC and amending Regulation (EC) No 451/2000, regulates for the European Food Safety Authority (EFSA) the procedure of evaluation of the draft assessment reports provided by the designated rapporteur Member State. Fenpropidin is one of the 79 substances of the third stage, part A, covered by the Regulation (EC) No 1490/2002 designating Sweden as rapporteur Member State.

In accordance with the provisions of Article 10(1) of the Regulation (EC) No 1490/2002, Sweden submitted the report of its initial evaluation of the dossier on fenpropidin, hereafter referred to as the draft assessment report, to the EFSA on 24 June 2005. Following an administrative evaluation, the EFSA communicated to the rapporteur Member State some comments regarding the format and/or recommendations for editorial revisions In accordance with Article 11(2) of the Regulation (EC) No 1490/2002 the draft assessment report was distributed for consultation on 23 March 2006 to the Member States and the main applicant Syngenta Ltd. as identified by the rapporteur Member State.

The comments received on the draft assessment report were evaluated and addressed by the rapporteur Member State. Based on this evaluation, representatives from Member States identified and agreed during a written procedure in January – February 2007 on data requirements to be addressed by the notifier as well as issues for further detailed discussion at expert level.

Taking into account the information received from the notifier addressing the request for further data, a scientific discussion of the identified data requirements and/or issues took place in expert meetings in May – June 2007. The reports of these meetings have been made available to the Member States electronically.

A final discussion of the outcome of the consultation of experts took place with representatives from Member States on 14 November 2007 leading to the conclusions as laid down in this report.

During the peer review of the draft assessment report and the consultation of technical experts no critical issues were identified for consultation of the Scientific Panel on Plant Health, Plant Protection Products and their Residues (PPR).

In accordance with Article 11(4) of the Regulation (EC) No 1490/2002, this conclusion summarises the results of the peer review on the active substance and the representative formulation evaluated as finalised at the end of the examination period provided for by the same Article. A list of the relevant end points for the active substance as well as the formulation is provided in appendix 1.

The documentation developed during the peer review was compiled as a **peer review report** comprising of the documents summarising and addressing the comments received on the initial evaluation provided in the rapporteur Member State's draft assessment report:

- the comments received;
- the resulting reporting table (rev. 1-1 of 19 February 2007)

as well as the documents summarising the follow-up of the issues identified as finalised at the end of the commenting period:

- the reports of the scientific expert consultation;
- the evaluation table (rev. 2-1 of 15 November 2007).

Given the importance of the draft assessment report including its addendum (compiled version of September 2007 containing all individually submitted addenda) and the peer review report with respect to the examination of the active substance, both documents are considered respectively as background documents A and B to this conclusion.

By the time of the presentation of this conclusion to the EU-Commission, the rapporteur Member State has made available amended parts of the draft assessment report which take into account mostly editorial changes. Since these revised documents still contain confidential information, the documents cannot be made publicly available. However, the information given can be found in the original draft assessment report together with the peer review report, both of which are publicly available.

THE ACTIVE SUBSTANCE AND THE FORMULATED PRODUCT

Fenpropidin is the ISO common name for (*R,S*)-1-[3-(4-tert-butylphenyl)-2-methylpropyl]-piperidine (IUPAC).

Fenpropidin is in a chemical class of its own as it is a piperidine fungicide. However it is structurally related to the morpholine fungicides which include compounds such as fenpropimorph and dimethomorph and it also has the same mode of action. Fenpropidin is an ergosterol biosynthesis inhibitor. It is a foliar fungicide with both protective, curative and eradicative activity.

The representative formulated product for the evaluation was "Tern 750 EC", an emulsifiable concentrate (EC) formulation.

The evaluated representative uses are as a fungicide for cereals. Full details of the gap can be found in the attached list of end points.

SPECIFIC CONCLUSIONS OF THE EVALUATION

1. Identity, physical/chemical/technical properties and methods of analysis

The minimum purity of fenpropidin as manufactured should not be less than 960 g/kg (fenpropidin is racemic). At the moment no FAO specification exists.

During the meeting of experts a data gap was identified for one of the impurities. New quality control batch data were provided and in the opinion of EFSA this data support the proposed revised specification of 3 g/kg. However, since this quality control data has not been peer reviewed the specification for this impurity should be regarded as provisional for the moment and the data gap will remain.
The technical material contains no relevant impurities. The content of fenpropidin in the representative formulation is 750 g/L (pure).

The assessment of the data package revealed no issues that need to be included as critical areas of concern with respect to the identity, physical, chemical and technical properties of fenpropidin or the respective formulation.

The main data regarding the identity of fenpropidin and its physical and chemical properties are given in appendix 1.

Sufficient test methods and data relating to physical, chemical and technical properties are available. Also adequate analytical methods are available for the determination of fenpropidin in the technical material and in the representative formulation as well as for the determination of the respective impurities in the technical material. The only outstanding issue is that during the peer review process it was noted that the emulsion stability of the formulation was poor. A data requirement was raised for a sprayability study. This study has been received but has not been fully evaluated by the rapporteur and it has not been peer reviewed. For this reason it will remain as a data requirement.
Therefore, enough data are available to ensure that quality control measurements of the plant protection product are possible.

A multi-residue method like the Dutch MM1 or the German S19 is not applicable due the nature of the residues. Residues of fenpropidin in products of plant origin are analysed by LC-MS/MS with an LOQ of 0.01 mg/kg. For products of animal origin fenpropidin and CGA 289267[3] were analysed by LC-MS/MS with an LOQ of 0.005 mg/kg in milk and an LOQ of 0.01 mg/kg in muscle, kidney, liver, fat and eggs. There was also a GC-NPD method for milk, eggs and fat with an LOQ of 0.005 mg/kg in milk and 0.01 mg/kg in eggs and fat. Soil is analysed for fenpropidin by LC-MS/MS with an LOQ of 0.01 mg/kg. Drinking/groundwater can be analysed for by HPLC-UV with confirmation by GC-

[3] CGA 289267: 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid

MS with an LOQ of 0.05 µg/L. Surface water can be analysed for fenpropidin by HPLC-UV with confirmation by GC-MS the LOQ is 0.1 µg/L. Air is analysed for fenpropidin by LC-MS/MS with an LOQ of 0.15 µg/m^3.

2. Mammalian toxicology

Fenpropidin was discussed in a meeting of experts in March 2007 (PRAPeR 24, round 5).

Fenpropidin tested in toxicological studies was a racemate.
In the proposed specification two impurities (CGA 289264 and CGA 289272) will be increased with respect to the batches used in the key toxicological studies (from 2% to 3% and from 0.4% to 0.5% respectively). No toxicological information is available for the 2 impurities, however they are structurally similar to fenpropidin and there is no indication of any additional toxicity. It was agreed in the meeting to consider the new specification as adequately tested in the toxicological studies.

2.1. Absorption, Distribution, Excretion and Metabolism (Toxicokinetics)

Fenpropidin is rapidly and extensively absorbed after single oral dose in rats (>80%, excretion within 48h, 79% in urine, 12% via bile). It distributed mainly in liver and kidneys. No tissue accumulation occurs. Almost complete excretion of the administered dose occurs within 48 hours predominantly via the urine. No parent compound is excreted. The main metabolite in urine is CGA 289267 which accounts for 46-79% of the administered dose. Other metabolites do not exceed 2.5% of the administered dose. The main faeces and bile metabolite in female rats is a sulphate ester conjugate of CGA 289268[4] accounting for 6-27% and 6% of the administered dose, respectively. The other metabolite fractions in urine, faeces and bile do not exceed 2.5% of the administered dose.

2.2. Acute toxicity

Fenpropidin is acutely toxic via ingestion and inhalation (LD50 1452 mg/kg bw and LC50 1.22 mg/L). It is not acutely toxic via dermal route. It is irritant to skin and eyes but not corrosive. It is a skin sensitiser in both the Buehler and Maximization tests. Therefore classification with Xn R20/22 (Harmful by inhalation and if swallowed), Xi R38 (Irritating to skin), R41 (Risk of serious damage to eyes) and R43 (May cause sensitization by skin contact) was proposed by the RMS and confirmed in the meeting of experts.

2.3. Short term toxicity

Oral administration of fenpropidin to rats caused irritation of the esophagus and gastro intestinal tract, besides decrease body weight. One rat had demyelination of the spinal chord, hind limb paresis and bilateral cataracts. The 28-day inhalation study was inconclusive as for systemic toxicity, however it was considered sufficient to show that a classification of fenpropidin as R37 (Irritating to the respiratory system) is warranted.

[4] CGA 289268: 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propan-1-ol.

The relevance of the local NOAEL on the overall risk assessment was discussed in the experts' meeting. The majority of Member States noted that in general local effects should not be used to set NOAELs that are the basis for reference values; however it has to be considered whether the effect is adverse. The irritation effects were seen in many studies summarised in the DAR, in some cases even at doses lower than the ones with systemic effects. Because of the adversity of the effect (e.g. irritation of the stomach) the meeting agreed to set a single NOAEL for the 90- day rat study at 1.14 mg/kg bw/day.

The irritative potential of fenpropidin was also observed in dogs expressed mainly as skin irritations and increased frequency of vomiting. At 20 mg/kg bw/day (highest dose tested), in the 1-year dog study all males showed demyelination of the spinal chord and corneal opacity or cataracts. The female dogs had no signs of demyelination but had whitish eyes and cataracts of the crystalline lens. The absolute and relative liver weight (with associated hepatocyte hypertrophy) was increased in males. However, 2/4 males had effects on liver weight and a statistically non-significant effect on liver histopathology already at 5 mg/kg bw/day. The relevance of liver effects in the 1-year dog study was discussed in the meeting which confirmed the NOAEL from the 1-year dog study set at 2.0 mg/kg bw/day and the relevance of the liver effects observed.

The proposal for classification as R48/22, based on the spinal cord demyelination in the 1 year study in dog, was considered. The proposal has been already agreed by ECB in 2006.

2.4. GENOTOXICITY

Fenpropidin was tested both *in vitro* and *in vivo* for mutagenicity. Fenpropidin was negative for gene mutations, DNA damage or chromosome aberrations in the Chinese hamster ovary cells, and did not show clastogenicity or an aneugenic potential. Overall the results indicate that fenpropidin does not possess any concern for genotoxicity.

2.5. LONG TERM TOXICITY

The long-term toxicity and carcinogenicity was investigated in rats and mice. The long-term exposure produced signs of local irritation expressed as skin irritation in rats and as hyperkeratosis of the esophagus in mice at doses below those causing systemic toxicity (decreased body weight). The relevant long term toxicity NOAEL was 2.27 mg/kg bw/day and 41.9 mg/kg bw/day for rats and mice, respectively. There was no evidence of a carcinogenic potential in either species.

2.6. REPRODUCTIVE TOXICITY

The reproductive toxicity was investigated in rats and rabbits. Maternal and offspring NOAELs were 8 and 18 mg/kg bw/day, respectively, based on decreased body weights; the reproductive NOAEL was 9 mg/kg bw/day, based on decreased number of F2 pups delivered and implantations at maternally toxic doses. There were no evident signs of reproductive toxicity.

In teratology studies the relevant maternal and developmental NOAELs were 90 and 12 mg/kg bw/day in rats and rabbits, respectively. In the experts' meeting a concern was raised for the validity

of the teratology data package. Rabbits seemed to be more sensitive than rats, however, foetal effects were not tested properly.
However, fenpropidin was not expected to show any developmental toxicity potential.

2.7. NEUROTOXICITY

Fenpropidin showed a neurotoxic potential in the repeated dose studies, expressed as spinal chord demyelination at the maximum doses tested in a 90-day rat and 1-year dog study. The NOAELs were 5 mg/kg bw/day in dogs and 10.1 mg/kg bw/day in rats.

2.8. FURTHER STUDIES

No further studies were submitted, or required.
The meeting of experts agreed that there are two major metabolites in the rat (CGA 289267 and CGA 289268) and that the ADI of fenpropidin would cover both of them.

2.9. MEDICAL DATA

Several reports of health surveillance on workers of plants involved in the fenpropidin production have been summarised, showing no occurrence of adverse health effects. Furthermore, no cases of acute poisoning are reported in the published literature and in the official alert databases.

2.10. ACCEPTABLE DAILY INTAKE (ADI), ACCEPTABLE OPERATOR EXPOSURE LEVEL (AOEL) AND ACUTE REFERENCE DOSE (ARFD)

ADI

The meeting agreed to set the ADI of 0.02 mg/kg bw/day based on the relevant NOAEL from the toxicity/carcinogenicity study, where no local gastric and oesophagus irritation was observed, with a NOAEL of 2.27 mg/kg bw/day, with an uncertainty factor of 100. The value was supported by the NOAEL of 2 mg/kg bw/day in the 1-year toxicity study in dogs.

AOEL

The meeting agreed to set the AOEL of 0.02 mg/based on the 1-year dog study (NOAEL 2 mg/kg bw/day, SF 100). The local gastric irritation in rats (NOAEL 1.14 mg/kg bw/day in the 90 day study) was considered of less relevance given the exposure routes for the operators (dermal and inhalation).

ARfD

The ARfD is based on the 28-day study in rats and the 1-year study in dogs. This gives an ARfD of 0.02 mg/kg bw with an uncertainty factor of 100.

2.11. DERMAL ABSORPTION

The meeting agreed to keep the value for dermal absorption of TERN 750 EC as proposed by the RMS (2.5% for the concentrate and 6.4% for the dilution respectively), based on the results of an *in vivo* study and a comparative human/rat skin *in vitro* study.

2.12. EXPOSURE TO OPERATORS, WORKERS AND BYSTANDERS

The operator exposure estimates were calculated using both the German model (geometric mean values) and the UK-POEM model.

Operator exposure

TERN 750 EC is formulated as an emulsifiable concentrate and contains 750 g/L fenpropidin. It is applied in cereals in the field for the control of powdery mildew. The product is sold in 1L bottles with 45 mm neck diameter and in 5L bottles with 63 mm neck diameter.

Scenario	Model	%AOEL No PPE	%AOEL With PPE
Tractor mounted hydraulic boom sprayers	German model	206	38*
Tractor mounted field crop sprayers, hydraulic boom sprayers	UK POEM	1856	311°

* gloves during mixing/loading and coverall plus sturdy footwear during application

° gloves during mixing/loading and application

The operator exposure of fenpropidin in field crop scenario with a tractor mounted hydraulic boom sprayer shows exposure levels below the AOEL when appropriate PPE is worn (gloves during mixing/loading and sturdy footwear during application).

Worker exposure

Estimated worker exposure under conservative assumptions (2 applications) was shown to be 67% of AOEL when gloves are worn.

Bystander exposure

Bystander estimated exposure was shown to be 4.5% (worst case).

3. Residues

Fenpropidin was discussed by the experts in residues in a PRAPeR meeting in June 2007 (PRAPeR 25, round 5).

3.1. NATURE AND MAGNITUDE OF RESIDUES IN PLANT

3.1.1. PRIMARY CROPS

The metabolism of fenpropidin has been investigated in spring wheat, sugar beet, grape vines and bananas. The design of the studies in wheat was in accordance with the representative use supported by the applicant. In all crops the product was applied as foliar treatment.

In wheat grains and straw, sugar beet leaves, grapes as well as bananas the observed metabolic pattern is similar. Fenpropidin represents the major part of the extractable radioactivity and the total amount of metabolites is generally one order of magnitude lower than the amount of parent compound. The nature of the identified metabolites shows that the metabolic pathway of fenpropidin consists in oxidative processes affecting the piperidine ring, the tertiary-butyl side chain and the methyl-propyl bridge. In addition, cleavage of the piperidine bond and glucose conjugation of a number of metabolites was also observed.

In sugar beet roots, Total Radioactive Residues (TRR) are very low and consist mainly of polar material. About 20 % of the radioactivity was due to the incorporation of radioactive carbon into natural plant sugars.

The rat metabolism proceeds mainly through oxidation of the tertiary-butyl moiety and in a minor pathway through opening and progressive degradation of the piperidine ring. Given these differences in rat and plant metabolism a range of plant metabolites were not observed in rats, but due to their very low amount and their structural similarity to the parent compound, they are not of particular concern. In addition several of these metabolites were tested through DEREK analysis and did no show any toxicological alert.

The proposed residue definition for monitoring and risk assessment consists in parent compound only, including its salts. Considering that the residue pattern was similar in 3 crop groups this residue definition can be considered as valid for all foliar treatments with fenpropidin.

A total of 50 supervised residue trials were conducted in cereals over six seasons in countries of the Northern and Southern EU regions. However, only 9 barley trials and 6 wheat trials in Northern EU were reflecting the representative use with the last application at or closely around the BBCH 65 growth stage. In barley the Highest Residues (HR) found in grains and straw were 0.19 and 6.7 mg/kg respectively. The HR found in wheat were below the Limit of Quantification (LOQ, 0.05 mg/kg) and 3.7 mg/kg for grain and straw respectively. Some additional trials with the latest application at BBCH 71 growth stage showed residues slightly above the LOQ.

In most of the trials from Southern Europe the last application was done between growth stages BBCH 71 and 88. Only a few ones were conducted with earlier application but don't allow a reliable estimation of the actual residue levels. Therefore the expert meeting estimated that further residue trials on cereals were needed to support uses in Southern Europe.

The results of the available residue trials can be considered as reliable on the basis of storage stability studies demonstrating that fenpropidin is stable under deep freeze storage conditions in plant matrices (grapes, wine, bananas and wheat).

There is no significant hydrolysis of fenpropidin in buffer solutions in standard conditions simulating pasteurisation, baking, brewing, boiling and sterilisation. Processing studies simulating the brewing process of barley grains (2 studies) and the milling process (1 balance and 3 follow-up studies) for the wheat grains were conducted. The transfer factor to beer could not be determined exactly because the residue levels in raw barley were to low. For bran and flour (type 550) transfer factors could be determined, showing that fenpropidin residues are mainly transferred to the bran fraction.

3.1.2. SUCCEEDING AND ROTATIONAL CROPS

Confined rotational crop studies after application of fenpropidin on bare soil show a moderate uptake of soil residues. The metabolic pattern is similar to that observed in primary crops. Fenpropidin is the major constituent of the residue, but found at low levels (0.01 mg/kg in lettuce and radish roots, 0.003 mg/kg in wheat grains) at 1N rate of application, and only for short plant-back intervals (28 days). Therefore, under normal rotation practices and considering that fenpropidin is applied to established cereals, ensuring a significant degree of interception, no residues of compounds structurally related to fenpropidin is expected to be present in plant products for human consumption from rotational crops.
The need for field rotational crops studies should be reconsidered at Member State level in case of uses on other crops at higher application rate and/or lower degree of soil coverage by plants at the time of application.

3.2. NATURE AND MAGNITUDE OF RESIDUES IN LIVESTOCK

The metabolism of fenpropidin has been investigated in lactating goats and laying hens. In both cases the compound is extensively metabolised and represents less than 10 % of the TRR in all animal tissues. In particular it was not identified in goat milk and muscle. The identified metabolites suggest that the metabolic pathway in livestock is similar to that observed in rats, involving oxidation of the tertiary-butyl side chain and in a minor extent degradation of the piperidine ring.
Major metabolites accounting for a significant part of the radioactivity (from 10 to 40 % of the TRR) in goat tissues were metabolites CGA 289267, SYN515213[5] and its sulphate ester (in milk only) and a sulphate ester conjugate of CGA 289268. In hen tissues, only CGA 289267 appeared as major constituent of the residue, forming at least 60% of the TRR in muscles and eggs.
Considering the metabolic pattern in animal commodities it is proposed to use metabolite CGA 289267 as marker compound for monitoring purposes. This metabolite was preferred to metabolite SYN515213, which could also be valid for monitoring of ruminant tissues, on consideration of the results from the hen metabolism. The parent compound is also proposed to be included in the residue definition for monitoring as it was found at low but quantifiable concentration in liver and kidneys in the lactating goat feeding study for realistic exposure level.
For risk assessment the expert meeting recommended to include all major metabolites identified in the goat metabolism study (sum of fenpropidin, CGA 298267, SYN515213, SYN515213 sulphate ester, CGA 298268 sulphate ester expressed as fenpropidin). It was discussed and agreed by the evaluation meeting to amend the expert meeting proposal to 'sum of fenpropidin and its salts, CGA 289267, SYN515213, CGA289268 and their conjugates expressed as fenpropidin' to make it practicable from an analytical point of view in case a feeding study with analysis of residues according to the definition for risk assessment would be needed in future. Although this change in theory broadens the scope of the definition, the practical quantitative impact as expected from the metabolism studies is very minor. This definition covers 80 % of the TRR in milk and muscle and at least 50 % of the TRR in other tissues. Conversion factors ranging from 2 to 5 between residue definitions for monitoring and risk assessment were established by the expert meeting. It was

[5] SYN515213: 3-hydroxy-2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid.

nevertheless recognized that the determination of such conversion factors on the single ground of a metabolism study should be restricted to cases where it clearly appears that consumer exposure is far below the toxicological reference values.
Intake of fenpropidin residues by livestock is expected from grain, bran and (for ruminants only) straw. Straw is by far the major source of animal exposure.
A feeding study in lactating cow conducted at critical exposure level shows measurable residues of fenpropidin and CGA 289267 in liver and kidneys. These 2 compounds were below the LOQ in other tissues (0.01 and 0.005 in solid matrices and milk respectively). Analysis of free CGA 289268 was also included in this study. However this information was not considered as this metabolite in its free form is very minor in the metabolic pattern and no indication was available whether its sulphate conjugate, which is a major metabolite, was hydrolysed or not during the analytical procedure.
For poultry, no feeding study was conducted, given the results of the available metabolism study at exaggerated dose rate showing that no residues above the LOQ is to be expected under practical exposure conditions in eggs, fat and meat.

3.3. CONSUMER RISK ASSESSMENT

No risk for the consumer is expected resulting from the use of fenpropidin according to the representative uses.
The risk assessment was performed disregarding the possible impact of a change of the enantiomer ratio due to plant or livestock metabolism as this was not investigated by the notifier.

Chronic exposure

Theoretical Maximum Daily Intake (TMDI) was calculated by the RMS using the WHO guidelines. The typical European diets for adult consumers, the German diet for the 4-6 year old girl as well as UK national diets for population subgroups including infants, toddlers, schoolchildren and adults, taking into consideration high individual consumption levels, were used. Residue levels in cereal grains and animal products were considered to be at the level of the respective proposed MRLs. Based on this, the calculated TMDI ranged from 3 to 12 % of the ADI in all the considered consumer populations. Nevertheless, for animal products no conversion factor was used by the RMS to correct the MRL levels according to the residue definition for risk assessment. This constitutes an underestimation of potential consumer exposure.
Therefore further calculations including appropriate conversion factors for the various animal commodities were conducted by the EFSA, using its own data base, containing all the national chronic diets collected from MS as well as the WHO European cluster diets (28 diets in total). From this collection of diets only average national consumption levels are at this time used for modelling chronic intakes. This exercise showed that consumer exposure was below 10 % of the ADI in all 28 diets.

Acute exposure

Considering the toxicological end point used for setting the ARfD, all categories of consumer need to be considered in the acute dietary risk assessment. National Estimates of Short Term Intakes (NESTI)

were carried out by the RMS on the basis of UK national large portion consumption data for adults and toddlers. Residues in cereals and animal products were considered to be at the level of the respective HRs (cereals) or proposed MRLs (animal products). No variability factor needs to be used for any of the considered commodity. Conversion factors for risk assessment were not used in the case of animal commodities. Based on this, calculated NESTIs for adults and toddlers were below 10 % the ARfD for all commodities.

As for chronic exposure assessment, the EFSA conducted calculations including conversion factors for risk assessment in the case of animal commodities. National Estimates of Short Term Intakes (NESTI) were calculated on the basis of the EFSA data base for acute intake assessment, compiled from information provided by several Member States. The EFSA data base uses for each commodity the most critical national combination of large portion consumption and unit size. As expected, this resulted in higher levels of ARfD exhaustion, compared to the RMS assessment, but all results were below the ARfD. The highest NESTI value was obtained for liver (40% of the ARfD for 6-12 months old children).

3.4. PROPOSED MRLS

Considering the results of supervised residue trials as well as feeding studies in lactating cow, the following MRLs are proposed to be set in accordance with the representative uses of fenpropidin in cereals.

Fenpropidin:

Commodity	***Proposed MRL (mg/kg)***
Wheat, rye and triticale	0.1
Barley and oats	0.3

Sum of fenpropidin and 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid, expressed as fenpropidin:

Commodity	***Proposed MRL (mg/kg)***
Ruminant liver	0.2
Ruminant kidney	0.05
milk	0.01*
Other products of animal origin, including poultry products	0.02*

4. Environmental fate and behaviour

Fenpropidin was discussed at the PRAPeR experts' meeting for environmental fate and behaviour PRAPeR 22 in May 2007. It should be noted that the methods of analysis used in all the fate and behaviour studies were not stereoselective. Therefore the regulatory dossier provides no information

on the behaviour of each individual fenpropidin enantiomer in the environment. Therefore all residues reported as fenpropidin in this conclusion are for the sum of the 2 enantiomers. It is not known if either isomer is degraded more quickly than the other in the environmental matrices studied.

4.1. FATE AND BEHAVIOUR IN SOIL

4.1.1. ROUTE OF DEGRADATION IN SOIL

Soil experiments (2 different soils) were carried out under aerobic conditions in the laboratory (22°C 75% 1/3 bar moisture holding capacity in the dark. In a second experiment one of these soils (sandy loam) was also investigate at 20-22°C and 20 or 40% maximum water holding capacity (MWHC) or 8°C and 40% MWHC. In all these experiments two fortification levels of fenpropidin were investigated. In a third soil (sand) the experts from the member states agreed that the soil microbial activity even at the beginning of the experiment was too low for the results to be relied on (additional information regarding microbial activity in this experiment can be found in the addendum). The formation of residues not extracted by acidified acetonitrile were a sink for the applied benzylic bridge-^{14}C-radiolabel (9-19% of the applied radiolabel (AR) after 90-92 days, 22°C). Mineralisation to carbon dioxide of this radiolabel accounted for 16-32 % AR after 90-92 days at 22°C. The only metabolite identified was CGA 289267 (max. 4.6 % AR at 22°C & 40% MWHC and 10.6% AR at 8°C).

Under anaerobic laboratory conditions fenpropidin was stable. A laboratory soil photolysis study indicated that degradation by photolysis would not be expected to be a process that significantly influences the dissipation of fenpropidin in the environment.

4.1.2. PERSISTENCE OF THE ACTIVE SUBSTANCE AND THEIR METABOLITES, DEGRADATION OR REACTION PRODUCTS

The rate of degradation of fenpropidin was estimated from the results of the studies described in 4.1.1 above. DT_{50} were: 58-103 days (single first order non linear regression, 22°C 75% 1/3 bar or 40% MWHC experiments). After normalisation to FOCUS reference conditions[6] (20°C and -10kPa soil moisture content) and taking the average of the replicated experiments dosed at different concentrations (see addendum) the single first order DT_{50} become 76 and 65.5 days (experiments with the sandy loam) and 59 days (experiment with the loam).

The experts from the member states agreed that as the database of laboratory DT_{50} for fenpropidin was small (only available for 2 different soils), a data gap was necessary as two additional laboratory aerobic soil degradation rate endpoints for fenpropidin on two additional different soils should be provided to comply with minimum annex II data requirements. They also agreed, that with this small database FOCUS scenario PEC calculations should use the long value DT_{50} of 76 days when calculating fenpropidin PEC but the short value of 59 days when doing simulations for metabolites utilising kinetic formation fractions from fenpropidin.

[6] Using section 2.4.2 of the generic guidance for FOCUS groundwater scenarios, version 1.1 dated April 2002.

The degradation product, CGA 289267 was applied as test substance to 3 soils and incubated in the laboratory (aerobic dark 20°C 40% MWHC). Single first-order DT_{50} values from these studies were calculated to be 9.5-63 days. After normalising to FOCUS reference condition soil moisture (-10kPa) this range is 5.8 to 38 days. The experts from the member states had an extensive discussion on whether a geomean single first order DT_{50} value or longest value for CGA 289267 should be selected for FOCUS modelling. It was agreed that there was insufficient information to confirm or refute if soil pH or any other soil property might be affecting degradation rates of CGA 289267. Eventually the majority of the experts agreed that in this case, it would be appropriate to be conservative and use the longest value of 38 days, because of the variability and skewed distribution of the 3 values (2 very similar values around 6 days and the third longer value of 38 days). They concluded this even though the minimum required number of soils (3 for a metabolite) had been investigated and usually a geometric mean value would have been selected in the absence of any indication (from all the available data) that DT_{50} showed any correlation with a soil property.

Field soil dissipation studies (bare soil) were provided from 6 sites located in Switzerland and Germany where applications were made in May and June. At 3 of the sites, using the residue levels of parent fenpropidin determined over the 0-5cm soil layer, single first order (SFO) DT_{50} were 7-116 days (DT_{90} 22-384 days). At a 4th site where fenpropidin was determined over the 0-10 cm soil layer the SFO DT_{50} was 94 days (DT_{90} 312 days). At the remaining 2 trial sites the pattern of dissipation was not adequately described by SFO kinetics, so a first order multi compartment model (FOMC) was fitted that resulted in DT_{50} of 7[7] days (residues determined over 0-10cm soil layer) and 47[8] days (residues determined over 0-5cm soil layer) with associated DT_{90} of 217 and 10712 days (of course the value of 10712 days is an extrapolated value as the last sample was taken at 647 days). Residues of fenpropidin were <0.05mg/kg in soil layers deeper than 5cm or <0.02mg/kg in soil layers deeper than 10cm when this was the shallowest upper depth segment analysed in a trial.

In 2 field accumulation trial sites carried out in the UK where plots were cropped with winter wheat and at least 1 application was made in November and up to 3 applications were made per year for 3 consecutive years using the maximum application rate applied for in the European dossier, there was no evidence of accumulation. However the dissipation rate in these trials could not be estimated because of the sampling intervals chosen for the study design and the DT_{90} at the sites may well have been less than 365 days as was the case in 4 of the field dissipation studies carried out elsewhere in Europe. The relatively warm wet UK winter conditions compared to other regions of the EU may also mean that the trials do not represent a realistic worst case for an EU wide assessment. The EU level assessment therefore had to be completed using an accumulation calculation based on the results from the available field dissipation studies.

[7] α=0.502, ß=2.214
[8] α=0.302, ß=5.263

The experts from the member states discussed the fenpropidin accumulation calculations presented in the addendum that were calculated assuming FOMC kinetics and the pattern of decline observed in the field dissipation study with the longest estimated DT_{90} (α=0.302, ß=5.263). They agreed that the calculations in the addendum would be appropriate if the reason for the slowing of the rate of decline observed later in the study (biphasic pattern) occurred because temperatures at the trial site were low and or soil moisture content was low. Under these conditions the calculation approach used, that assumed the faster rate of degradation resumed for the whole soil residue after 12 months when the first application from the next season was simulated would be appropriate. However some experts commented that if reduction in bioavailability of the residue was the mechanism responsible for the observed biphasic pattern in this trial, then the residue remaining in the soil at the time of the following season's applications would continue to dissipate at the slow rate. As it was not clear from the information available to the experts what the reason was for the observed biphasic decline, the majority of the experts considered that PEC accumulation should be recalculated using the assumption that residual residues that originated from the previous years applications should continue to decline at the slow rate. This calculation was done during the meeting and this is the calculation that is presented in the list of agreed endpoints (see appendix 1 of this conclusion). This calculation which assumed even incorporation over the top 5 cm (minimum tillage conditions) and applications every year for up to 20 years (no rotation of a crop where fenpropidin was not applied) resulted in a soil concentration of 2.15 mg/kg after 20 years (upper part of the 'saw tooth' pattern) with no plateau being reached after 20 years. As this worst case concentration results in annex VI triggers being breached with the available ecotoxicology effects values, the meeting of experts agreed that a data gap should be identified for the applicant to provide a new soil accumulation calculation (see section: List of Studies to be Generated) that could include more realistic assumptions regarding cultivation (minimum tillage with a soil mixing depth of only 5 cm is unlikely continuously for 20 years) and crop rotation. Alternatively it might be demonstrated that temperature and soil moisture conditions were the explanation for the biphasic degradation pattern in the trial and then the calculation already available and evaluated in the addendum would be appropriate. Demonstrating the decline pattern in the trial can be reasonably described by first order kinetics after completing a time step normalisation to reference soil temperature and soil moisture conditions, following the recommendations described in Chapter 9 of FOCUS kinetics guidance[9] would be one way to demonstrate this.

4.1.3. MOBILITY IN SOIL OF THE ACTIVE SUBSTANCE AND THEIR METABOLITES, DEGRADATION OR REACTION PRODUCTS

The adsorption / desorption of fenpropidin was investigated in 6 soils in satisfactory batch adsorption experiments. Calculated adsorption K_foc values varied from 2105 to 5313 mL/g, (mean 3808 mL/g) (1/n 0.56 – 0.8, mean 0.71). There was no evidence of a correlation of adsorption with pH.

[9]) "Guidance Document on Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration" Report of the FOCUS Work Group on Degradation Kinetics, EC Document Reference Sanco/10058/2005 version 2.0, 434 pp

The adsorption / desorption of CGA 289267 was investigated in 5 soils in satisfactory batch adsorptions experiments. Calculated adsorption $K_f$oc values were 51-363 mL/g (mean 147 mL/g) (1/n 0.91 – 0.98, mean 0.93). Whilst the pK_a values quoted for CGA 289267 ($pK_{a,1}$ 4.4 and $pK_{a,2}$ 10.7)[10] indicate it is a dipolar zwitter ion at environmentally relevant pH values, there was no evidence of a correlation of adsorption with pH (or cation exchange capacity and clay content) in the 5 soils tested. The meeting of experts therefore agreed that it was appropriate to use an arithmetic mean adsorption value in the environmental exposure estimates.

The low mobility of fenpropidin and potential mobility of CGA 289267 were confirmed by the results of laboratory unaged (7 soils) and aged (3 soils) column leaching studies.

In a BBA guideline lysimeter study (1.2 m depth soils monoliths of sandy loam soil) carried out in Switzerland where an application was made in May to spring planted cereals at half the annual dose applied for in the EU dossier, only unidentified fractions were present in leachate that were shown by chromatography to be polar in nature and had different chromatographic behaviour from the known metabolites CGA 289267 and CGA 289263[11]. The peer review agreed with the conclusion of the RMS in the DAR that it is not considered realistic to require any further investigations of the nature of the leached material that accounted for a maximum annual average leachate concentration of 0.14 µg fenpropidin equivalents/L and was demonstrated to be made up of at least 2 components.

4.2. FATE AND BEHAVIOUR IN WATER

4.2.1. SURFACE WATER AND SEDIMENT

Fenpropidin was stable under sterile aqueous hydrolysis conditions at 50°C at pH 3, 7 and 9. Measurement of the UV visible absorption spectrum of aqueous solutions of fenpropidin indicated that direct aqueous photolysis of fenpropidin would not be expected due to the absence of any significant absorption over the relevant wavelengths for sunlight (>290 nm). A ready biodegradability test (OECD 301B) indicated that fenpropidin is 'not readily biodegradable' using the criteria defined by the test.

In water-sediment studies (2 systems studied at 25°C in the laboratory, sediment pH 7.4-8.0, water pH 8.1-8.6) fenpropidin dissipated rapidly from the water partitioning to sediment with DT_{50} of 0.7 and 3 days (respective DT_{90} 64 and 10 days). Degradation in sediment subsequently occurred with single first order whole system DT_{50} being calculated as 23 and 45 days (geomean value 32 days at 25°C equivalent to 46.5 days after normalisation[12] to the usual reference temperature of 20°C). The metabolite CGA 289267 was identified and present at maxima of 13-14% AR at 28-70 days after treatment in water, but only accounted for a maximum of 2.3 % AR in sediment. The terminal metabolite, CO_2, accounted for 11-60 % of the benzylic bridge-^{14}C-radiolabel by 84 days. Residues

[10] Quoted by the RMS in the DAR and addendum and provided in a study report on PECgw (Gurney, 2003), with further reference to Widner (1997). The latter report was not evaluated by the RMS.
[11] CGA 289263: 1-[3-(4-tert-butyl-phenyl)-2-methyl-propyl]-piperidine-1-oxide
[12] assuming an Arrhenius activation energy of 54 kJ mol. as used by TOXSWA.

not extracted from sediment by methanol:water, dichloromethane and Soxhlet methanol represented ca. 8 % AR at study end (84 days). The peer review concludes that for fenpropidin water and sediment DT_{50} of 999 days (default) and 46.5 days (geomean of whole system values normalised to 20°C) respectively were acceptable for use as FOCUSsw scenario calculation input at steps 3 and 4.

The experts also agreed that for the metabolite CGA 289267 DT_{50} values of 43 days in water and sediment could be used (as a consequence of the argumentation included by the RMS in the addendum) in the available step 3 calculations, this being a conservative assumption[13] when combined with the knowledge that this metabolite accounted for a maximum of 16.1% AR in the whole sediment water system and this fact was used to calculate the (theoretical) metabolite application rate to use as modelling input at step 3.

FOCUS surface water modelling was evaluated up to step 4 for fenpropidin (see DAR and addendum) and step 3 for the metabolite CGA 289267 (see DAR). The peer review agreed these PEC surface water and sediment as presented in the DAR for CGA 289267 and addendum for fenpropidin at step 3 and step 4 where just spray drift was mitigated, were appropriate for use in risk assessment. In the expert meeting, values for 5 m no spray zones were available in the addendum. As a consequence of the conclusions of the ecotoxicology expert meeting regarding algae and after the fate and behaviour meeting, the addendum was updated to include step 4 surface water calculations with 50 m no spray zones. As an agreed standard methodology was used for these calculations EFSA considers these are agreed values, so they are included in appendix 1. Calculations with a 10 m vegetated buffer to reduce drift and runoff in combination with drift reducing nozzles and calculations with a 50 m vegetated buffer reducing drift and runoff were also added to the addendum by the RMS but cannot be considered agreed values for the reasons pertaining to their additional uncertainty, as outlined in the comments of the RMS in the addendum.
Because of the potential volatilisation of fenpropidin from plant surfaces particularly around the time of application (see section 4.3), the experts from the Member States considered that this conclusion should identify that in national assessments at the Member State level, the potential for surface water contamination as a result of volatilisation losses may require consideration. Note this has not been done in the available EU level assessment.

4.2.2. POTENTIAL FOR GROUND WATER CONTAMINATION OF THE ACTIVE SUBSTANCE THEIR METABOLITES, DEGRADATION OR REACTION PRODUCTS

The conclusions of the peer review were that with the available database of studies (less than minimum annex II data requirements, for fenpropidin laboratory soil degradation rates), the following chemical substance input parameters at FOCUS reference conditions were appropriate to be used in FOCUS groundwater scenario modelling. For fenpropidin: single first order laboratory DT_{50} 76 days, K_{foc} 3808 mL/g, 1/n=0.71. When calculating CGA 289267 leachate concentrations: fenpropidin single

[13] Degradation rate is comparable to that of parent fenpropidin whole system, though in any future calculations presented to member states the value of 46.5 days as agreed for fenpropidin would be easiest to explain / justify.

first order laboratory DT_{50} 59 days, K_{foc} 3808 mL/g, 1/n=0.71; kinetic formation fraction of CGA 289267 from fenpropidin 0.28; CGA 289267 single first order laboratory DT_{50} 38 days, K_{foc} 147 mL/g, 1/n=0.93. See section 4.1.2 of this conclusion for the reasoning behind the selection of these DT_{50} values, section B.8.6.1 of the DAR for the derivation of the kinetic formation fraction and section 4.1.3 of this conclusion for the adsorption selection.

The applied for representative use of Spring applications (1st & 22nd May N. Europe, 1st & 22nd April S Europe) to winter planted cereals was simulated using FOCUS PELMO 3.3.2 using Parent fenpropidin single first order laboratory DT_{50} 67 days, (compared to 76 days agreed by the peer review) adsorption values as agreed by the peer review. Fenpropidin was calculated to be present in leachate leaving the top 1 m soil layer at 80th percentile annual average concentrations of <0.001 µg/L at all 9 FOCUS groundwater scenarios (see DAR for full details of the simulations). The peer review agreed that even if the slightly longer DT_{50} had been used in simulations, because of the high adsorption of fenpropidin, concentrations would have remained <0.1 µg/L. It was therefore concluded that the potential for contamination of groundwater above the 0.1 µg/L parametric drinking water limit by parent fenpropidin from the applied for representative uses is low over a broad range of vulnerable groundwater situations across Europe.

This same use pattern on winter planted cereals was simulated using FOCUS PELMO 3.3.2 and FOCUS PEARL 3.3.3 using fenpropidin single first order laboratory DT_{50} 49 days (more conservative value than the 59 days agreed by the peer review with respect to CGA 289267 leaching potential). All other substance input values used were as agreed by the peer review (see addendum for full details of the simulations). The calculation was provided after the expert meeting but since agreed standard methodology was used EFSA considers the results are agreed values, so they are included in appendix 1. CGA 289267 was calculated to be present in leachate leaving the top 1 m soil layer at 80th percentile annual average concentrations of <0.001 to 0.055 µg/L at the 9 FOCUS groundwater scenarios. It was therefore concluded that the potential for contamination of groundwater above the 0.1 µg/L parametric drinking water limit by CGA 289267 from the applied for representative uses is low over a broad range of vulnerable groundwater situations across Europe.

4.3. FATE AND BEHAVIOUR IN AIR

The vapour pressure of fenpropidin ($1.7x10^{-2}$ Pa at 25°C) means that fenpropidin would be classified under the national scheme of The Netherlands as moderately volatile, indicating losses due to volatilisation would be expected. In its neutral form that would be expected to be present in the spray solution fenpropidin has a relatively low water solubility indicating volatilisation at the time of spraying is likely to occur. Based on the results of a laboratory climate chamber experiment where a fenpropidin EC formulation was applied to wheat plants at the 2 leaf growth stage it was estimated that 80% of the radioactivity from the radioactive fenpropidin applied was lost to the air compartment in 24 hours. In a second laboratory experiment where applications were made to soil, measured losses were low as might be expected when salts of the predominantly protonated fenpropidin are formed in soil and the compound has a high measured soil adsorption (see section 4.1.3). Calculations using the

method of Atkinson for indirect photo oxidation in the atmosphere through reaction with hydroxyl radicals resulted in an atmospheric half life estimated at about 1 hour (assuming an atmospheric hydroxyl radical concentration of $1.5x10^6$ radicals cm^{-3}) indicating that the fenpropidin that will volatilise would be unlikely to be subject to long range atmospheric transport.

5. Ecotoxicology

Fenpropidin was discussed at the PRAPeR experts' meeting for ecotoxicology (PRAPeR 23) in May 2007. In the risk assessment it was not specifically considered that fenpropidin is a racemic mixture. It should be noted that this adds some unquantified uncertainty to the outcome of the risk assessment. A data gap was identified in the evaluation meeting in November 2007 to address the impact of different isomer ratios on the environmental risk assessment of fenpropidin

5.1. RISK TO TERRESTRIAL VERTEBRATES

The representative uses of fenpropidin evaluated are the use as a fungicide in cereals (early and late growth stages) in Northern and Southern Europe. The first application is on cereals at an 'early' stage (BBCH 29) where the crop itself is still likely to be eaten while the second application, at least 21 days later, is at a stage when it is considered that the crop itself will not be eaten anymore. Therefore only one application instead of two was taken into account to calculate the risk to herbivorous birds and mammals. The risk was calculated according to SANCO/4145/2000 for herbivorous birds and mammals and for insectivorous birds and mammals in cereals.

The first tier risk assessment for birds resulted in TERs below the Annex VI trigger for the acute scenario in Northern Europe and long-term scenarios in Northern and Southern Europe.

The refined risk assessment was based on measured residues. The residue trials were conducted in UK at the Northern European GAP (2 x 0.75 g a.s./ha). The residue trials were discussed and agreed in the meeting of experts. Based on initial maximum residue values the acute TER for a large herbivorous bird was calculated as 46.3 indicating a low risk.

To refine the long-term risk the following refinement steps were suggested and discussed in the meeting:

- The use of a FCOUS based interception factor of 0.5 for residues on weed seeds was not accepted by the meeting since weeds may have a similar or larger height as the crop during early cereal growth stages and extrapolation from deposition on soil surface was considered as not correct.
- Skylark (*Alauda arvensis*) and yellowhammer (*Motacilla flava*) were agreed by the meeting as focal species.
- The suggested PT values of 0.5 for large herbivorous birds and 0.78 for skylark were not agreed since the refinement was not sufficiently supported by data.

- The meeting agreed to take into account in the risk assessment that cereals would become not attractive as a food source for herbivorous birds soon after the first application when stem elongation starts. The meeting agreed to calculate 21-d time weighted average residues but with exposure only during the first 2 weeks. This would result in a long-term TER of 4.3.
- The reduction of residues in insects of 50% due to development of insect populations was not agreed. The meeting concluded that a quantification of the residue decline in insects should either be supported by measured residues or a more detailed consideration of the insect populations in the relevant crop.
- Dehusking was considered in a qualitative way. For yellowhammer it was agreed that dehusking could be used to refine the risk assessment. No information was made available for skylark.

The long-term TERs based on accepted refinements were calculated as 4.3 (large herbivorous) and 2.9 for skylark and yellowhammer. A data gap was identified to refine the long-term risk assessment for herbivorous birds and insectivorous birds (Northern and Southern Europe).

The endpoint NOAEL of 60.25 mg/kg bw/d from a 2-generation reproduction study in rats was discussed since effects on body weight gain were observed. No other adverse effects were observed in the study at this concentration. The experts agreed to the use of the endpoint since the magnitude of effects was low and at least partly caused by reduced maternal food consumption. Based on the first tier risk assessment for mammals a refinement of the risk assessment is considered necessary for the acute risk (Northern Europe) and long-term risk for herbivorous mammals (Northern and Southern Europe). The first-tier TERs were above the trigger for insectivorous mammals. The acute TER for herbivorous mammals based on maximum initial measured residues was accepted and resulted in an acute TER of 58 (Northern Europe).
The suggested PT to refine the long-term risk assessment was not agreed by the experts since it was not supported by data. As for herbivorous birds it was considered appropriate to take into account that cereals would become not attractive as a food source soon after the firs application. Based on the 21-d time weighted average residues and exposure only during the first two weeks after application the TER is 5.6 for herbivorous mammals (Northern Europe covering also the lower application rate in the Southern European scenario).

Overall it is concluded that the risk to mammals is low for the representative use in cereals.

The acute risk from uptake of contaminated drinking water was assessed by the RMS on the basis of exposure of birds and mammals to the 5-fold dilution of the sprayed solution. The acute TERs ranged from 0.9-4.9 for birds and from 6.7 –36 for mammals for spray volumes of 100 – 400 L/ha (Northern and Southern EU). In general it was considered as unlikely that droplets would accumulate in leaf axils or that puddles would be formed in the field considering the proposed spray volumes. The meeting did not reach a final conclusion on the risk to birds and mammals since no information on the drinking behaviour (formation and ingestion of dew drops) was made available and the current

guidance gives no recommendations on risk refinements. Further information should be made available on the drinking behaviour of birds.

As the log P_{ow} is above 3, the risk from secondary poisoning to birds and mammals was assessed. This assessment was based on maximum initial PECsw values (from FOCUS step 2) and on max. accumulated PECsoil which are considered worst-case to the 21 days PECtwa values recommended by SANCO/4145/2000. The resulting TER-values were above the Annex VI trigger value indicating a low risk to birds and mammals from secondary poisoning.

5.2. RISK TO AQUATIC ORGANISMS

Algae are the most sensitive aquatic organisms when tested with fenpropidin and the lead formulation TERN 750 EC. To further address the risk to aquatic organisms two micro/mesocosm studies were submitted. The study by Neumann (1997) is used in the risk assessment.

The formulation A-7516 A was applied twice to the mesocosms with an interval of 14 days. This formulation is regarded as equal to the lead formulation. Three mesocosms were included as controls, one mesocosm for the highest concentration and two replicates for the other concentrations. Observations were made until 25 weeks after the first application.

The RMS considered it more appropriate to base the results on mean measured concentrations in order to establish an endpoint which represents a 'true' no-effect concentration level, which is used to override the results from the laboratory studies and which can be used for different purposes (e.g. comparison with PECsw in FOCUS SW modelling which reflect additional routes of contamination besides spray-drift). Furthermore the RMS considers the use of mean measured concentrations more appropriate as the neutral and potentially volatile form of fenpropidin is present in alkaline solutions and in the formulated product. Partial loss due to volatilisation during spraying of the mesocosms was therefore possible.

The endpoints from the mesocosm were recalculated to initial mean measured concentrations from the two applications in the addendum. The RMS proposed a NOEAEC of 6.8 µg/L based on recovery of phytoplankton community parameters within 8 weeks after the first application. This proposal was rejected by the meeting since the sensitive group of Chlorophyceae needed 10 weeks to recover at a concentration of 1.4 µg/L. The meeting agreed on a NOEC of 0.39 µg/L[14]. An assessment factor of 1-3 was suggested by the meeting. Member States should choose the assessment factor depending on the representativeness of the mesocosm to their environmental conditions. In the updated addendum of September 2007 (not peer reviewed) the RMS recalculated the TERs with FOCUS step 4 PECsw. With a no-spray buffer zone of 50 m TERs >1 were observed in all drainage scenarios out of 6 but in none of the 3 run-off scenarios. No full FOCUS step 4 scenario resulted in a TER >3.

[14] Erroneously stated as 0.14 µg/L in addendum B.9 and in report from the PRAPeR meeting, because of mis-calculation of the mean measured peak concentrations.

Fenpropidin is not an herbicide so studies on aquatic plants are not considered necessary. However aquatic higher plants were included in the mesocosm study discussed above. No effects on macrophytes were observed.

Fenpropidin was found in concentrations above 10% of the AR in the sediment and hence a risk assessment for sediment dwelling organisms is required. A chronic water spiked and a chronic sediment spiked study on *Chironomus riparius* was provided. *C. riparius* is less sensitive to fenpropidin than algae. The TER values for *C. riparius* were above the Annex VI trigger with FOCUS step 2 PECsw.

The metabolite CGA 289267 was identified as a major metabolite in surface water in the section on fate and behaviour. Studies on fish, *Daphnia magna* and algae were submitted. Based on this studies the risk to aquatic organisms from this metabolite can be regarded as low for the representative uses evaluated. CGA 289267 is considered to be not ecotoxicologically relevant due to the lower risk to aquatic organisms than fenpropidin.

A study on bioconcentration in fish was submitted as the Log P_{ow} exceeds 3. The resulting BCF is 163 which is above the Annex VI trigger of 100 for not readily biodegradable compounds. CL_{50} was estimated to 17 hours and CL_{90} to approximately 14 days. The risk from bioaccumulation in aquatic food chains was considered as low.

5.3. RISK TO BEES

Acute contact and oral toxicity studies both with fenpropidin and the formulation A-7516 A are available. This formulation is regarded as equal to the lead formulation. The resulting HQ values are below the appropriate Annex VI trigger value indicating a low risk to bees for the representative uses evaluated.

Furthermore three cage studies were submitted. TERN 750 EC was applied at 1500 g a.s./ha during these studies which is equal to twice the maximum application rate from the representative uses evaluated. No effects on behaviour, apart from a repellent effect in one of the studies, were observed. In two of the studies flight activity was reduced for a short time after application but returned to control levels within one day. Due to the high treatment rate used, the low magnitude of effects on mortality and the short duration of the effect on foraging activity, it is considered that the studies confirm that the risk to bees is low.

5.4. RISK TO OTHER ARTHROPOD SPECIES

A high mortality rate (>50%) was observed in standard laboratory tests with *Aphidius rhopalosiphi*, *Chrysoperla carnea* at an application rate of 750 g a.s/ha. The other tested species *Aleochara bilineata, Bembidion tetracolum, Coccinella septempunctata* and *Poecilus cupreus* were less sensitive and the observed effects were less than 50%. No standard glass plate test was available for *Typhlodromus pyri*. However predatory mites were identified as as the most sensitive organisms

tested in the extended laboratory studies. *Phytoseilus persimilis* was the most sensitive organism. A high in-field risk was identified for leaf dwelling arthropods. However the results from aged residue studies indicated that potential of recolonisation after 1 day of ageing. The available tests with *Phytoseilus persimilis* did not cover the expected exposure at 1 m distance from the field. It was decided in the meeting that either a test with the appropriate dose should be conducted or a no-spray buffer distance needs to be calculated to cover the tested rates. In the updated addendum of September 2007 (not peer reviewed) the RMS calculated the off-field rate as 30 g a.s/ha. The effects on mortality and fecundity on *P. persimilis* were <50% at this rate in a test where the whole plants were sprayed. Based on the data available it is concluded that risk mitigation such as an in-field no-spray buffer zone of 5 metres is needed to protect non-target arthropods in the off-field area.

5.5. RISK TO EARTHWORMS

A study on the acute toxicity to earthworms both with fenpropidin and the formulation A-7516 A is available. The formulation is considered to be equivalent to the lead formulation TERN 750 EC. A chronic study on earthworms was made available as the DT_{90} in soil for fenpropidin exceeds 1 year. The endpoints were corrected as the log P_{ow} exceeds 2. The TER calculations presented in the DAR resulted in TERs above the trigger. The PECsoil values were not accepted by the fate experts. The new PECsoil values based on 20 years of accumulation are still above the trigger except for the long-term risk for the use in Northern Europe with a TER of 4.6. The experts considered the risk as acceptable since the TER is not far below the trigger of 5 and the PECsoil calculation is very conservative. The remaining uncertainty with regard to the long-term risk to earthworms can be addressed when reliable soil PEC values are established (see point 4.1.2).

CGA 289267 is a major metabolite in soil. Based on the available acute study, the risk to earthworms from the soil metabolite CGA 289267 can be regarded as low. No long term study with this metabolite is considered necessary since the geometric mean DT_{90} is <100 days and the maximum number of applications is two for the representative uses evaluated.

5.6. RISK TO OTHER SOIL NON-TARGET MACRO-ORGANISMS

The maximum DT_{90} for soil in the field exceeds 1 year. Therefore the effects of fenpropidin on other soil non-target organisms need to be assessed. A study on collembola and a litterbag study were therefore submitted. The TER values for collembola were >5 indicating a low risk. A litter-bag study was also submitted and evaluated in the DAR. No significant effects on organic matter breakdown were observed in the study at a calculated soil concentration of 0.6 mg a.s./kg soil (calculated for a soil depth of 0-10 cm). This concentration is below the maximum PECsoil after 10 and 20 years of accumulation (PECs plateau recalculated to 0.79 and 1.08 mg a.s./kg for a depth of 0-10 cm) and hence the test result is of limited use for the risk assessment of the representative uses.

5.7. RISK TO SOIL NON-TARGET MICRO-ORGANISMS

No effects >25% on soil nitrification and respiration were observed at concentrations of up to 6 mg fenpropidin/kg soil. These dose rates are higher than the PECsoil for the representative uses evaluated and hence the risk to soil non-target micro-organisms from fenpropidin is considered to be low for the representative uses evaluated.

Also a study with the major soil metabolite CGA 289267 is available. Based on this study the risk to soil non-target micro-organisms from this metabolite can be regarded as low.

5.8. RISK TO OTHER NON-TARGET-ORGANISMS (FLORA AND FAUNA)

No effects on emergence of seeds were observed in tests with 6 different plant species at the highest application rate of 1 L TERN 750 EC/ha. Effects of >50% on vegetative vigour were observed at the highest treatment rate in two plant species. Only minor effects were observed in one species at the lowest tested rate of 31.25 mL TERN 750 EC/ha. Therefore the risk to non-target plants is considered to be low in the off-field area where the rate was calculated to be 27.7 mL product/ha (2.77% drift rate).

5.9. RISK TO BIOLOGICAL METHODS OF SEWAGE TREATMENT

The 3 hour EC_{50} for fenpropidin on the activity of activated sludge exceeds 100 mg/L. The 3 hour EC_{50} for the lead formulation TERN 750 EC on the activity of activated sludge is approximately 171 mg a.s./L. If the product is applied according to the GAP it is not expected that the concentration of fenpropidin will reach levels of >171 mg a.s./L and hence the risk to biological methods of sewage treatment is considered to be low.

6. Residue definitions

Soil

Definitions for risk assessment: fenpropidin, CGA 289267[15]

Definitions for monitoring: fenpropidin and its salts

Water

Ground water

Definitions for exposure assessment: fenpropidin, CGA 289267

Definitions for monitoring: fenpropidin and its salts

Surface water

Definitions for risk assessment: water: fenpropidin, CGA 289267

sediment: fenpropidin

[15] CGA 289267: 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid

Definitions for monitoring: fenpropidin and its salts

Air

Definitions for risk assessment: fenpropidin

Definitions for monitoring: fenpropidin and its salts

Food of plant origin

Definitions for risk assessment: sum of fenpropidin and its salts expressed as fenpropidin

Definitions for monitoring: sum of fenpropidin and its salts expressed as fenpropidin

Food of animal origin

Definitions for risk assessment: sum of fenpropidin and its salts, CGA 289267, SYN515213[16], CGA 289268[17] and their conjugates expressed as fenpropidin[18].

Definitions for monitoring: sum of fenpropidin, its salts and CGA 289267, expressed as fenpropidin.

[16]SYN515213: 3-hydroxy-2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid

[17] CGA 289268: 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propan-1-ol

[18] This definition differs from that proposed by the expert meeting. The reason is given in point 3.2.

Overview of the risk assessment of compounds listed in residue definitions for the environmental compartments

Soil

Compound (name and/or code)	Persistence	Ecotoxicology
fenpropidin	Moderate to high persistence Single first order DT_{50} 59-76 days (20°C, -10kPa soil moisture) DT_{50} 7-116 days (European field studies)	The risk to soil dwelling organisms was assessed as low
CGA 289267	Low to moderate persistence Single first order DT_{50} 5.8-38 days (20°C, -10kPa soil moisture)	The risk to earthworms was assessed as low

Ground water

Compound (name and/or code)	Mobility in soil	> 0.1 µg / L 1m depth for the representative uses (at least one FOCUS scenario or relevant lysimeter)	Pesticidal activity	Toxicological relevance	Ecotoxicological relevance
fenpropidin	slight mobility to immobile K_{foc} 2105-5313 mL/g	No	Yes	Yes	Yes
CGA 289267	high to medium mobility K_{foc} 51-363 mL/g	No	No information available. No information required.	Not assessed, assessment not required	No. Several orders of magnitude less toxic to aquatic organisms compared to fenpropidin.

Surface water and sediment

Compound (name and/or code)	Ecotoxicology
fenpropidin	See 5.2
CGA 289267	Low toxicity and low risk to aquatic organisms.

Air

Compound (name and/or code)	Toxicology
fenpropidin	Harmful via inhalation (LC50 1.22 mg/L)

LIST OF STUDIES TO BE GENERATED, STILL ONGOING OR AVAILABLE BUT NOT PEER REVIEWED

- Additional QC data to support the notifiers suggested 5 g/kg for impurity CGA 289272 were identified as a data gap (relevant for all uses evaluated, data requirement identified by the meeting of experts May 2007, data available but not peer reviewed, refer to chapter 1).
- As the emulsion stability for the product was poor a sprayability study was required (relevant for all uses evaluated, data requirement identified by EFSA and confirmed by the meeting of experts May 2007, data available but not fully validated by the rapporteur and not peer reviewed, refer to chapter 1).
- Impact of different isomer ratios on the exposure assessment of fenpropidin for operator, worker and bystander is to be addressed (relevant for all applied for intended uses; data gap identified by EFSA after the expert meeting; no submission date proposed; refer to point 2.12).
- Impact of different isomer ratios on the consumer risk assessment of fenpropidin is to be addressed (relevant for all applied for intended uses; data gap identified by EFSA after the experts' meeting; no submission date proposed; refer to point 3.3).
- Supervised residue trials in accordance with the representative use for Southern European region (relevant for uses in cereals in Southern Europe; data gap identified by the expert meeting; no submission date proposed though the notifier has indicated that it will likely take 2 years to complete the residue programme; refer to point 3.1.1).
- Two additional laboratory aerobic soil degradation rate endpoints for fenpropidin on two additional different soils (relevant for all applied for intended uses; data gap identified by the expert meeting; submission proposed for the end of 2008; refer to point 4.1.2).
- Soil accumulation PEC to be correctly calculated using FOMC kinetics (or different kinetics if justified by FOCUS degradation kinetics guidance) based on the worst case decline pattern from the available field dissipation studies, with the plateau being calculated using assumptions in line with realistic Good Agricultural Practice conditions (relevant for all applied for intended uses; data gap identified by the expert meeting; no submission date proposed; refer to point 4.1.2).
- A refined long-term risk assessment for herbivorous birds and insectivorous birds (Northern and Southern European uses) (data gap identified in the expert meeting on ecotoxicology, PRAPeR 23 in May 2007; no submission date proposed by the applicant but the RMS was informed that data are currently being generated to refine the risk assessment; refer to point 5.1).
- Further refinement of the risk assessment to aquatic organisms is required (relevant for all applied for intended uses; data gap identified in the expert meeting PRAPeR 23 in May 2007; no submission date proposed by the applicant; refer to point 5.2).
- Impact of different isomer ratios on the environmental risk assessment of fenpropidin is to be addressed (relevant for all applied for intended uses; data gap identified by EFSA after the expert meeting; no submission date proposed; refer to chapters 4 and 5).

CONCLUSIONS AND RECOMMENDATIONS

Overall conclusions

The conclusion was reached on the basis of the evaluation of the representative uses as a fungicide on cereals full details of the GAP can be found in the attached end points.

The representative formulated product for the evaluation was "Tern 750 EC", an emulsifiable concentrate formulation (EC). Fenpropidin is a racemic mixture. It has been identified that more information is necessary to enable the impact of potential different isomer ratios on the risk assessments to be better characterised.

Adequate methods are available to monitor fenpropidin (and its salts expressed as fenpropidin) in products of plant origin, soil water and air and fenpropidin (and its salts expressed as fenpropidin) and CGA 289267 in products of animal origin. Only single methods for the determination of residues are available since a multi-residue-method like the German S19 or the Dutch MM1 is not applicable due to the nature of the residues.

Sufficient analytical methods as well as methods and data relating to physical, chemical and technical properties are available to ensure that quality control measurements of the plant protection product are possible. There is an outstanding data requirement for a sprayability study to address the poor emulsion stability of the formulation.

Fenpropidin is acutely toxic via ingestion and inhalation. It is not acutely toxic via dermal route. It is irritant to skin and eyes but not corrosive. It is a skin sensitiser. Classification with **Xn R20/22** (harmful by inhalation and if swallowed), **Xi R38** (irritating to skin), **R41** (risk of serious damage to eyes) and **R43** (may cause sensitization by skin contact) and as **R37** (irritating to the respiratory system) is proposed. The relevant NOAEL for short term toxicity is 1.14 mg/kg bw/day and 2 mg/kg bw/day in rats and dogs, respectively. The proposal for classification as **R48/22**, based on the spinal cord demyelination in the 1 year study in dog, has been agreed by ECB already. Fenpropidin does not show any potential for genotoxicity, carcinogenicity, and reproductive toxicity. Fenpropidin showed a neurotoxic potential in the repeated dose studies, expressed as spinal chord demyelination at the maximum doses tested in a 90-day rat and 1-year dog study. The NOAELs were 5 mg/kg bw/day in dogs and 10.1 mg/kg bw/day in rats. The ADI, AOEL and ARfD are 0.02 mg/kg bw (SF 100). The operator exposure of fenpropidin shows exposure levels below the AOEL when appropriate PPE is worn. Workers and bystanders show exposure levels below the AOEL under worst case assessments.

The metabolic pathway of fenpropidin in cereals has been elucidated. Several routes of metabolism have been identified but the metabolic pattern in wheat grain and straw at plant maturity is clearly dominated by the parent compound. Therefore the residue definition for risk assessment and monitoring in cereals is restricted to fenpropidin.

Supervised residue trials conducted in Northern Europe support the setting of MRLs of 0.1 mg/kg in wheat, rye and triticale and of 0.3 mg/kg in barley and oats. High residue levels were found in straw.

Under processing the nature of fenpropidin residues is not affected and residues are preferentially transferred to bran during the milling process. The transfer factor from barley to beer could not be determined exactly but is below 0.4.
A transfer of soil residues to rotational crops after cereal use is not expected.
A significant exposure of livestock mainly resulting from consumption of straw is expected. Animal metabolism studies in lactating goats and laying hens show that fenpropidin is extensively metabolised in livestock and a complex residue pattern is found in edible tissues. The residue definition for monitoring animal commodities consists in the sum of fenpropidin and one of its major animal metabolites (CGA 289267). For risk assessment, further major metabolites need to be considered and conversion factors between both definitions have been proposed. A feeding study in dairy cows has been conducted and can be used for MRL setting in animal products.
Chronic and acute consumer exposure assessments were conducted and, under restriction of an uncertainty related to the isomer ratio consumer is actually exposed to, did not show any indication of dietary risk.

The information available on the fate and behaviour in the environment is sufficient to carry out an environmental exposure assessment at the EU level based on the sum of isomers, though the level of information is below that required by the fate data requirements annex's regarding the provision of reference condition single first order soil DT_{50} for fenpropidin for use in scenario modelling of predicted environmental concentrations. A data gap for additional information on a further two different soils is therefore identified and as a consequence some conservative assumptions have been incorporated into the available assessments produced to support the applied for intended uses. A data gap is also identified to clarify the soil accumulation potential of fenpropidin under the geoclimatic conditions represented by a field study carried out in Switzerland. The peer review has identified that short range atmospheric deposition to surface water from fenpropidin that may volatilise at the time of application and from plant surfaces for around 24 hours after application would need to be considered further when making product authorisations. For the applied for intended uses, the potential for groundwater exposure by fenpropidin and its soil metabolite CGA 289267 above the parametric drinking water limit of 0.1 µg/L is considered low over a broad range of vulnerable groundwater situations across Europe.

The first-tier risk assessment for birds resulted in TERs below the Annex VI trigger for the acute scenario in the Northern European GAP and in the long-term scenarios in the Northern and Southern European GAPs. Measured residue values and the focal skylark (*Alauda arvensis*) and yellowhammer (*Motacilla flava*) were agreed by the experts as well as to take into account in the long-term risk assessment that cereals would become not attractive as a food source soon after the first application when stem elongation starts. The suggested refinements of PT, FOCUS based interception factor for residues on weed seeds, reduction of residues in insects due to population growth were rejected in the meeting of experts and further refinement of the long-term risk assessment is required for herbivorous birds and insectiorvorous birds (Northern and Southern Europe).

Algae were the most sensitive group of aquatic organisms driving the aquatic risk assessment. The proposed NOEAEC of 6.8 µg fenpropidin/L was not agreed because long-lasting effects on Chlorophyceae were observed at a concentration of 1.4 µg fenpropidin/L. The meeting agreed on a NOEC of 0.39 µg fenpropidin/L. It was suggested by the meeting of experts that an assessment factor of 1-3 should be applied at Member State level depending on the representativeness of the mesocosm to the local environmental conditions in the agricultural landscape and considering that the endpoint is based on mean measured initial concentrations. With a no spray buffer-zone of 50 metres TERs were >1 in all out of 6 drainage scenarios, but no full scenario was observed with a TER > 3. No run-off scenario resulted in a TER of >1. Predatory mites were the most sensitive group of non-target terrestrial arthropods tested. Extended laboratory studies indicated a high in-field risk but also a potential of recolonisation due to rapid residue decline. The available studies did not cover the off-field exposure rates for *Phytoseilus persimilis*. An in-field no-spray buffer zone of 5 metres is required to achieve a rate low enough to conclude on a low risk to predatory mites based on the available studies. The acute risk to earthworms was assessed as low. The long-term TER for the Northern European use was calculated as 4.6. Since the TER value is not far below the trigger of 5 and the TER is based on very conservative PECsoil calculations (accumulation for 20 years) the experts agreed that the long-term risk to earthworms is low. The risk from the major soil metabolite CGA 289267 was assessed as low. The risk to bees, other soil non-target macro-organisms (collembola), soil non-target micro-organisms, biological methods of sewage treatment was assessed as low for the representative uses in cereals.

Particular conditions proposed to be taken into account to manage the risk(s) identified

- PPE has to be worn to decrease the operator and worker exposure below the AOEL
- Substantial risk mitigation measures are required to protect aquatic organisms. In the drainage scenarios risk mitigation equivalent to no-spray buffer zones of 50 meters would be sufficient to achieve TERs above the trigger of 1. Additional mitigation to this would be required in all drainage situations if a trigger of 3 is chosen. No run-off scenario resulted in a TER > 1 (refer to point 5.2).

Critical areas of concern

- The long-term risk to birds needs to be addressed further.
- A high risk to aquatic organisms.

APPENDIX 1 – LIST OF ENDPOINTS FOR THE ACTIVE SUBSTANCE AND THE REPRESENTATIVE FORMULATION

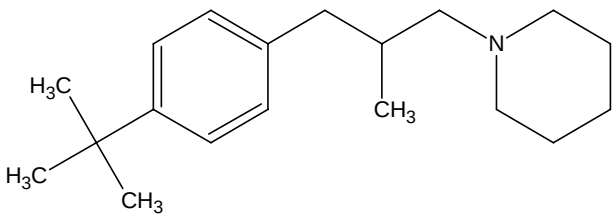
(Abbreviations used in this list are explained in appendix 2)

Appendix 1.1: Identity, Physical and Chemical Properties, Details of Uses, Further Information

Active substance (ISO Common Name) ‡	Fenpropidin
Function (e.g. fungicide)	Fungicide

Rapporteur Member State	Sweden
Co-rapporteur Member State	--

Identity (Annex IIA, point 1)

Chemical name (IUPAC) ‡	(*R*,*S*)-1-[3-(4-tert-butylphenyl)-2-methylpropyl]-piperidine
Chemical name (CA) ‡	1-[3-[4-(1,1-dimethylethyl)phenyl]-2-methylpropyl]-piperidine
CIPAC No ‡	520
CAS No ‡	67306-00-7
EC No (EINECS or ELINCS) ‡	Not allocated
FAO Specification (including year of publication) ‡	No FAO specification available.
Minimum purity of the active substance as manufactured ‡	960 g/kg (racemate)
Identity of relevant impurities (of toxicological, ecotoxicological and/or environmental concern) in the active substance as manufactured	Fenpropidin as manufactured contains no relevant impurities.
Molecular formula ‡	$C_{19}H_{31}N$
Molecular mass ‡	273.5 g/mol
Structural formula ‡	

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Physical and chemical properties (Annex IIA, point 2)

Melting point (state purity) ‡	-64.6°C ± 0.3°C, purity 99.5 %
Boiling point (state purity) ‡	Not relevant at atmospheric pressure as decomposition occurs. 70.2°C at 1.1 Pa, purity 99.3 %
Temperature of decomposition (state purity)	Oxidative decomposition: 93°C-155°C Thermal decomposition: 243°C-288°C (under N_2-atmosphere)
Appearance (state purity) ‡	Pale yellow liquid with a weak-amine like odour, purity 96.7 % Pale yellow liquid with a weak aromatic odour, purity 99.5 %
Vapour pressure (state temperature, state purity) ‡	1.7 $x10^{-2}$ at 25°C (extrapolated) (purity: 99.3%)
Henry's law constant ‡	10.7 at 25°C
Solubility in water (state temperature, state purity and pH) ‡	pH 6.0: 130 g/L (acetate buffer) at 25°C pH 7.0: 0.530 g/L (phosphate buffer) at 25°C pH 9.0: 6.2 mg/L (borax buffer) at 25°C
Solubility in organic solvents ‡ (state temperature, state purity)	>250 g/L at 25°C in all the tested solvents (acetone, dichloromethane, ethyl acetate, hexane, methanol, octanol and toluene).
Surface tension ‡ (state concentration and temperature, state purity)	51.6-52.1 mN/m at 20°C (saturated solution at a pH of approximately 8.6)
Partition co-efficient ‡ (state temperature, pH and purity)	pH 4.2: 0.83 at 25°C pH 7.0: 2.9 at 25°C pH 9.0: 4.5 at 25°C
Dissociation constant (state purity) ‡	10.13 (estimation)
UV/VIS absorption (max.) incl. ε ‡ (state purity, pH)	λ_{max} [nm] Neutral media: 218.2 263.7 Acidic media: 217.9 262.9 Alkaline media: 219.2 263.9 No absorption maxima > 290 nm
Flammability ‡ (state purity)	Flammability: not required since fenpropidin is a liquid. Auto-ignition temperature: 265°C (purity: 96.7%) Flash-point: 156°C (1013 mbar) (purity: 96.7%)
Explosive properties ‡ (state purity)	Not explosive, purity 96.7%
Oxidising properties ‡ (state purity)	Not oxidising, purity 97.0%

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Summary of representative uses evaluated *

Crop and/ or situation (a)	Member State or Country	Product name	F G or I (b)	Pests or Group of pests controlled (c)	Preparation		Application				Application rate per treatment			PHI (days) (m)	Remarks
					Type (d-f)	Conc. of as (i)	method kind (f-h)	growth stage & season (j)	number min/ max (k)	interval between applications (min)	g as/hL min – max (l)	water L/ha min – max	g as/ha min – max (l)		
Cereals	North EU	TERN 750 EC	F	fungi	EC	750 g/L	Spray	BBCH 29-65	1-2	21	188-750	100-400	750	35	[1]
Cereals	South EU	TERN 750 EC	F	fungi	EC	750 g/L	Spray	BBCH 29-65	1-2	21	140-563	100-400	562	28	[1]

[1] The long-term risk to birds is not addressed and needs further refinement. A high risk to aquatic organisms was identified requiring a substantial risk mitigation measures such as a no spray buffer zone of 50 m to achieve TERs above the refined assessment factor.

* For uses where the column "Remarks" is marked in grey further consideration is necessary. Uses should be crossed out when the notifier no longer supports this use(s).
(a) For crops, the EU and Codex classifications (both) should be taken into account; where relevant, the use situation should be described (e.g. fumigation of a structure)
(b) Outdoor or field use (F), greenhouse application (G) or indoor application (I)
(c) *e.g.* biting and suckling insects, soil born insects, foliar fungi, weeds
(d) *e.g.* wettable powder (WP), emulsifiable concentrate (EC), granule (GR)
(e) GCPF Codes - GIFAP Technical Monograph No 2, 1989
(f) All abbreviations used must be explained
(g) Method, e.g. high volume spraying, low volume spraying, spreading, dusting, drench
(h) Kind, *e.g.* overall, broadcast, aerial spraying, row, individual plant, between the plant- type of equipment used must be indicated
(i) g/kg or g/L. Normally the rate should be given for the active substance (according to ISO) and not for the variant in order to compare the rate for same active substances used in different variants (e.g. fluoroxypyr). **In certain cases, where only one variant is synthesised, it is more appropriate to give the rate for the variant (e.g. benthiavalicarb-isopropyl).**
(j) Growth stage at 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
(k) Indicate the minimum and maximum number of application possible under practical conditions of use
(l) The values should be given in g or kg whatever gives the more manageable number (e.g. 200 kg/ha instead of 200 000 g/ha or 12.5 g/ha instead of 0.0125 kg/ha
(m) PHI - minimum pre-harvest interval

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.2: Methods of Analysis

Analytical methods for the active substance (Annex IIA, point 4.1)

Technical as (analytical technique)	GC with flame ionisation detector (FID)
Impurities in technical as (analytical technique)	GC with flame ionisation detector (FID) and HPLC-UV
Plant protection product (analytical technique)	GC with flame ionisation detector (FID)

Analytical methods for residues (Annex IIA, point 4.2)

Residue definitions for monitoring purposes

Food of plant origin		Sum of fenpropidin and its salts
Food of animal origin		Sum of fenpropidin, its salts and CGA 289267, expressed as fenpropidin
Soil		Fenpropidin and its salts
Water	surface	Fenpropidin and its salts
	drinking/ground	Fenpropidin and its salts
Air		Fenpropidin and its salts

Monitoring/Enforcement methods

Food/feed of plant origin (analytical technique and LOQ for methods for monitoring purposes)	Fenpropidin and its salts: LC-MS/MS LOQ: 0.01 mg/kg (wheat grain, wheat straw, oil seed rape (seed), sugar beet (roots), grape (whole fruit), apple (whole fruit)
Food/feed of animal origin (analytical technique and LOQ for methods for monitoring purposes)	Fenpropidin and its salts, CGA 289267[19]: LC-MS/MS LOQ (fenpropidin and its salts and CGA 289267): 0.005 mg/kg (bovine milk) 0.01 mg/kg (bovine muscle, liver, kidney, fat, hen eggs) Fenpropidin and its salts: GC-NPD (Milk, eggs, fat) LOQ: 0.005 mg/kg (milk) 0.01 mg/kg (eggs and fat) Confirmation: GC-MS
Soil (analytical technique and LOQ)	Fenpropidin and its salts: LC-MS/MS LOQ: 0.01 mg/kg

[19] CGA 289267: 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Water (analytical technique and LOQ)	Drinking water: Fenpropidin and its salts: HPLC-UV LOQ 0.05 µg/L; Confirmation: GC-MS Surface water: Fenpropidin and its salts: HPLC-UV(column switching technique) LOQ 0.1 µg/L; Confirmation: GC-MS
Air (analytical technique and LOQ)	Fenpropidin and its salts: LC-MS/MS LOQ: 0.15 ng/L (corresponding to 0.15 µg/m^3)
Body fluids and tissues (analytical technique and LOQ)	Not required (fenpropidin is not classified as toxic or highly toxic)

Classification and proposed labelling with regard to physical and chemical data (Annex IIA, point 10)

	RMS/peer review proposal
Active substance	No classification

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.3: Impact on Human and Animal Health

Absorption, distribution, excretion and metabolism (toxicokinetics) (Annex IIA, point 5.1)

Rate and extent of oral absorption ‡	Oral absorption > 80% (excretion within 48 h, 79% in urine, 12% via bile).
Distribution ‡	Widely distributed
Potential for accumulation ‡	No evidence for accumulation.
Rate and extent of excretion ‡	Rapid and extensive >82% within 48h, mainly via urine (77-86%) within 24h.
Metabolism in animals ‡	Extensively metabolised (>95%) main metabolite 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid; oxidation reactions and sulphate conjugation.
Toxicologically relevant compounds ‡ (animals and plants)	Parent compound, metabolites CGA 289267 and CGA 289268
Toxicologically relevant compounds ‡ (environment)	Parent compound

Acute toxicity (Annex IIA, point 5.2)

Rat LD_{50} oral ‡	1452 mg/kg bw	**R22**
Rat LD_{50} dermal ‡	>4000 mg/kg bw	--
Rat LC_{50} inhalation ‡	1.22 mg/L air /4 h (nose only)	**R20**
Skin irritation ‡	Irritant	**R38**
Eye irritation ‡	Irritant	**R41**
Skin sensitisation ‡	Sensitiser (Maximization, Buehler)	**R43**

Short term toxicity (Annex IIA, point 5.3)

Target / critical effect ‡	Local irritation, body weight, liver (hypertrophy), spinal chord demyelination, corneal opacity.	
Relevant oral NOAEL ‡	1 yr dog 2 mg/kg bw/day 13 week rat 1.14 mg/kg bw/day	
Relevant dermal NOAEL ‡	21 day rabbit: no NOAEL established due to severe irritation.	
Relevant inhalation NOAEL ‡	Study inconclusive for systemic toxicity; local irritation of nose and upper respiratory tract.	**R37**

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Genotoxicity ‡ (Annex IIA, point 5.4)

……..	No genotoxic potential.	

Long term toxicity and carcinogenicity (Annex IIA, point 5.5)

Target/critical effect ‡	Body weight; rats	
Relevant NOAEL ‡	Rat: 2.27 mg/kg bw/day Mouse: 41.9 mg/kg bw/day	
Carcinogenicity ‡	No carcinogenic potential.	

Reproductive toxicity (Annex IIA, point 5.6)

Reproduction toxicity

Reproduction target / critical effect ‡	Parents: decreased body weight Offspring: decreased body weight Reproduction: decreased number of F2 pups delivered and implantations at maternally toxic doses	
Relevant parental NOAEL ‡	8 mg/kg bw/day	
Relevant reproductive NOAEL ‡	18 mg/kg bw/day	
Relevant offspring NOAEL ‡	9 mg/kg bw/day	

Developmental toxicity

Developmental target / critical effect ‡	Rat: neither maternal nor foetal effects observed up to the highest dose tested. Rabbit: Decreased bw gain, decreased litter weight but foetal effects not assessed properly	
Relevant maternal NOAEL ‡	Rat: 90 mg/kg bw/day Rabbit: 12 mg/kg bw/day	
Relevant developmental NOAEL ‡	Rat: 90 mg/kg bw/day Rabbit: 12 mg/kg bw/day	

Neurotoxicity (Annex IIA, point 5.7)

Acute neurotoxicity ‡	No data, no study required	

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Repeated neurotoxicity ‡	Spinal chord demyelination 90 day rat NOAEL: 10.1 mg/kg bw/day 1-year dog NOAEL: 5 mg/kg bw/day	**R48/ 22**
Delayed neurotoxicity ‡	No data, no study required	

Other toxicological studies (Annex IIA, point 5.8)

Mechanism studies ‡	No data, no study required
Studies performed on metabolites or impurities ‡	No data, no study required

Medical data ‡ (Annex IIA, point 5.9)

……..	Limited - no detrimental effects on health in manufacturing personnel (one incident of eye and skin irritations reported) or in a farmer survey of 65 farmers in the UK.

Summary (Annex IIA, point 5.10)	Value	Study	Safety factor
ADI ‡	0.02 mg/kg bw/day	rat, 2-yr study; dog, 1-yr study	100
AOEL ‡	0.02 mg/kg bw/day	dog, 1-yr study	100
ARfD ‡	0.02 mg/kg bw	dog 28-day to 1-yr studies	100

Dermal absorption ‡ (Annex IIIA, point 7.3)

Formulation: TERN 750 EC	Concentrate: 2.5% Spray dilution: 6.4% Rat *in vivo* and comparative *in vitro* (human/rat skin).

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Exposure scenarios (Annex IIIA, point 7.2)

Operator	Field application with highest use rate as worst case: POEM % of AOEL (tractor, 750 g a.s./ha, without PPE) 1856 (tractor, 750 g a.s./ha, PPE=gloves during mixing/loading and application) 311 BBA (tractor, 750 g a.s./ha, without PPE) 206 (tractor, 750 g a.s./ha, PPE= gloves during mixing /loading and coverall and sturdy foot wear during application) 38
Workers	67 % of the AOEL when PPE (gloves) is worn
Bystanders	4.5 % of AOEL

Classification and proposed labelling with regard to toxicological data (Annex IIA, point 10)

	RMS/peer review proposal	
Substance (name)	Xn	Harmful
	Xi	Irritant
	R 20/22	Harmful by inhalation and if swallowed
	R 37/38	Irritating to the respiratory system and skin
	R 41	Risk of serious damage to eyes
	R 43	May cause sensitisation by skin contact
	R 48/22	Harmful: danger of serious damage to health by prolonged exposure if swallowed
Preparation	Xn	Harmful
	Xi	Irritant
	R 20/22	Harmful by inhalation and if swallowed
	R 37	Irritating to the respiratory system
	R 48/22	Harmful: danger of serious damage to health by prolonged exposure if swallowed

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.4: Residues

Metabolism in plants (Annex IIA, point 6.1 and 6.7, Annex IIIA, point 8.1 and 8.6)

Plant groups covered	Cereals (wheat), root vegetables (sugar beet), fruits (grapes, banana). Foliar application.
Rotational crops	Leafy vegetables (lettuce), root vegetables (radish), cereals (spring and winter wheat)
Metabolism in rotational crops similar to metabolism in primary crops?	Yes. No new metabolites were observed.
Processed commodities	Fenpropidin is stable under conditions representative of pasteurisation, baking/brewing/boiling and sterilisation. (96.1 to 97.1% of the applied radioactivity consisted of parent fenpropidin).
Residue pattern in processed commodities similar to residue pattern in raw commodities?	Yes. The nature of fenpropidin residues is not affected by processing.
Plant residue definition for monitoring	Sum of fenpropidin and its salts, expressed as fenpropidin
Plant residue definition for risk assessment	Sum of fenpropidin and its salts, expressed as fenpropidin
Conversion factor (monitoring to risk assessment)	N/A

Metabolism in livestock (Annex IIA, point 6.2 and 6.7, Annex IIIA, point 8.1 and 8.6)

Animals covered	Ruminant (goat), poultry (hen)
Time needed to reach a plateau concentration in milk and eggs	48 hours in milk 72 hours in eggs
Animal residue definition for monitoring	Sum of fenpropidin, its salts and 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid expressed as fenpropidin.
Animal residue definition for risk assessment	Definitions for risk assessment: sum of fenpropidin and its salts, 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid, 3-hydroxy-2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid, 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propan-1-ol and their conjugates expressed as fenpropidin.
Conversion factor (monitoring to risk assessment)	Meat (except poultry meat): 2 Fat (except poultry fat): 3 Liver: 5 Kidney: 4 Milk: 4 Poultry products: 1
Metabolism in rat and ruminant similar (yes/no)	Yes

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Fat soluble residue: (yes/no)	No

Residues in succeeding crops (Annex IIA, point 6.6, Annex IIIA, point 8.5)

……..	Maximum residues of fenpropidin in human food commodities from succeeding crops (lettuce, radish roots) grown in rotation after cereals are not expected to exceed 0.01 mg/kg.

Stability of residues (Annex IIA, point 6 introduction, Annex IIIA, point 8 Introduction)

……..	Wheat grain, wheat straw, grapes, banana and wine: stable at -18°C for at least 24 months. Muscle, liver, kidney, fat: stable at 18°C for at least 3 months. Milk: stable at 18°C for at least 2 months. Blood: stable at 18°C for at least 1 month.

Residues from livestock feeding studies (Annex IIA, point 6.4, Annex IIIA, point 8.3)

	Ruminant:	Poultry:	Pig:
	Conditions of requirement of feeding studies		
Expected intakes by livestock ≥ 0.1 mg/kg diet (dry weight basis) (yes/no - If yes, specify the level)	Yes (4 mg/kg feed)	No	Yes (0.2 mg/kg feed)
Potential for accumulation (yes/no):	No	No	No
Metabolism studies indicate potential level of residues ≥ 0.01 mg/kg in edible tissues (yes/no)	Yes	No	No
	Feeding studies (dairy cattle fed 0.12 mg fenpropidin/kg bw/d) Residue levels in matrices : Mean (max) mg/kg		
Muscle	Fenpropidin and CGA 289267: < 0.01 mg/kg	Feeding study not required	Feeding study not required
Liver	Fenpropidin: 0.02 mg/kg; CGA 289267: 0.09 mg/kg		
Kidney	Fenpropidin: 0.01 mg/kg; CGA 289267: 0.02 mg/kg		

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

	Ruminant:	Poultry:	Pig:
Fat	Fenpropidin and CGA 289267: < 0.01 mg/kg		
Milk	Fenpropidin and CGA 289267: < 0.005 mg/kg		
Eggs		Feeding study not required	

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Summary of residues data according to the representative uses on raw agricultural commodities and feedingstuffs (Annex IIA, point 6.3, Annex IIIA, point 8.2)

Crop	Northern or Mediterranean Region, field or glasshouse, and any other useful information	Trials results relevant to the representative uses (a)	Recommendation/comments	MRL estimated from trials according to the representative use[3]		STMR[4] (b)
				MRL – 1 (R_{max})	MRL – 2 (R_{ber})	
Barley grain	Northern	9 trials: 0.04; <0.05; 0.07; 2x0.08; 2x0.09; 0.11; 0.19 mg/kg	One trial was conducted with an application rate of 0.5625 kg fenpropidin/ha, but within ± 25% of the dosage of 0.75 kg fenpropidin/ha. The second application was made at the growth stage BBCH 55 – 65, i.e. middle of heading and full flowering.	0.22	0.20	0.08
	Southern	No trial available according to the representative GAP	In all trials, the second application was made later than the proposed GAP (between BBCH 71 and 85, i.e. during the development of fruit and ripening stage).	-	-	-
Wheat grain	Northern	6 trials: 0.03; 0.04; 4x<0.05 mg/kg	Two trials were conducted with an application rate of 0.560 kg fenpropidin/ha. The second application was made at the growth stage BBCH 51 – 65, i.e. beginning of heading and full flowering.	0.08	0.10	0.05
	Southern	No trial available according to the representative GAP	In all trials, the second application was made later than the proposed GAP (between BBCH 75 and 88, i.e. during the development of fruit and ripening stage).	-	-	-

(a) Numbers of trials in which particular residue levels were reported e.g. 3 x <0.01, 1 x 0.01, 6 x 0.02, 1 x 0.04, 1 x 0.08, 2 x 0.1, 2 x 0.15, 1 x 0.17
(b) Supervised Trials Median Residue i.e. the median residue level estimated on the basis of supervised trials relating to the representative use
[3] MRL proposal derived from supervised residue trials according to Guidance Document Appendix I. When the MRL is estimated at the LOD this should be annotated by an asterisk after the number.
[4] STMR value from results of supervised residue trials for MRL setting.
MRL - 1: MRL calculated according to Method I (Doc. 7039/VI/95 EN 22/7/1997, Appendix I, Calculation of maximun residue levels and safety intervals).
MRL - 2: MRL calculated according to Method II (Doc. 7039/VI/95 EN 22/7/1997, Appendix I, Calculation of maximun residue levels and safety intervals).

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Consumer risk assessment (Annex IIA, point 6.9, Annex IIIA, point 8.8)[20]

ADI	0.02 mg/kg bw/day
TMDI (% ADI) according to WHO European diet	WHO European regional diet – adult, 60 kg bw: 2.6% (3.2% including conversion factor for animal commodities)
TMDI (% ADI) according to national (to be specified) diets	German model – girl, 13.5 kg bw: 3.7% (5.7% including conversion factor for animal commodities) UK model – adult, 70.1 kg bw: 3.9% (5% including conversion factor for animal commodities) UK model – child, 43.6 kg bw: 4.6% (7% including conversion factor for animal commodities) UK model – toddler, 14.5 kg bw: 9.9% (26% including conversion factor for animal commodities) UK model – infant, 8.7 kg bw: 11.9% (33% including conversion factor for animal commodities) *Note: for UK model, calculations reported in this table include the contribution of 2 commodities at 97.5th percentile of consumption.*
IEDI (WHO European Diet) (% ADI)	Not calculated (TMDI < 100%)
NEDI (specify diet) (% ADI)	Not calculated (ITMDI < 100%)
Factors included in IEDI and NEDI	N/A
ARfD	0.02 mg/kg
IESTI (% ARfD)	--
NESTI (% ARfD) according to national (to be specified) large portion consumption data	Current WHO methodology and UK acute consumption data: Max 8.4% (wheat in toddlers) Max 40% (liver consumption of 6-12 months old children, including conversion factor for animal commodities)
Factors included in IESTI and NESTI	Variability factor of 1 for all considered commodities Processing factor: 4.2 for bran and 1.0 for bread.

[20] To be done on the basis of WHO guidelines and recommendations with the deviations within the EU so far accepted diets.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Processing factors (Annex IIA, point 6.5, Annex IIIA, point 8.4)

Crop/ process/ processed product	Number of studies	Processing factors		Amount transferred (%) (Optional)
		Transfer factor	Yield factor	
Barley – malt	2	1.1		
Barley – wort	2	0.7		
Barley – beer	2	< 0.4		
Wheat – bran	4	4.2		
Wheat – flour (Type 550)	4	0.2		
Wheat – wholemeal flour	4	1.1		
Wheat – wholegrain bread	4	1.0		

Proposed MRLs (Annex IIA, point 6.7, Annex IIIA, point 8.6)

Wheat group (wheat, rye, triticale) – grain[1]	0.1 mg/kg
Barley group (barley, oats) – grain[1]	0.3 mg/kg
Milk	0.01* mg/kg
Bovine meat and bovine fat	0.02* mg/kg
Bovine liver	0.2 mg/kg
Bovine kidney	0.05 mg/kg
Poultry products	0.02* mg/kg

[1]Proposals for cereals are based on the residue data from Northern Europe only.

* LOQ

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.5: Fate and Behaviour in the Environment

Route of degradation (aerobic) in soil (Annex IIA, point 7.1.1.1.1)

Mineralization after 100 days ‡	16-32 % after 90/92 d, 22°C (^{14}C-label in benzylic carbon)
Non-extractable residues after 100 days ‡	8.9-19% after 90/92 d, 22°C (^{14}C-label in benzylic carbon)
Metabolites requiring further consideration ‡ - name and/or code, % of applied (range and maximum)	CGA289267[21] max. 4.6% of AR day 62 at 22°C; max. 10.6% of AR day 184 at 8°C

Route of degradation in soil - Supplemental studies (Annex IIA, point 7.1.1.1.2)

Anaerobic degradation ‡

Mineralization after 100 days	Stable 0.0 % of AR after 59/60 days, 22°C
Non-extractable residues after 100 days	8.1 % of AR after 59/60 days, 22°C
Metabolites that may require further consideration for risk assessment - name and/or code, % of applied (range and maximum)	None

Soil photolysis ‡

Metabolites that may require further consideration for risk assessment - name and/or code, % of applied (range and maximum)	Insignificant
	None

Rate of degradation in soil (Annex IIA, point 7.1.1.2, Annex IIIA, point 9.1.1)

Laboratory studies ‡

Parent	Aerobic conditions						
Soil type	appl. rate, mg/kg	pH	t. °C / % MWHC	DT_{50} /DT_{90} (d)	DT_{50} (d) 20°C pF2/10kPa	St. (r^2)*	Method of calculation
sandy loam	1.4	6.9	22 / 75% 1/3 bar	84 / 278	68	0.98	SFO
sandy loam	10.0	6.9	22 / 75% 1/3 bar	103 / 342	84	0.99	SFO
loam	1.4	7.5	22 / 75% 1/3 bar	58 / 192	49	0.99	SFO
loam	10.0	7.5	22 / 75% 1/3 bar	82 / 271	69	0.998	SFO
sandy loam	0.9	7.4	22 / 40% MWC	98 / 324**	77	0.98	SFO

[21] CGA 289267: 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Soil type	appl. rate, mg/kg	pH	t. °C / % MWHC	DT_{50} /DT_{90} (d)	DT_{50} (d) 20°C pF2/10kPa	St. (r^2)*	Method of calculation
sandy loam	9.4	7.4	22 / 40% MWC	68 / 226	54	0.99	SFO
sandy loam	9.4	7.4	8 / 40% MWC	217 / >275	-	0.96	SFO
sandy loam	9.4	7.4	22 / 20% MWC	165 / >365	-	0.95	SFO
As information is only available on 2 different soils (a loam and a sandy loam) the peer review agreed that for FOCUS modelling assessments utilising laboratory data and calculating fenpropidin concentrations a long DT50 of 76 days (mean of 68 and 84 days replicated experiment except differing application rate sandy loam) should be used. When FOCUS modelling assessments are calculating metabolite concentrations a short DT50 of 59 days (mean of 49 and 69 days replicated experiment except differing application rate loam) should be used.							
CGA 289267	Aerobic conditions						
sandy loam	0.4	7.2	20 / 40% of MWC	9.9 / 33	6.7	0.98	SFO
loam	0.4	7.4	20 / 40% of MWC	9.5 / 32	5.8	0.98	SFO
silt loam	0.4	5.7	20 / 40% of MWC	63 / 209	38	0.99	SFO
Geometric mean				18 / 60	11		
The peer review agreed to use the value of 38 days for FOCUS modelling assessments (and not a geomean value) due to the relatively high variability of the available dataset.							

* Non-linear curve fitting, hence r2 ≠ coefficient of determination but instead fraction of variation explained by model.
** Uncertain value based on extrapolation beyond study termination at day 275 (21% of radioactivity remained).

Field studies ‡

Parent	Aerobic conditions								
Soil type (indicate if bare or cropped soil was used).	Location (country or USA state).	appl. rate kg/ha	pH	Depth (cm)	DT_{50} (d) actual	DT_{90}(d) actual	St. (r^2)*	DT_{50} (d) Norm.	Method of calculation
sandy clay loam	Switzerland	750	7.1	0-5	116	384	0.93		SFO
loam	Switzerland	750	6.4	0-5	47	10712**	0.97		FOMC***
loam	Switzerland	1500	7.8	0-5	24	79	0.97		SFO
silt loam	Switzerland	1500	8.0	0-5	7	22	0.997		SFO
loam	Germany	844	5.8	0-10	94	312**	0.89		SFO
sandy loam	Switzerland	750	7.8	0-10	7	217	0.97		FOMC****
Geometric mean/median									

* Non-linear curve fitting, hence r2 ≠ coefficient of determination but instead fraction of variation explained by model.
** These two values are highly uncertain since 30-40% of the day 0 concentrations were measured on the last sampling day.
*** alpha=0.302 and beta=5.263.
**** alpha=0.502 and beta=2.214.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

pH dependence ‡ (yes / no) (if yes type of dependence)	No
Soil accumulation and plateau concentration ‡	No accumulation in soil indicated in three-year study in UK (two different soils) with 2-3 application made per season. However, these results are only indicative since no field dissipation study was carried out at these UK sites. It is therefore uncertain if the UK sites were sufficiently worst-case with regard to dissipation rate. See box "PECsoil Plateau concentration".

Soil adsorption/desorption (Annex IIA, point 7.1.2)

Parent ‡							
Soil Type	OC %	Soil pH	Kd (mL/g)	Koc (mL/g)	Kf (mL/g)	Kfoc (mL/g)	1/n
sandy clay loam	1.9	7.2	-	-	40.3	2105	0.80
sandy clay loam	2.2	7.3	-	-	117.1	5313	0.72
loamy sand	0.46	7.8	-	-	24.1	5194	0.56
sand	0.52	6.6	-	-	17.4	3333	0.72
sand	2.9	6.9	-	-	64.2	2214	0.74
sandy loam	0.93	5.6	-	-	43.5	4687	0.74
Arithmetic mean					51.1	3808	0.71
pH dependence, Yes or No			No				

CGA 289267 ‡							
Soil Type	OC %	Soil pH	Kd (mL/g)	Koc (mL/g)	Kf (mL/g)	Kfoc (mL/g)	1/n
loamy sand	2.2	5.7	1.7	79	1.5	70	0.92
loam	1.3	7.4	0.8	59	0.7	54	0.92
silty clay loam	1.2	6.6	3.7	316	4.2	363	0.91
sandy loam	1.2	7.2	0.4	36	0.61	51	0.98
silt loam	2.1	5.7	4.7	224	4.1	196	0.92
Arithmetic mean/median					2.2	147	0.93
pH dependence (yes or no)			No				

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Mobility in soil (Annex IIA, point 7.1.3, Annex IIIA, point 9.1.2)

Column leaching ‡	Study 1 4 soils Elution: 200 mm + 308 mm. Time period: Elution over 5-120 h. Leachate: 0-0.9% of AR measured in first eluate (393 ml); 0.5-2.1% of AR measured in total eluate (997 ml). ≥ 95.6% of AR retained in top 6 cm.
	Study 2 3 soils Elution: 200 mm. Time period: Elution over 2 days. Leachate: 0.1-0.5% of AR in eluate (393 ml). No fenpropidin identified in eluate. Radioactivity is soil segments not analysed.
Aged residues leaching ‡	Study 1 2 soils Aged for: 30 days. Elution: 508 mm. Time period: Elution over 168-275 h. Soil residue pre-leaching: 87 and 90% fenpropidin in each soil, respectively. Leaching: 0.3-0.8% of AR in eluate (997 ml). ≥ 92.6% of AR retained in top 6 cm.
	Study 2 1 soil Aged for: 194 days. Elution: 200 mm. Time period: 2 days. Soil residue pre-leaching: 56% fenpropidin, 26% CGA 289267, 2.6% polar metabolites, 0.9% un-known, 14% non-extractable. Leaching: 7.7% of AR. 5.9% as CGA 289267 (major part, up to 4.9% was identified as bound to small soil components) and the rest (1.8%) unknown polar metabolites and/or CGA 289267 bound to soil components.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Lysimeter/ field leaching studies ‡	Location: Two monoliths (no. 7 and 9) collected near Hannover moved to test facility in Switzerland. Surface area 1 m^2, depth 1.20 m. Soil properties (0-30 cm): Sandy loam, pH 5.7, 1.5% OC, 20-34% field capacity. Date of appl.: 22 May 1990. Application rate: 750 g a.s./ha Crop: Summer wheat (sown April 1990); winter rape (Sept., 1990); Winter barley (Sept., 1991). Duration: Until May 1992, i.e. 2 years after appl. Total rainfall: 1046 mm (May 1990-April 1991) and 962 mm (May 1991-May 1992), irrigation included. Leachate: 403/407 litre year 1; 464/490 litre year 2. Leachate, Lysimeter 7: 0.20% of AR (after stripping $^{14}CO_2$ off). >0.1 µg/L parent eqv./L at all sampling points from Sept. 1990 and onwards. Max. conc. 0.24 µg parent eqv./L (day 213). Annual average: 0.14 µg parent eqv./L both years. Average over 2 years: 0.16 µg parent eqv./L. Leachate, Lysimeter 9: 0.18% of AR (after stripping $^{14}CO_2$ off). >0.1 µg/L parent eqv./L at all sampling points from Sept. 1990 and onwards (exception sampling day 687). Max. conc. 0.23 µg parent eqv./L (day 213). Annual average: 0.13 and 0.12 µg parent eqv./L year 1 and 2, respectively. Average over 2 years: 0.13 µg parent eqv./L. None of the reference compounds were identified in the leachates. Leached radioactivity consisted of at least two different metabolite fractions, probably polar in nature. After 2 years 34-37% of AR was identified in lysimeter soil, mainly in top 10 cm. In the soil fenpropidin was identified as 14-15% of the AR. Up to 6 metabolite fractions identified in soil, each one as max. 3.9% of AR.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC (soil) (Annex IIIA, point 9.1.3)

Parent	
Method of calculation	DT_{50} 116 days (SFO), field. For plateau PECs field DT_{90}: 10712 days (FOMC, alpha =0.302, beta=5.263).
Application data	Winter cereals. Mixing depth 0-5 cm, density 1.5 g/cm^3. 50% crop interception at 1st application, 90% at 2nd. Single and two appl. of 750 g a.s./ha (21 days interval).

$PEC_{(s)}$ (mg/kg)		Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial		0.50		0.54	
Short term	24h	0.50	0.50	0.54	0.54
	2d	0.49	0.50	0.53	0.54
	4d	0.49	0.49	0.53	0.53
Long term	7d	0.48	0.49	0.52	0.53
	28d	0.42	0.46	0.46	0.50
	50d	0.37	0.43	0.40	0.47
	100d	0.28	0.38	0.30	0.41

Plateau concentration	2.15 mg/kg (upper part of "saw teeth" curve) after 20 years (0-5 cm). 1.58 mg/kg (upper part of "saw teeth" curve) after 10 years (0-5 cm). Note: plateau PECs was not yet reached after 20 years but calculated values are conservative since cultivation (mixing with deeper layers), crop rotation and possible restrictions in use to avoid resistance was not accounted for.*

* These plateau PECsoil were calculated at the expert meeting. Degradation of remaining portion from each previous year was calculated separately (*i.e.*, remaining portion was *not* added to concentration from each new application and therefore did not restart a faster degradation).

Metabolite CGA 289267	
Method of calculation	Worst-case assumption: CGA 289267 will be present as 10.6% (result from d 184 in study at 8ºC) of the parent worst-case PECsoil (0.54 mg/kg). Mol. weight: 303.4.
Application data	Winter cereals, two appl. of 750 g fenpropidin/ha. Mixing depth 0-5 cm, density 1.5 g/cm^3.

$PEC_{(s)}$ (mg/kg)	Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial	-		0.06	

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Route and rate of degradation in water (Annex IIA, point 7.2.1)

Hydrolytic degradation of the active substance and metabolites > 10 % ‡	Stable at pH 3, 7 and 9 at 50°C
Photolytic degradation of active substance and metabolites above 10 % ‡	Insignificant
Quantum yield of direct phototransformation in water at Σ > 290 nm	Not relevant since there is no absorption maxima at wavelength > 290 nm.
Readily biodegradable ‡ (yes/no)	No

Degradation in water / sediment

Parent	Distribution (Max in water 81.5-83.9% day 0; Max. in sed 54.6-58.4% after 14 d)									
Water / sediment system	pH water phase	pH sed	t. °C	DT_{50}-DT_{90} whole sys.	St. (r^2)	DT_{50}-DT_{90} water	St. (r^2)	DT_{50}-DT_{90} sed	St. (r^2)	Method of calculation
River	8.1	8.0	25	45 / > 84	0.89	0.7 / 64	1.0	-	-	SFO/FOMC
Pond	8.6	7.4	25	23 / 77	0.97	3 /10	0.996	-	-	SFO
Geometric mean				32 / --		1.4 / 25		-		
Arithmetic mean				34 / --		1.8 / 37				

Mineralization and non extractable residues					
Water / sediment system	pH water phase	pH sed	Mineralization x % after n d. (end of the study).	Non-extractable residues in sed. max x % after n d	Non-extractable residues in sed. max x % after n d (end of the study)
River	8.1	8.0	10.9% after 84 d	9.7% day 14	7.6% after 84 d
Pond	8.6	7.4	60.1% after 84 d	20.6% day 14	8.4% after 84 d

CGA 289267	Distribution: Max in water 12.9% d 28 in pond system, 14.3% d 70 in river system; Max. in sed 2.3% d 70 in pond systen, 1.8% d 70 in river system. $DT_{50/90}$ for metabolite not established due to few sampling points after peak (river system) or variation in concentrations after peak (pond system). No other metabolites identified as >10% of AR.

* Non-linear curve fitting, hence r2 ≠ coefficient of determination but instead fraction of variation explained by model.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC (surface water) and PEC sediment (Annex IIIA, point 9.2.3)

Parent Parameters used in FOCUSsw Step 2	DT_{50} soil 67 d, DT_{50} water 43 d, DT_{50} sed. 28 d. Koc 3808 Water solubility 530 mg/L (pH 7)
Application rate in FOCUSsw Step 2	1 and 2 appl. of 750 g a.s./ha (21 d interval) to winter cereals in March-May. Max. appl. rate in Northern EU. Average crop cover 50%. 90th %-ile spray drift for one appl., 82nd %-ile spray drift for two appl.
Main routes of entry FOCUSsw Step 2:	22% via spray drift (distance 1 m) 78% via run-off/drainage
Parameters used in FOCUSsw Step 3	DT_{50} soil 84 d (at 20 ^{o}C) DT_{50} water 999 d and DT_{50} sed. 32 d (at 25 ^{o}C) Koc 3808, 1/n 0.75 Mol. weight: 273.5 Water solubility 530 mg/L (pH 7)
Application rate in FOCUSsw Step 3	1 and 2 appl. of 750 g a.s./ha (21 d interval) to winter cereals. Max. appl. rate in Northern EU. Appl. between 29 Feb. and 26 April. Scenario R2 excluded (does not include winter cereals).
Parameters used in FOCUSsw Step 4	As in Step 3.
Application rate in FOCUSsw Step 4	50 m untreated buffer zone introduced to reduce spray drift accordingly. Otherwise as in Step 3.

FOCUS STEP 2 Scenario	Day after overall maximum	One application		Two applications	
		PECsw µg/L	PECsed µg/kg	PECsw µg/L	PECsed µg/kg
	0 h	6.9	187	9.23*	323*
	24 h	3.00	185	8.47	320
	2 d	1.92	181	8.28	312
	4 d	5.43	173	7.90	298
	7 d	4.68	161	7.37	278
	14 d	3.98	137	6.26	236
	21 d	3.38	116	5.31	201
	28 d	2.87	98.6	4.51	170
	42 d	2.07	71.2	3.26	123

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

FOCUS STEP 2 Scenario	Day after overall maximum	One application		Two applications	
		PECsw µg/L	PECsed µg/kg	PECsw µg/L	PECsed µg/kg
	50 d	1.72	59.0	2.70	102
	100 d	0.53	18.4	0.84	31.8

* Max. PECsw and PECsed occurring on day 25, i.e. 4 days after the 2nd application when loading from run-off and drainage is added to the system.

FOCUS STEP 3 Scenario	Water body	PEC_{SW} (µg/L)		PEC_{SED} (µg/kg)
		Global max. (= initial)	2-day TWA	Global max. (= initial)
D1	Ditch	4.68*	not used for	5.31
D1	Stream	3.18*	risk assessment	0.151
D2	Ditch	4.76*		16.3
D2	Stream	4.18*		12.4*
D3	Ditch	4.69*		3.97
D4	Pond	0.16*		2.64
D4	Stream	3.82*		0.280
D5	Pond	0.18		2.64
D5	Stream	3.69*		0.156
D6	Ditch	4.70*		13.4
R1	Pond	0.214		4.49
R1	Stream	3.10*		18.5
R3	Stream	4.35*		14.7
R4	Stream	3.09*		22.1

* Depending on percentage spray-drift the highest global maximum was sometimes obtained in scenario with one application, sometimes in scenario with two applications. The table above shows the highest global max. PECsw and PECsed regardless of number of applications. Values marked with "*" were obtained in scenario with only one application.

FOCUS STEP 4 Scenario with a 50 m no spray buffer zone	Water body	PEC_{SW} (µg/L)	
		Global max. (= initial)	2-day TWA
D1	Ditch	0.142*	Not used for
D1	Stream	0.131*	risk assessment
D2	Ditch	0.145*	
D2	Stream	0.172*	

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

FOCUS STEP 4 Scenario with a 50 m no spray buffer zone	Water body	PEC_{SW} (µg/L)	
		Global max. (= initial)	2-day TWA
D3	Ditch	0.143*	
D4	Pond	0.034*	
D4	Stream	0.157*	
D5	Pond	0.036	
D5	Stream	0.152*	
D6	Ditch	0.143*	
R1	Pond	0.173	
R1	Stream	1.31	
R3	Stream	1.49	
R4	Stream	2.53	

* Depending on percentage spray-drift the highest global maximum was sometimes obtained in scenario calculated with one application, sometimes in scenario with two applications. The table above shows the highest global max. PECsw regardless of number of applications. Values marked with "*" were obtained in scenario with only one application.

Metabolite CGA 289267 Parameters used in FOCUSsw Step 3	DT_{50} soil 0.01 d (to restrict loading to spray drift events since CGA 289267 was a major metabolite in water/sed, not in soil). DT_{50} water 43 d, DT_{50} sed. 43 d Koc 147, 1/n 0.90 Water solubility 8000 mg/L pH 7
Application rate	Two appl. of 134 g/ha (21 d interval) to reflect max. amount found in water/sediment study (16.1%) and molecular weight (303.5). Appl. between 1 March and 24 May.
FOCUS STEP 3, PECsw (µg/L)	0.752 µg/L, highest global maximum, obtained in D2 ditch scenario. Additional results not needed for risk assessment.

PEC (ground water) (Annex IIIA, point 9.2.1)

Method of calculation and type of study (*e.g.* modelling, field leaching, lysimeter)	FOCUS PELMO (ver. 3.3.2). Fenpropidin: DT_{50} soil 67 days, Koc 3808, 1/n 0.74. CGA289267: DT_{50} soil 17 days, Koc 147, 1/n 0.93. Formation fraction: 0.28.
Application rate	Winter cereals. 2 x 750 g a.s./ha (N EU); 2 x 562 g a.s./ha (S EU). Appl. at 1 and 22 May (N EU); 1 and 22 April (S EU). 50% crop interception at 1st appl., 70% at 2nd.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC(gw) - FOCUS modelling results (80th percentile annual average concentration at 1m)

80th percentile annual average concentrations at 1 m depth from 20 years simulation were < 0.001 µg/L for fenpropidin in all nine FOCUS scenarios.

Method of calculation and type of study (e.g. modelling, field leaching, lysimeter)	FOCUS PELMO (3.3.2) and FOCUS PEARL (3.3.3). Scenarios: All 9 FOCUS scenarios. Crop: Winter wheat. DT_{50} soil: Fenpropidin 49 days (20°, pF2, shortest value[22]); CGA289267 38 days (20°, pF2, longest value). $K_F oc$: Fenpropidin 3808 L/kg, 1/n 0.71 (mean values); CGA 289267 147 L/kg, 1/n 0.93 (mean values). K_{FOM}: Fenpropidin 2209 L/kg (mean); CGA 289267 85.3 L/kg (mean). Formation fraction CGA 289267: 0.28.
Application rate	2 x 750 g a.s./ha (N EU); 2 x 562 g a.s./ha (S EU). Appl. at 1 and 22 May (N EU); 1 and 22 April (S EU). 50% crop interception at 1st appl., 70% at 2nd.

PEC(gw) - FOCUS modelling results (80th percentile annual average concentration at 1m)

	Scenario	Parent (µg/L)	Metabolite (µg/L)		
			CGA 289267	2	3
PELMO/Winter wheat	Châteaudun	<0.001	<0.001		
	Hamburg	<0.001	0.011		
	Jokioinen	<0.001	0.001		
	Kremsmünster	<0.001	0.004		
	Okehampton	<0.001	0.014		
	Piacenza	<0.001	0.024		
	Porto	<0.001	<0.001		
	Sevilla	<0.001	<0.001		
	Thiva	<0.001	<0.001		

[22] Though the use of the slightly less conservative value of 59 days (mean of 49 and 69 days for the loam soil) would have been appropriate as agreed by the experts at the experts' meeting.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

	Scenario	Parent (µg/L)	Metabolite (µg/L)		
			CGA 289267	2	3
PEARL/Winter wheat	Châteaudun	<0.001	0.002		
	Hamburg	<0.001	0.039		
	Jokioinen	<0.001	0.003		
	Kremsmünster	<0.001	0.027		
	Okehampton	<0.001	0.047		
	Piacenza	<0.001	0.055		
	Porto	<0.001	<0.001		
	Sevilla	<0.001	<0.001		
	Thiva	<0.001	<0.001		

$PEC_{(gw)}$ From lysimeter / field studies

Parent / meatbolite	1st year	2nd year	3rd year
Not available, not required			

Fate and behaviour in air (Annex IIA, point 7.2.2, Annex III, point 9.3)

Direct photolysis in air ‡	Not study submitted, not required.
Quantum yield of direct phototransformation	Not study submitted, not required.
Photochemical oxidative degradation in air ‡	DT_{50} about 1 h (estimated; 1.5 x 10^6 OH-radicals/cm^3 and a 12-hour day length assumed, and the rate constant was calculated to 112.8567 x 10^{-12} cm^3/molecule-sec).
Volatilisation ‡	Volatilization chamber (0.003 and 1.0 m/sec., 20°C): ≤1.9% (24 h) volatilisation from soil at low wind speed; ≤9.0% at high wind speed. Volatilization chamber (1.0-1.1 m/sec., 20-21°C): 25% (24 h) volatilisation from soil; 80% from plants; calculated overall volatilisation 37%. The results above represent indirect measurements of volatilisation as loss from treated material. Only the neutral form of fenpropidin is potentially volatile. pKa is 10.1 and at environmentally relevant pH fenpropidin will predominantly be present in protonated, non-volatile form. The EC formulation has pH 9.9 and thus proportion of neutral and more volatile form of fenpropidin may be relatively high in the spray tank. Fenpropidin may

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

	therefore be potentially volatile during spray events. National risk assessments may need to consider re-deposition of fenpropidin from volatilised residue to off crop areas (including surface water) that may occur during / shortly after spraying.
Metabolites	Not study submitted, not required.

PEC (air)

Method of calculation	Not calculated.

$PEC_{(a)}$

Maximum concentration	Not calculated.

Residues requiring further assessment

Environmental occurring metabolite requiring further assessment by other disciplines (toxicology and ecotoxicology).	Soil: Fenpropidin and CGA 289267. Groundwater: Fenpropidin and CGA 289267. Surface water: Fenpropidin, CGA 289267. Sediment: Fenpropidin. Air: Fenpropidin .

Monitoring data, if available (Annex IIA, point 7.4)

Soil (indicate location and type of study)	Not submitted, not required.
Rain water (indicate location and type of study)	Not submitted, not required.
Surface water (indicate location and type of study)	Not submitted, not required.
Ground water (indicate location and type of study)	Not submitted, not required.
Air (indicate location and type of study)	Not submitted, not required.

Points pertinent to the classification and proposed labelling with regard to fate and behaviour data

Not readily biodegradable and no evidence of degradation >70% within a 28-day period. Candidate for R53.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.6: Effects on non-target Species

Effects on terrestrial vertebrates (Annex IIA, point 8.1, Annex IIIA, points 10.1 and 10.3)

Species	Test substance	Time scale	End point (mg/kg bw/day)	End point (mg/kg feed)
Birds ‡				
Mallard duck (*A. platyrhynchos*)	Fenpropidin	Acute	LD_{50} 1899	-
Pheasant (*P. colchicus*)	Fenpropidin	Acute	LD_{50} 369	-
Bobwhite quail (*C. virginianus*)	TERN 750 EC	Acute	LD_{50} 568 (431 mg a.s./kg bw/d)	-
Bobwhite quail (*C. virginianus*)	Fenpropidin	Short-term	LD_{50} > 1417	LC_{50} > 6594
Mallard duck (*A. platyrhynchos*)	Fenpropidin	Short-term	(~~LD_{50} 542~~)*	LC_{50} 3762
Bobwhite quail (*C. virginianus*)	Fenpropidin	Long-term	NOAEL 14.6	NOAEC 180
Mammals ‡				
Rat	Fenpropidin	Acute	LD_{50} 1452	-
Rat	Fenpropidin	Short/long-term	NOAEL 60.25	NOAEL 500
Additional higher tier studies ‡				
No further studies required.				

* Exact figure not considered reliable but RA based on LD_{50} considered sufficiently robust.

Toxicity/exposure ratios for terrestrial vertebrates (Annex IIIA, points 10.1 and 10.3)

Winter cereals, 0.75 kg a.s./ha (N EU). 1st appl. at the end of tillering and 2nd appl. at the end of flowering. 1st appl. represented by "early" scenario, 2nd by "late" scenario when grazing of crop is unlikely. Therefore, for herbivores a single application was assumed. A single application was assumed also for insectivores since no accumulation of residues in insects is assumed (both "early" and "late" scenarios covered by single application scenario).

Indicator species/Category	Time scale	ETE	TER	Annex VI Trigger
Tier 1 (Birds)				
Large herbivore / early	Acute	46.86	**7.9**	10
Small insectivore / early/late	Acute	40.56	**9.1**	10
Large herbivore / early	Short-term	25.08	21.6	10

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Indicator species/Category	Time scale	ETE	TER	Annex VI Trigger
Small insectivore / early/late	Short-term	22.62	24.0	10
Large herbivore / early	Long-term	13.29	**1.1**	5
Small insectivore / early/late	Long-term	22.62	**0.65**	5
Earthworm-eating bird	Long-term	0.118[1]	124	5
Earthworm-eating bird	Long-term	0.200-0.273[9]	53-73	5
Fish-eating bird	Long-term	0.315[2]	46	5
Exposure via drinking water	Acute	405-101[8]	**0.9-3.6**[8]	10
Higher tier refinement (Birds)				
Large herbivore / early	Acute	7.96[3]	46.3	10
Yellowhammer / early/late	Acute	27.7[5]	13	10
Large herbivore / early	Long-term	3.42[4]	**4.3**	5
Skylark / early/late	Long-term	5.08[6]	**2.9**	5
Yellowhammer/ early/late	Long-term	5.10[7]	**2.9**	5
Tier 1 (Mammals)				
Small herbivore / early	Acute	148.04	**9.8**	10
Small insectivore / late	Acute	6.62	219	10
Small herbivore / early	Long-term	42.0	**1.4**	5
Small insectivore / late	Long-term	2.41	25	5
Earthworm-eating mammal	Long-term	0.150[1]	402	5
Earthworm-eating mammal	Long-term	0.255-0.347[9]	174-236	5
Fish-eating mammal	Long-term	0.195[2]	309	5
Exposure via drinking water	Acute	216-54[8]	**6.7**-27[8]	10
Higher tier refinement (Mammals)				
Small herbivore / early	Acute	25.16[3]	58	10
Small herbivore / early	Long-term	10.8[4]	5.6	5

[1] ETE_{worm}, based on max. initial PECsoil from annual use and estimated BCF in earthworms.
[2] PEC_{fish} based on max. initial PECsw in FOCUS Step 2 and measured BCF in fish.
[3] Based on initial max. measured residues 18.1 mg/kg residue in cereals (winter wheat).
[4] Based on initial max. measured residues 18.1 mg/kg residue in cereals (winter wheat) and decline of residues DT_{50} 9.0 days (f_{TWA} 0.5). Due to development of crop into "late" growth stage exposure assumed to be limited to 2 weeks (see addendum). PT=1.
[5] Yellowhammer (31 g) assumed to feed 100% on small insects (90th %-ile RUD 52).
[6] Skylark (38 g) assumed mixed diet: 44% seeds (weed seeds, mean RUD 40), 30% leaves (grasses & cereal shoots), 26% invertebrates (large insects, mean RUD 5.1). For grasses and cereal shoots initial max. measured residues 18.1 mg/kg residue in cereals (winter wheat) and decline of residues DT_{50} 9.0 days (f_{TWA} 0.5) was used. PT=1.
[7] Yellowhammer (31 g) assumed mixed diet: 65% seeds (weed seeds, mean RUD 40), 35% invertebrates (50% small insects mean RUD 29, 50% large insects mean RUD 5.1). PT=1.
[8] ETE and TER depend on water volume used per hectare (100 or 400 L/ha).

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

[9] ETEworm, based on max. accumulated PECsoil from 10-20 ~~5~~ years of consecutive use (upper part of saw tooth curve) and minimal tillage (0-5 cm), and estimated BCF in earthworms.

Winter cereals, 0.562 kg a.s./ha (S EU). 1st appl. at the end of tillering and 2nd appl. at the end of flowering. 1st appl. represented by "early" scenario, 2nd by "late" scenario when grazing of crop is unlikely. Therefore, for herbivores a single application was assumed. A single application was assumed also for insectivores since no accumulation of residues in insects is assumed (both "early" and "late" secenarios covered by single application scenario).

Indicator species/Category	Time scale	ETE mg/kg bw/d	TER	Annex VI Trigger
Tier 1 (Birds)				
Large herbivore / early	Acute	35.1	10.5	10
Small insectivore / early/late	Acute	30.4	12.1	10
Large herbivore / early	Short-term	18.8	28.8	10
Small insectivore / early/late	Short-term	16.9	32.1	10
Large herbivore / early	Long-term	9.96	**1.5**	5
Small insectivore / early/late	Long-term	16.9	**0.86**	5
Exposure via drinking water	Acute	303-76[1]	**1.2-4.9**[1]	10
Tier 1 (Mammals)				
Small herbivore / early	Acute	110.9	13	10
Small insectivore / late	Acute	4.96	292	10
Small herbivore / early	Long-term	31.47	**1.9**	5
Small insectivore / late	Long-term	1.81	33	5
Exposure via drinking water	Acute	162-40[1]	**9.0**-36[1]	10

[1] ETE and TER depend on water volume used per hectare (100 or 400 L/ha).

Toxicity data for aquatic species (most sensitive species of each group) (Annex IIA, point 8.2, Annex IIIA, point 10.2)

Group	Test substance	Time-scale (Test type)	Endpoint	Toxicity[1] (mg/L)
Laboratory tests				
Fish				
Bluegill sunfish (*L. macochirus*)	Fenpropidin	96 h flow-through	Mortality, LC_{50}	1.9 (meas)
Rainbow trout (*S. gairdneri*)	Fenpropidin	96 h flow-through	Mortality, LC_{50}	2.6 (meas)

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Group	Test substance	Time-scale (Test type)	Endpoint	Toxicity[1] (mg/L)
Mirror carp (*C. carpio*)	Fenpropidin	96 h flow-through	Mortality, LC_{50}	3.6 (meas)
Rainbow trout (*O. mykiss*)	CGA 289267[23]	96 h static	Mortality, LC_{50}	>100 (nom)
Rainbow trout (*S. gairdneri*)	Fenpropidin	21 d flow-through	Mortality, growth, behaviour, NOEC	0.32 (nom)
Aquatic invertebrate				
Daphnia magna	Fenpropidin	48 h static	Immobility, EC_{50}	0.54 (meas)
Daphnia magna	CGA 289267	48 h static	Immobility, EC_{50}	>100 (nom)
Daphnia magna	Fenpropidin	21 d semi-static	Mortality, reproduction, NOEC	0.32 (nom)
Sediment dwelling organisms				
Chironomus riparius	Fenpropidin	28 d static	Emergence and development rate, NOEC	1.0 (nom)[2]
Chironomus riparius	Fenpropidin	28 d static	Emergence and development rate, NOEC	40 mg/kg (nom)[3]
Algae				
Scenedesmus subspicatus	Fenpropidin	96 h static	Growth inhibition, E_bC_{50}	0.0057 (nom)
Navicula pelliculosa	Fenpropidin	96 h static	Growth inhibition, E_bC_{50}	0.0008-0.002 (nom)
Scenedesmus subspicatus	CGA 289267	72 h static	Growth inhibition, E_bC_{50}	31 (nom)
Selenastrum capricornatum	TERN 750 EC	72 h static	Growth inhibition, E_bC_{50}	0.00032 (nom) 0.00026 mg a.s./L
Scenedesmus subspicatus	TERN 750 EC	72 static	Growth inhibition, E_bC_{50}	0.00020 (nom) **0.00016 mg a.s./L**
Higher tier tests				
Two micro/mesocosm studies were submitted, both mainly addressing effects on algae as the most sensitive group of organisms. One of the studies is proposed to be used for risk assessment (see below).				

[1] indicate whether based on nominal (nom) or mean measured concentrations (meas). In the case of preparations indicate whether endpoints are presented as units of preparation or a.s.
[2] "Spiked-water" test system.
[3] "Spiked-sediment" test system.

[23] CGA 289267: 2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Mesocosm tests					
Size: 6 m length, 6 m width, height 1.5 m in deep water zone, 0.5 m in shallow water zone. Test concentrations:					
Nominal conc. TERN 750 EC, µg/L:	0.29	1.17	4.69	18.75	75
Nominal conc. µg a.s./L:	0.23	0.95	3.8	15.2	60.8
Mean measured conc. TERN 750 EC, µg/L:	0.13	0.475[24]	1.7	8.4	63.8
Mean measured conc. µg a.s./L:	0.11	0.39[24]	1.4	6.8	52

Two applications were done (over-spray Knapsack sprayer) on 25 April and 9 May (14 d interval).

Location Switzerland.

Three mesocosms as controls, one mesocosm for highest test conc., two replicates for other test concentrations.

Duration: 25 weeks after 1st application (until October).

No treatment related effects on phys/chem parameters (pH, oxygen saturation, conductivity).

Chlorophyll a: Significant depression at 1.4 µg a.s./L* and higher conc. d 14-56 (clear dose-response d 21-28)**.

Total phytoplankton: Treatment related effect on abundance at 1.4 µg a.s./L and higher conc. Recovery by d 56. Treatment related effects on species diversity at 1.4 µg a.s./L and higher conc. after the 2nd appl. with recovery close to control by d 98 except possibly at the highest test conc. Significant increase in diversity at 6.8 µg a.s./L and higher conc. explained by reduction of dominant species. Days 56-70 the diversity decreased significantly in these two groups. By d 98 diversity was similar in all groups.

Chlorophyceae: Decrease in abundance d 14-70, during d 14-56 statistically significant deviation at 1.4 µg a.s./L and higher conc. Two dominant species were further evaluated: *Crucigeniella rectangularis* was significantly depressed from d 14 at 0.39 µg a.s./L and higher. Recovery in all groups by d 84 except the highest one which significantly deviated d 112-175. At 1.4 µg/L recovery was indicated by 70 days after 1st application. *Tetraedron minimum*: No treatment related effects observed.

Cryptophyceae: Effect on abundance at 1.4 µg a.s./L and higher. At 6.8 µg/L recovery was observed after d 56 and almost comparable densities in all treatment groups at study termination. Effects could be attributed to effects on *Cryptomonas ovata* and *C. erosa*.

No other treatment related effects were observed for other phytoplankton classes (Bacillariophyceae, Cyanophyceae and Conjungatophyceae) in part due to low abundance; at least diatoms showed an apparent depression d 14-21 at the highest test conc. with recovery by d 28. (In the microcosm study not used for risk assessment Cryptophyceae and one species of green algae were most sensitive, and at the next higher dose level, diatoms. Since Cryptophyceae and species of green algae were the most sensitive taxa also in the study summarised above, the NOEAEC proposed below is expected to be protective also for diatoms.)

No treatment related effects were observed on Periphyton (total number, abundance of major classes, or community similarities); Macrophytes; Zooplankton (total abundance or abundance at class level); Bentic macroinvertebrates (total number or selected species: Chironomidae larvae and Gastropoda); Emergent insects (adult Chironomidae dominant); Fish (growth, gonadosomatic index).

Uncertainty regarding the lack of observable effects on zooplankton; possibly due to presence of fish and/or

[24] The level 0.39 µg a.s./L was erroneously reported as 0.14 µg/L in addendum B.9 and report from PRAPeR meeting because of a mis-calculation of the mean measured peak concentration. The value 0.475 µg formulation/L was erroneously reported as 0.175 µg/L in the addendum B.9.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

large variation. Proposed NOEC: 0.39 µg/L based on phytoplankton effects and long time to recovery within phytoplankton community and uncertainty regarding possible effects on zooplankton. NOEC conservative since based on mean measured concentrations instead of nominal. Safety assessment of 1-3 proposed (to be decided by Member States).

* Test concentrations refer to measured a.s./L day 0 and 14 (i.e. at days of application).
** Days refer to days after the first application.

Toxicity/exposure ratios for the most sensitive aquatic organisms (Annex IIIA, point 10.2)

FOCUS Step 2

Winter cereals, initial max. PECsw and PECsed resulting from 2 x 750 g a.s./ha (21 d interval) in March-May (growth stage BBCH 29 and 65). Max. appl. rate in Northern EU. TER values shown in bold are less than the relevant Annex VI trigger value.

Test substance	Organism	Toxicity endpoint, mg a.s./L	Time scale	PEC µg/L	TER	Annex VI Trigger
Fenpropidin	Fish	LC_{50} 1.93	96 hour	9.23	209	100
Fenpropidin	Fish	NOEC 0.32	21 day	9.23	35	10
Fenpropidin	Daphnia	EC_{50} 0.54	48 hour	9.23	**59**	100
Fenpropidin	Daphnia	NOEC 0.32	21 day	9.23	35	10
Fenpropidin	Green algae	E_bC_{50} 0.0057	96 hour	9.23	**0.62**	10
Fenpropidin	Diatom	$0.0008<E_bC_{50}<0.002$	96 hour	9.23	**0.2-0.09**	10
TERN 750 EC	Green algae	E_bC_{50} 0.00016	72 hour	9.23	**0.02**	10
Fenpropidin	Chironomus	NOEC 1.0	28 day	9.23	108	10
Fenpropidin	Chironomus	NOEC 40 mg a.s./kg*	28 day	323 µg/kg*	124	10

* NOEC from "spiked-sediment" study compared to initial max. PECsed.

Refined aquatic risk assessment using higher tier FOCUS modelling.

FOCUS Step 3

Winter cereals, global maximum from 1 or 2 applications of 750 g a.s./ha (max. appl. rate i Northern EU). Application between 29 Feb. and 26 April (minimum 21 d interval between treatments).
Scenario R2 excluded (does not include winter cereals). TER values shown in bold are less than the relevant Annex VI trigger value/lowest proposed assessment factor.

Test substance	Scenario	Water body	Time-scale	Toxicity endpoint (µg a.s./L)[1]	PECsw (µg a.s./L)[2]	TER	Annex VI trigger[3]
Fenpropidin: Acute risk aquatic invertebrates (Daphnia)[4]							
Fenpropidin	D2	Ditch	Acute	EC_{50} 540	4.76*	113	100
Fenpropidin: Long-term risk to algae							

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Test substance	Scenario	Water body	Time-scale	Toxicity endpoint (µg a.s./L)[1]	PECsw (µg a.s./L) [2]	TER	Annex VI trigger[3]
TERN 750 EC	D1	Ditch	Long-term	NOEC 0.39	4.68*	**0.08**	1-3
TERN 750 EC	D1	Stream	Long-term	NOEC 0.39	3.18*	**0.12**	1-3
TERN 750 EC	D2	Ditch	Long-term	NOEC 0.39	4.76*	**0.08**	1-3
TERN 750 EC	D2	Stream	Long-term	NOEC 0.39	4.18*	**0.09**	1-3
TERN 750 EC	D3	Ditch	Long-term	NOEC 0.39	4.69*	**0.08**	1-3
TERN 750 EC	D4	Pond	Long-term	NOEC 0.39	0.16*	2.4	1-3
TERN 750 EC	D4	Stream	Long-term	NOEC 0.39	3.82*	**0.10**	1-3
TERN 750 EC	D5	Pond	Long-term	NOEC 0.39	0.18	2.2	1-3
TERN 750 EC	D5	Stream	Long-term	NOEC 0.39	3.69*	**0.11**	1-3
TERN 750 EC	D6	Ditch	Long-term	NOEC 0.39	4.70*	**0.08**	1-3
TERN 750 EC	R1	Pond	Long-term	NOEC 0.39	0.214	1.8	1-3
TERN 750 EC	R1	Stream	Long-term	NOEC 0.39	3.10*	**0.12**	1-3
TERN 750 EC	R3	Stream	Long-term	NOEC 0.39	4.35*	**0.09**	1-3
TERN 750 EC	R4	Stream	Long-term	NOEC 0.39	3.09*	**0.13**	1-3

* Depending on percentage spray-drift the highest global maximum was sometimes obtained in scenario calculated with one application, sometimes in scenario with two applications. The table above shows the highest global max. PECsw and PECsed regardless of number of applications. Values marked with "*" were obtained in scenario with only one application.
[1] Proposed NOEC from mesocosm study (measured concentration), based on effects on algae being the most sensitive organism group.
[2] Global maximum in each scenario (= intial PEC).
[3] Appropriate assessment factor to apply for mesocosm endpoint not decided but suggested to be in the order of 1-3.
[4] The identified acute risk to aquatic invertebrates at Step 2 is here followed up by calculation of TER using the single highest PECsw estimated at Step 3.

FOCUS Step 4

Winter cereals, global maximum from 1 or 2 applications of 750 g a.s./ha (max. appl. rate i Northern EU). Application between 29 Feb. and 26 April (minimum 21 d interval between treatments).
Scenario R2 excluded (does not include winter cereals). TER values shown in bold are less than an trigger of 1. A 50 m no spray buffer zone introduced to reduce spray drift.

Test substance	Scenario	Water body	Time-scale	Toxicity endpoint (µg a.s./L)[1]	PECsw (µg a.s./L) [2]	TER	Annex VI trigger[3]
TERN 750 EC	D1	Ditch	Long-term	NOEC 0.39	0.142*	2.7	-
TERN 750 EC	D1	Stream	Long-term	NOEC 0.39	0.131*	3.0	-

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Test substance	Scenario	Water body	Time-scale	Toxicity endpoint (µg a.s./L)[1]	PECsw (µg a.s./L)[2]	TER	Annex VI trigger[3]
TERN 750 EC	D2	Ditch	Long-term	NOEC 0.39	0.145*	2.7	-
TERN 750 EC	D2	Stream	Long-term	NOEC 0.39	0.172*	2.3	-
TERN 750 EC	D3	Ditch	Long-term	NOEC 0.39	0.143*	2.7	-
TERN 750 EC	D4	Pond	Long-term	NOEC 0.39	0.034*	11.5	-
TERN 750 EC	D4	Stream	Long-term	NOEC 0.39	0.157*	2.5	-
TERN 750 EC	D5	Pond	Long-term	NOEC 0.39	0.036	10.8	-
TERN 750 EC	D5	Stream	Long-term	NOEC 0.39	0.152*	2.6	-
TERN 750 EC	D6	Ditch	Long-term	NOEC 0.39	0.143*	2.7	-
TERN 750 EC	R1	Pond	Long-term	NOEC 0.39	0.173	2.3	-
TERN 750 EC	R1	Stream	Long-term	NOEC 0.39	1.31	**0.30**	-
TERN 750 EC	R3	Stream	Long-term	NOEC 0.39	1.49	**0.25**	-
TERN 750 EC	R4	Stream	Long-term	NOEC 0.39	2.53	**0.15**	-

* Depending on percentage spray-drift the highest global maximum was sometimes obtained in a scenario calculated with one application, sometimes in scenario with two applications. The table above shows the highest global max. PECsw and PECsed regardless of number of applications. Values marked with "*" were obtained in scenario with only one application.
[1] Proposed NOEC from mesocosm study (measured concentration), based on effects on algae being the most sensitive organism group.
[2] Global maximum in each scenario (= intial PEC).
[3] Appropriate assessment factor to apply for mesocosm endpoint not decided but suggested to be in the order of 1-3.

Metabolite CGA 289267

FOCUS Step 3

Winter cereals, 2 applications of 134 g CGA 289267/ha (21 d interval, application between 1 March and 24 May). Rate is based on max. recommended appl. rate i Northern EU (750 g fenpropidin/gha) and takes max. amount identified in water/sediment study (16.1%) and difference in molecular weight relative to the parent compound into account.

Test substance	Scenario	Water body	Test organism	Time-scale	Toxicity endpoint (µg/L)	PECsw (µg/L)[1]	TER	Annex VI trigger
CGA 289267	D2	Ditch	Fish	Long-term	$> 1 \times 10^5$	0.752	>133000	100
CGA 289267	D2	Ditch	Daphnia	Long-term	$> 1 \times 10^5$	0.752	>133000	10
CGA 289267	D2	Ditch	Algae	Long-term	3.1×10^4	0.752	41200	10

[1] Only the highest global maximum at Step 3 is used for risk assessment, calculated for D2 Ditch scenario.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Bioconcentration				
	Active substance	Metab. 1	Metab. 2	Metab. 3
$logP_{O/W}$	0.83 at pH 4.2 2.9 at pH 7.0 4.5 at pH 9.0	-	-	-
Bioconcentration factor (BCF) ‡	163* (at pH 7.6-7.9)	-	-	-
Annex VI Trigger for the bioconcentration factor	100	-	-	-
Clearance time (days) (CT_{50})	ca 17 h	-	-	-
(CT_{90})	ca 14 d	-	-	-
Level and nature of residues (%) in organisms after the 14 day depuration phase	18.8% identified as fenpropidin, 16.1% as CGA 289268, 2.0% unknown and 58.1% polar metabolites or conjugates.			

* Measured as total ^{14}C.

Effects on honeybees (Annex IIA, point 8.3.1, Annex IIIA, point 10.4)

Test substance	Acute oral toxicity (LD_{50} µg/bee)	Acute contact toxicity (LD_{50} µg/bee)
Fenpropidin	> 10	46.0
TERN 750 EC (A-7516 A)	99.9	55.3
Field or semi-field tests		
Three cage studies: At 1500 g a.s./ha (twice the recommended application rate) no effects on behaviour, apart from a repellent effect in one of the studies. In at least one of the studies a slight increase in mortality was indicated. In two of the studies flight activity was reduced for a short time after application but returned to control levels later the same day. Due to the high treatment rate used, the low magnitude of effects on mortality and the short duration of the effect on activity the studies confirm that the risk to bees is low.		

[1] All values refer to µg a.s./bee.

Hazard quotients for honey bees (Annex IIIA, point 10.4)

Winter cereals, application during spring at max. 750 g a.s./ha (max. 2 applications, here single appl. used).

Test substance	Route	Hazard quotient	Annex VI Trigger
Fenpropidin	Contact	16.3[1]	50
TERN 750 EC	Oral	7.5[2]	50

[1] Based on LD_{50} 46.0 µg a.s./bee being the lowest available value.
[2] Based on LD_{50} 99.9 µg a.s./bee from study on preparation since an LD_{50} was not reached in study on active ingredient.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Effects on other arthropod species (Annex IIA, point 8.3.2, Annex IIIA, point 10.5)

Laboratory tests with standard sensitive species

Species	Test Substance	End point	Effect (LR_{50} g/ha)
Typhlodromus pyri ‡	/	Mortality	/
Aphidius rhopalosiphi	TERN 750 EC (A-7516 A)	Mortality	48 h LR_{50} < 750

[1] Result expressed in units of a.s.

Crop and application rate

Test substance	Species	Effect (LR_{50} g/ha)	HQ in-field	HQ off-field	Trigger
	Typhlodromus pyri	/	/	/	2
TERN 750 EC	*Aphidius rhopalosiphi*	< 750	>1.7[1]	>0.04[2]	2
TERN 750 EC	*Aphidius rhopalosiphi*	< 750	>0.9[3]	-	2

[1] HQ (foliar, in-field) calculated in accordance with guidance document (ESCORT II).
[2] HQ (foliar, off-field) at 1 m distance calculated in accordance with guidance document (ESCORT II).
[3] HQ (soil, in-field) calculated as (PER soil) x $(LR50)^{-1}$, where (PER soil) = residues on soil after 2 applications taking crop interception into account. PER = Predicted Environmental Rate.

Further laboratory and extended laboratory studies ‡

Species	Life stage	Test substance, substrate and duration	Dose (g/ha)	End point	% effect	Trigger value
Laboratory (Tier-I) studies						
Aphidius rhopalosiphi	adult	TERN 750 EC (A-7516 A) glass plate 48 hours	750	mortality	100%	30%
Crysoperla carnea	larvae	TERN 750 EC glass plate 13 days	30 750	Mortality Fertility egg viability	6.9% (mort.) low dose; 86.2% (mort.) at high dose; ≥ 15 eggs/female/d and ≥ 70% egg viability at both doses[4]	30%

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Species	Life stage	Test substance, substrate and duration	Dose (g/ha)	End point	% effect	Trigger value
Coccinella septempunctata	larvae	TERN 750 EC glass plate 11-15 days	30 750 1500	mortality fecundity	4.6 and 25.0% mortality and ≥ 2 viable eggs/female/d at lowest doses; 79.6% mortality at high dose[5]	30%
Coccinella septempunctata	larvae	TERN 750 EC (A-7516 A) glass plate larval stage	562	mortality fecundity	-4.9% (mort.) ≥ 2 viable eggs/female/d	30%
Aleochara bilineata	adult	TERN 750 EC sand 28 days	30 375 750 1500	mortality fecundity	0% (mort.) 5% (R, fecund.) 0% (mort.) 16% (R, fecund.) 5% (mort.) 16% (R, fecund.) 0% (mort.) 12% (R, fecund.)	30%
Bembidion tetracolum	adult	TERN 750 EC (A-7516 A) sand 28 days	750	mortality feeding	43.3% (mort.) -6.0% (R, feeding)	30%
Poecilius cupreus	adult	TERN 750 EC (A-7516 A) sand 15 days	562	mortality feeding	0% (mort.) -3.0% (R, feeding)	30%
Poecilius cupreus	adult	TERN 750 EC sand 14 days	30 750 1500	mortality feeding	-3.4% (mort.) 0% (R, feeding) at all three doses	30%
Extended laboratory (Tier-II) studies						
Aphidius rhopalosiphi	adult	TERN 750 EC 3-D plant 48 hours	750	mortality fecundity	13.3% (mort.) -10.9% (R, fecundity)	50%

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Species	Life stage	Test substance, substrate and duration	Dose (g/ha)	End point	% effect	Trigger value
Aphidius rhopalosiphi	adult	TERN 750 EC 3-D plant 14 days	75 375 750 1500	mortality fecundity	17% (mort.) 2.7% (R,fecund.) 4% (mort.) -1% (R,fecund.) 1% (mort.) 12% (R,fecund.) 13% (mort.) 4.6% R,fecund.)	50%
Typhlodromus pyri	proto-nymph	TERN 750 EC (A-7516 A) 2-D leaf 15 days	400	mortality fecundity	85.7% (mort.) effect on fecundity uncertain	50%
Phytoseiulus persimilis	proto-nymph	TERN 750 EC (A-7516 A) 2-D leaf 8 days	400	mortality fecundity	84.7% (mort.) 34.3% (R, fecundity)	50%
Bembidion tetracolum	adult	TERN 750 EC 2-D soil 3+14 days	2 x 30 2 x 750	mortality feeding	6.7% (mort.) 6% (R, feeding) 3.3% (mort.) -3.9% (R, feeding)	50%
Typhlodromus pyri	proto-nymph	TERN 750 EC 3-D plant 7 days	1 x 750[56] 2 x 30[56] 2 x 750[56]	mortality fecundity	0, 9, 3, 0, 15% (mort.) and 34, 4, 57[7], -44, 20% (R, fecund.) in bioassays at 0, 1, 3, 5, 8 DAT. 7, 0, 4, 0, 4% (mort.) and 0, 4, -9, -5, 6% (R, fecundity) in bioassays at 0, 1, 3, 5, 8 DAT. 14, 0, 6, 0, 0% (mort.) and 8, -18, -5, -12, 29% (R, fecundity) in bioassays at 0, 1, 3, 5, 8 DAT.	50%

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Species	Life stage	Test substance, substrate and duration	Dose (g/ha)	End point	% effect	Trigger value
Phytoseiulus persimilis	proto-nymph	TERN 750 EC 3-d plant 4 days	1 x 750[5,6] 2 x 30[5,6] 2 x 750[5,6]	mortality fecundity	60, 12, 9, 3, 0% (mort.) in bioassays at 0, 1, 3, 5, 8 DAT and -12, -6, -11, -1% (R, fecundity) in bioassays at 1, 3, 5, 8 DAT. 35, 6, 0, 0, 0% (mort.) and 12, -9, -5, -8, 10% (R, fecundity) in bioassays at 0, 1, 3, 5, 8 DAT. 77, 24, 18, 0, 0% (mort.) in bioassays at 0, 1, 3, 5, 8 DAT and -29, -21, -11, 21% (R, fecundity) in bioassays at 1, 3, 5, 8 DAT.	50%

[1] Duration refer to exposure phase.
[2] All study results are from studies on formulation but recalculated i units per a.s.
[3] Animals were exposed to fresh air-dried residues unless otherwise indicated.
[4] The results with regard to effects on fertility and egg viability at the high dose level are uncertain due to a small number of surviving females.
[5] Also effects on fecundity at highest dose (< 2 viable eggs/female/day) however effect is uncertain as it was based on a small number of surviving females.
[6] Different groups of test animals were exposed to fresh air-dried residues and to residues "aged" for 1, 3, 5 and 8 days.
The dose 2 x 30 g a.s./ha is equal to the predicted environmental rate at 5 m distance from crop, applying an uncertainty factor of 5 and no vegetation distribution factor (to allow comparison with 3-D test systems).
[7] Effect not considered treatment related (no dose response or related to age of residues).

Field or semi-field tests
No field or semi-field studies were submitted, and not required.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Effects on earthworms, other soil macro-organisms and soil micro-organisms (Annex IIA points 8.4 and 8.5. Annex IIIA, points, 10.6 and 10.7)

Test organism	Test substance	Time scale	Endpoint
Earthworms			
Eisenia foetida	Fenpropidin	Acute 14/28 days	500 < LC_{50} < 1600 mg a.s./kg[1]
Eisenia foetida	TERN 750 EC	Acute 14/28 days	LC_{50} ca 500 mg/kg[1]
Eisenia foetida	CGA 289267	Acute 14 days	LC_{50} >1000 mg/kg
Eisenia foetida	TERN 750 EC	Chronic 56 days	NOEC 13.4 mg/kg[1] NOEC 10 mg a.s./kg[1]
Other soil macro-organisms			
Collembola	TERN 750 EC	Chronic 28 days	NOEC 62 mg/kg[1] NOEC 46.5 mg a.s./kg[1]
Soil micro-organisms			
Nitrogen mineralisation	TERN 750 EC (A-7516 A)	73 days	no stat. sign. effects at 1.1 to 6.0 mg a.s./kg
Carbon mineralisation	TERN 750 EC (A-7516 A)	34 days	no stat. sign. effect in loamy sand at 1.1 and 5.6 mg a.s./kg in sandy loam 15% reduction d 7-13 at 1.2 mg a.s./ kg, and 12% increase d 7-13 at 6.0 mg a.s./kg
Nitrogen mineralisation	TERN 750 EC	28 days	9% (3 h), 5% (14 d), -1% (28 d) at 0.1 mg a.s./ kg in sandy loam 27% (3 h), 11% (14 d), 16% (28 d) at 1.0 mg a.s./ kg in sandy loam 0% (3 h), 19% (14 d), -4% (28 d) at 0.1 mg a.s./ kg in loamy sand 0% (3 h), 11% (14 d), -2% (28 d) at 1.0 mg a.s./ kg in sandy loam
Dehydrogenase activity	TERN 750 EC	28 days	<10% at 0.25 and 2.5 mg a.s./kg in sandy loam no stat. sign. effect in loamy sand at 0.25 mg a.s./kg; 14% reduction by day 28 at 2.5 mg a.s./kg in loamy sand
Nitrogen mineralisation	CGA 289267	28 days	-11.2% (0-3 h), -8.6% (14 d), -13.4% (28 d) at 1.0 mg/kg -20.1% (0-3 h), -10.0% (14 d), -2.7% (28 d) at 10 mg/kg (only effects at 0-3 h were stat. sign.)

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Test organism	Test substance	Time scale	Endpoint
Carbon mineralisation	CGA 289267	28 days	2.6% (0-3 h), -9.0% (14 d), -11.0% (28 d) at 1.0 mg/kg 12.9% (0-3 h), -5.0% (14 d), -4.9% (28 d) at 10 mg/kg (none of the effects stat. sign.)
Field studies			
Litter bag study on TERN 750 EC at 375 + 750 g a.s./ha. Sampling 32, 102 and 189 days after treatment. No negative impact on the decomposition of organic material indicated.			

[1] LC50 and NOEC values from studies have been reduced by a factor of 2 to account for log Pow >2.0.

Toxicity/exposure ratios for soil organisms

Winter cereals, 2 x 750 g a.s./ha.

Test organism	Test substance	Time scale	Soil PEC initial	Soil PEC twa	TER	Trigger
Earthworms						
Eisenia foetida	Fenpropidin	Acute	0.54	-	>926	10
Eisenia foetida	Fenpropidin	Acute	1.58-2.15[a]		>316 - >233	10
Eisenia foetida	TERN 750 EC	Acute	0.80	-	625	10
Eisenia foetida	CGA 289267	Acute	0.06	-	>16600	10
Eisenia foetida	TERN 750 EC	Chronic	0.80		16.8	5
Eisenia foetida	Fenpropidin	Chronic	0.54	-	18.5	5
Eisenia foetida	Fenpropidin	Chronic	1.58-2.15[a]		6.3 - **4.6**[b]	5
Other soil macro-organisms						
Collembola	TERN 750 EC	Chronic	0.80	-	78	5
Collembola	Fenpropidin	Chronic	0.54	-	86	5
Collembola	Fenpropidin	Chronic	1.58-2.15[a]		29-22	5
Refined risk assessment						
-						

a PECs 1.58 and 2.15 mg/kg representing the worst-case plateau soil (upper part of saw tooth curve) after 10 and 20 years of consecutive application of 2 x 750 g a.s./ha with tillage only to 5 cm depth.
b TER considered acceptable since close to trigger and very conservative PECsoil.

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Effects on non target plants (Annex IIA, point 8.6, Annex IIIA, point 10.8)

Laboratory dose response tests

Tier II Dose response study

Study on 6 plant species at 6 doses ranging from 31 to 1000 ml TERN 750 EC/ha. Ratings of effects by scale: 0-10 (0="vigorous healthy plants, emergence of normal amounts of seeds, indistinguishable from control" and 10="complete destruction of plant parts above ground, complete inhibition of germination" No adverse effects on seedling emergence. Effects on vegetative vigour: ratings 0-1 at doses up to 125 ml/ha; ratings 0-2.5 at 250 ml/ha; 0-4 at 500 ml/ha; 0-6 at 1000 ml/ha.

Additional studies (e.g. semi-field or field studies)

No additional studies submitted, nor required

Effects on biological methods for sewage treatment (Annex IIA 8.7)

Test type/organism	Endpoint
Activated sludge, test substance: Fenpropidin	EC_{50} (3 h) > 100 mg a.s./L EC_{20} (3 h) 30.7 mg a.s./L
Activated sludge, test substance: TERN 750 EC	EC_{50} (3 h) ca 228 mg/L

Ecotoxicologically relevant compounds

Compartment	
soil	Fenpropidin
water	Fenpropidin
sediment	Fenpropidin
groundwater	Fenpropidin
air	Fenpropidin

Classification and proposed labelling with regard to ecotoxicological data (Annex IIA, point 10 and Annex IIIA, point 12.3)

	RMS/peer review proposal	
Active substance	N, R50/53	Harmful Very toxic to aquatic organisms, may cause long-term adverse effects to the aquatic environment

‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

	RMS/peer review proposal	
Preparation (TERN 750 EC)	N, R50/53	Harmful Very toxic to aquatic organisms, may cause long-term adverse effects to the aquatic environment

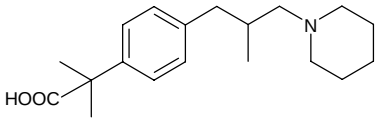
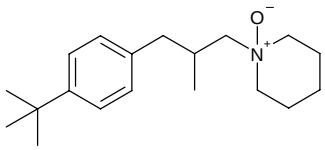
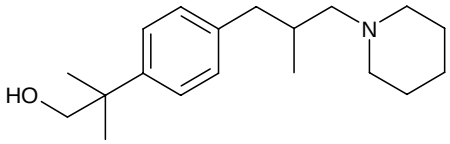
‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

APPENDIX 2 – ABBREVIATIONS USED IN THE LIST OF ENDPOINTS

ADI	acceptable daily intake
AOEL	acceptable operator exposure level
ARfD	acute reference dose
a.s.	active substance
BCF	bioconcentration factor
bw	body weight
CA	Chemical Abstract
CAS	Chemical Abstract Service
CIPAC	Collaborative International Pesticide Analytical Council Limited
d	day
DAR	draft assessment report
DM	dry matter
DT_{50}	period required for 50 percent dissipation (define method of estimation)
DT_{90}	period required for 90 percent dissipation (define method of estimation)
ε	decadic molar extinction coefficient
EC_{50}	effective concentration
EEC	European Economic Community
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINKS	European List of New Chemical Substances
EMDI	estimated maximum daily intake
ER50	emergence rate, median
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FOCUS	Forum for the Co-ordination of Pesticide Fate Models and their Use
GAP	good agricultural practice
GCPF	Global Crop Protection Federation (formerly known as GIFAP)
GS	growth stage
h	hour(s)
ha	hectare
hL	hectolitre
HPLC	high pressure liquid chromatography or high performance liquid chromatography
ISO	International Organisation for Standardisation
IUPAC	International Union of Pure and Applied Chemistry
K_{oc}	organic carbon adsorption coefficient
L	litre
LC	liquid chromatography
LC-MS	liquid chromatography-mass spectrometry

LC-MS-MS	liquid chromatography with tandem mass spectrometry
LC_{50}	lethal concentration, median
LD_{50}	lethal dose, median; dosis letalis media
LOAEL	lowest observable adverse effect level
LOD	limit of detection
LOQ	limit of quantification (determination)
MWHC	maximum water holding capacity
µg	microgram
mN	milli-Newton
MRL	maximum residue limit or level
MS	mass spectrometry
NESTI	national estimated short term intake
NIR	near-infrared-(spectroscopy)
nm	nanometer
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
PEC	predicted environmental concentration
PEC_A	predicted environmental concentration in air
PEC_S	predicted environmental concentration in soil
PEC_{SW}	predicted environmental concentration in surface water
PEC_{GW}	predicted environmental concentration in ground water
PHI	pre-harvest interval
pK_a	negative logarithm (to the base 10) of the dissociation constant
POEM	predictive operator exposure model
PPE	personal protective equipment
ppm	parts per million (10^{-6})
ppp	plant protection product
r^2	coefficient of determination
RPE	respiratory protective equipment
STMR	supervised trials median residue
TER	toxicity exposure ratio
TMDI	theoretical maximum daily intake
UV	ultraviolet
WHO	World Health Organisation
WG	water dispersible granule
yr	year

APPENDIX 3 – USED COMPOUND CODE(S)

Code/Trivial name	Chemical name	Structural formula
CGA 289267	2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid	
CGA 289263	1-[3-(4-tert-butyl-phenyl)-2-methyl-propyl]-piperidine-1-oxide	
CGA 289268	2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propan-1-ol	
SYN515213	3-Hydroxy-2-methyl-2-[4-(2-methyl-3-piperidin-1-yl-propyl)-phenyl]-propionic acid