5.12 FENPROPATHRIN (185)

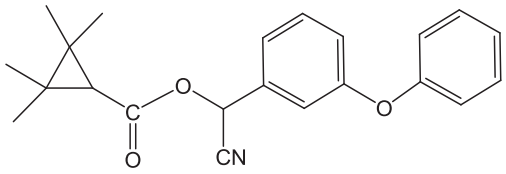
RESIDUE AND ANALYTICAL ASPECTS

Fenpropathrin is a type II pyrethroid insecticide and acaricide used for the control of a variety of arthropods including aphids, worms, moths, beetles, mites, spiders, thrips, flies, fleas and other pests in agriculture.

Fenpropathrin was first evaluated by JMPR in 1993 when an ADI of 0–0.03 mg/kg bw was established and a number of MRLs recommended. In 2006 MRL for tea was recommended. The compound was re-evaluated for toxicology within the periodic review programme in 2012 when the Meeting reaffirmed the ADI of 0–0.03 mg/kg bw and established an ARfD of 0.03 mg/kg bw.

The Forty-fifth Session of CCPR scheduled fenpropathrin for periodic re-evaluation of residues by the 2014 JMPR. Data to support proposed Codex MRLs on a number of commodities and on animal products were submitted for review.

The structural formulae and IUPAC name of fenpropathrin are:

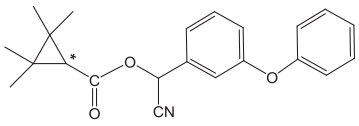


(*RS*)-α-cyano-3-phenoxybenzyl 2,2,3,3-tetramethylcyclopropanecarboxylate.

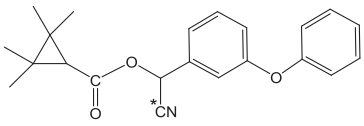
Metabolism and environmental fate

The metabolism of fenpropathrin has been investigated in apple, tomato, beans, cotton, cabbage, lactating goat and laying hens. The crops selected represent those for which supervised trials have been provided.

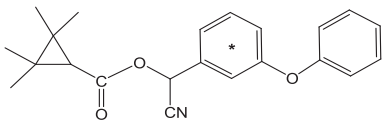
The fate and behaviour of fenpropathrin in plants, animals and soil were investigated using either [cyclopropyl-1-^{14}C]-fenpropathrin, [benzyl-^{14}C]-fenpropathrin, [phenoxyphenyl-^{14}C]-fenpropathrin or [cyano-^{14}C]-fenpropathrin (all with radiochemical purity >98%).



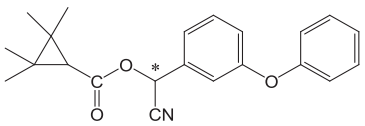
[cyclopropyl-1-^{14}C]-fenpropathrin



[cyano-^{14}C]-fenpropathrin

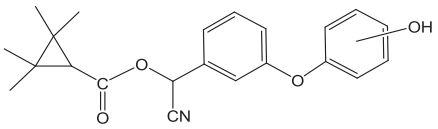
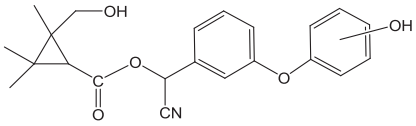
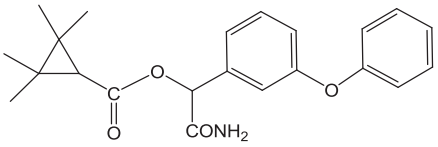
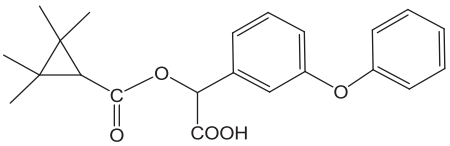
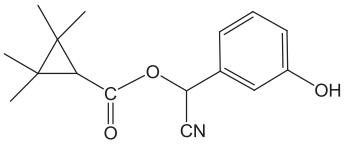
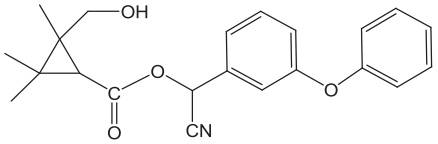
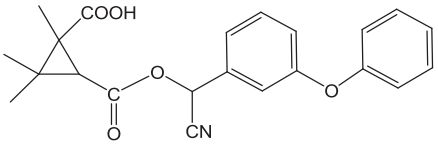
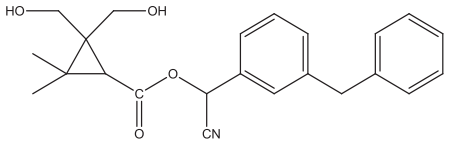
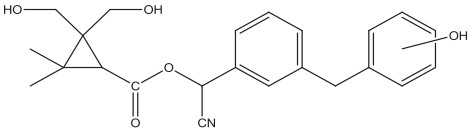
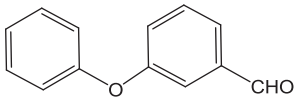
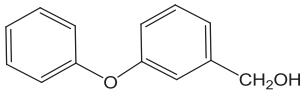
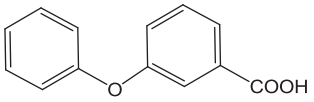


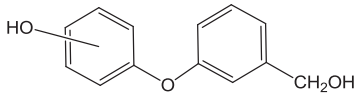
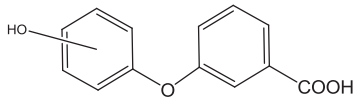
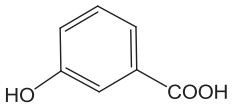
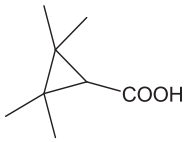
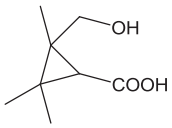
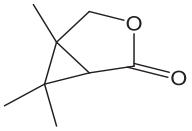
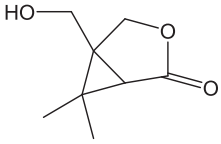
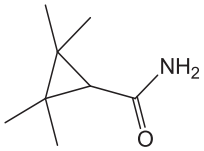
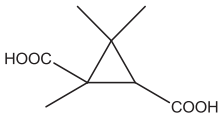
[phenoxyphenyl-^{14}C]-fenpropathrin



[benzyl-^{14}C]-fenpropathrin

The chemical and code names and structure of the major degradation compounds, referred to hereunder, are:

Compound Name	Structure	Found in:
2'-or 4'-OH-Fenpropathrin [α-cyano-3-(2'- or 4'-hydroxyphenoxy)benzyl 2,2,3,3-tetramethylcyclopropanecarboxylate]		Plant, animal, soil
2'- or 4'-OH-Fenpropathrin-CH_2OH [α-cyano-3-(2'- or 4'-hydroxyphenoxy) benzyl-2-hydroxymethyl-2,3,3-trimethylcyclopropanecarboxylate]		Plant, animal
$CONH_2$-Fenpropathrin [α-carbamoyl-3-phenoxybenzyl 2,2,3,3-tetramethylcyclopropanecarboxylate]		Soil, water plant
COOH-Fenpropathrin [α-carboxy-3-phenoxybenzyl 2,2,3,3-tetramethylcyclopropanecarboxylate]		Soil, plant
Desphenyl-Fenpropathrin [α-cyano-3-hydroxybenzyl 2,2,3,3-tetramethylcyclopropanecarboxylate]		Animal, soil, plant
Fenpropathrin-CH_2OH [α-cyano-3-phenoxybenzyl 2-hydroxymethyl-2,3,3-trimethylcyclopropanecarboxylate]		Plant, animal
Fenpropathrin-COOH [α-cyano-3-phenoxybenzyl 2-carboxy-2,3,3-trimethylcyclopropanecarboxylate]		Animal
Fenpropathrin-$(CH_2OH)_2$ [α-cyano-3-phenoxybenzyl 2,2-dihydroxymethyl-3,3-dimethylcyclopropanecarboxylate]		Plant
2'- or 4'-OH-Fenpropathrin-$(CH_2OH)_2$ [α-cyano-3-(2'- or 4'-hydroxyphenoxy)benzyl 2,2-dihydroxymethyl-3,3-dimethylcyclopropanecarboxylate]		Plant
PB aldehyde (PBald) [3-phenoxybenzaldehyde]		Plant, animal, soil
PB alcohol (PBalc) [3-phenoxybenzyl alcohol]		Plant, soil
PBacid [3-phenoxybenzoic acid]		Plant, animal, soil, water

Compound Name	Structure	Found in:
2'- or 4'-OH-PBalc [3-(2'- or 4'-hydroxyphenoxy)benzyl alcohol]		Plant
2'- or 4'-OH-PBacid [3-(2'- or 4'-hydroxyphenoxy)benzoic acid]		Plant, animal, soil
3-OH-Bacid [3-hydroxy-benzoic acid]		Animal, soil
TMPA [2,2,3,3-tetramethylcyclopropane-carboxylic acid]		Plant, animal, soil, water
TMPA-CH_2OH [2-hydroxymethyl-2,3,3-trimethylcyclopropanecarboxylic acid]		Plant, animal
TMPA-lactone [5,6,6-trimethyl-3-oxabicyclohexan-2-one]		Plant
TMPA-CH_2OH lactone [5-hydroxymethyl-6,6-dimethyl-3-oxabicyclohexan-2-one]		Plant, animal
TMPA carboxamide [2,2,3,3-tetramethylcyclopropane-carboxamide]		Water
TMPA-COOH [2-carboxy-2,3,3-trimethylcyclopropanecarboxylic acid]		Plant, animal

Animal metabolism

Laboratory animals

The toxicological evaluation fenpropathrin was carried out by the 2012 JMPR. Absorption by rats was rapid and excretion was almost complete (97%) within 48 hours. About 56% of the administered dose was found in urine and 40% in faeces after 48 hours. The amount of radioactivity excreted via expired air was 0.005%. The low residues found in blood, liver, kidney, fat, muscle and brain 24 hours after dosing depleted rapidly over the following 7 days to barely detectable levels, and less than 1.5% of the administered dose remained in the body 8 days after treatment. The highest residue was found in the fat. About 29–53% of the parent compound was detected in the faeces and no parent compound was detected in the urine. The predominant urinary metabolites derived from the acid moiety were identified as TMPA–glucuronide and TMPA-CH_2OH (*trans*). Other metabolites identified were TMPA-COOH (*trans*) and TMPA-CH_2OH-lactone in free form or as the glucuronide.

The major urinary metabolites derived from the alcohol moiety were PBacid in free form and as the glycine conjugate, 4′-OH-PBacid–sulfate and 2′-OH-PBacid–sulfate. The urinary metabolites from the alcohol moiety were similar to those from other pyrethroids. The major faecal metabolite was identified as CH_2OH *trans*-fenpropathrin, followed by COOH *trans*-fenpropathrin, 4′-OH-fenpropathrin and 4′-OH,CH_2OH *trans*-fenpropathrin. Fenpropathrin and TMPA were the major components of ^{14}C in tissues. No sex-related differences in tissue distribution were observed.

Lactating goats

Two lactating goats per group were dosed for five consecutive days via capsules with either [phenoxyphenyl-^{14}C]-fenpropathrin or [cyclopropyl-1-^{14}C]-fenpropathrin at a rate equivalent to 50 ppm. Milk samples were collected at the morning and afternoon and urine and faeces once a day.

The mean average total radioactivity recovered following dosing with both labelled compounds was about 65.8% with 40% recovered in the urine and 25% in the faeces.

Excretion via milk was a minor route with radioactivity accounting for approximately 0.15% of the applied phenoxyphenyl labelled and approximately 0.087% for the cyclopropyl labelled compound. Total radioactive residues in the milk reached a steady state by the evening milking on the third day.

Following the treatments with 50 ppm [phenoxyphenyl-^{14}C]-fenpropathrin, the maximum total residue in milk was 0.25 mg/l. The major residue components were the parent fenpropathrin 78% TRR, (0.02 mg/kg). At around the plateau, the average concentration of the parent compound was 0.05 mg/kg (29%TRR) and PBacid-glycine 0.076 mg/kg (46%TRR). The other metabolites were < 10% TRR.

At sacrifice, the average residues were: in fat: fenpropathrin (0.50 mg/kg, 78%TRR), all metabolites were present at lower than 5%TRR; in muscle: fenpropathrin (0.011 mg/kg, 45%TRR), PBacid-glycine (22.4% TRR), PBacid (10.9% TRR) the other metabolites were below 3%; in liver: fenpropathrin (0.014 mg/kg, 3.2% TRR), PBacid-glycine (20%TRR), PBacid (14% TRR), 4'-OH-PBacid (11%TRR), the other metabolites were below 10% TRR; in kidney: fenpropathrin (0.01 mg/kg, 1.24%TRR), PBacid-glycine (39%TRR), PBacid (38%TRR) and the other metabolites were below 10%.

After the goats were administered with [cyclopropyl-1-^{14}C]-fenpropathrin, the average total residue in milk was 0.11 mg/L. The parent compound in milk amounted to maximum 70% TRR (0.086 mg/kg). All metabolites amounted to maximum 4% TRR.

At sacrifice, the average residues were: in fat: fenpropathrin (0.55 mg/kg, 81% TRR), all metabolites were present at lower than 3%TRR; in muscle: fenpropathrin (0.005 mg/kg, 11.3% TRR), TMPA-CH_2OH-lactone (19.4% TRR) andTMPA-CH_2OH (11%TRR); in liver: fenpropathrin 0.011 mg/kg (2.45% TRR), TMPA (18.2%TRR), TMPA-CH_2OH (15.8%TRR) and TMPA-CH_2OH lactone (12.5% TRR); in kidney: fenpropathrin 0.0076 mg/kg (1.48% TRR), TMPA-CH_2OH-lactone (40.8% TRR) and TMPA-CH_2OH (14.5% TRR) .

The other metabolites in muscle, liver and kidney were below 5%TRR.

Laying hens

Fenpropathrin, labelled in either the cyclopropyl or the phenoxyphenyl ring was administered in capsules to laying hens daily for 10 days at a nominal rate of either 0.5 or 5 mg/kg body weight.

The recovery of total radioactivity from excreta, eggs and tissues was between 75 and 84% of the total applied dose. Between 98.9 and 99.6% of the recovered activity was found in the faeces irrespective of the label.

Approximately 0.05% of the applied phenoxyphenyl- and 0.2% of the cyclopropyl-labelled compound was found in the eggs. At about the 6th or 7th day of the study residue levels in the eggs reached a plateau of about 0.05 and 0.2 mg/kg fenpropathrin equivalent for the two doses of the phenoxyphenyl-labelled and about 0.2 and 0.5 mg/kg for those of the cyclopropyl-labelled compounds.

In case of high dose group treated with phenoxyphenyl-labelled compound, the average concentration of parent fenpropathrin amounted to 31% of TRR (0.043 mg/kg) in eggs and all identified metabolites were present at less than 10%TRR. In breast and tight muscle, the average proportions of residues (%TRR) were: parent compound 19% (0.02 mg/kg), PBacid (22%), 3-OH-BAcid (13%). In liver and kidney the average percentage distributions of TRR were, respectively: parent (0.98%, 2.11%; 0.014 mg/kg, 0.096 mg/kg), 3-OH-BAcid (29%, 35%), 4-OH-PBacid (16%, 26%) and PBacid (14.7%, 8.7%). The other metabolites were <10% TRR in all tissues.

In case of cyclopropyl label the average concentration of parent fenpropathrin amounted to 9.8% TRR (0.038 mg/kg) in eggs, and one major metabolite, TMPA-CH_2OH, was present at 11.7%n TRR. All other metabolites amounted to <10% TRR and their concentrations were < 0.03 mg/kg. In muscle, the average proportions of residues (%TRR) were: parent compound 6% (0.033 mg/kg), TMPA-CH_2OH (16%), TMPA (15.7%), TMPA-CH_2-OH-lactone (12.3%. All other metabolites amounted to <10% TRR and their concentrations were < 0.03 mg/kg. In liver and kidney the average percentage distributions of TRR were, respectively: parent (1.2%, 0.04 mg/kg; 5.1%; 0.24 mg/kg), TMPA (26.4%, 47.5%), TMPA-CH_2OH (14.7%, 7.7%), TMPA-CH_2-OH-lactone (14.8%, 5.3%), TMPA-COOH (11.4%, 15.3%). The other metabolites were present at < 1.8%TRR.

The metabolic pattern in fat was similar in case of both labels. The fat contained maximum 0.90 mg/kg total residue of which the parent compound amounted to 64%TRR (0.58 mg/kg). The most prominent metabolite was TMPA (14%nTRR), the other metabolites occurred at < 6% TRR.

In summary, the major biotransformation reactions of fenpropathrin in animals consisted of oxidation at the methyl groups of the acid moiety and at the 2'- or 4'-positions of the alcohol moiety, cleavage of the ester and ether linkages and conjugation of the resultant carboxylic acids and alcohols.

The parent compound was detected in milk, eggs and tissues, and it was the main residue in fat about 80%TRR. The major metabolites >10% TRR following the treatment with phenoxyphenyl-labelled fenpropathrin were PBacid-glycine, PBacid and 3-OH-BAcid, and after dosing with cyclopropyl-labelled compound the major metabolites were TMPA-CH_2OH, TMPA, TMPA-CH_2-OH-lactone and TMPA-COOH.

Plant metabolism

Apples

One apple tree was treated 3 times with [cyclopropyl-1-^{14}C]-fenpropathrin and [benzyl-^{14}C]-fenpropathrin at a rate equivalent to 0.45 kg ai/ha. Samples were collected 14 days after the final application. Un-extractable residues ranged from 3% (both labels in fruit) to 8% (benzyl label in leaves).

Practically, the entire residue found in the fruit (92–94% TRR) was present as the parent compound. The parent compound was also the major component in the rest of the plant (61–66%TRR). All metabolites were < 5%TRR.

Tomatoes

Greenhouse-grown tomato plants were treated four times, 7–8 days apart, with [cyclopropyl-1-^{14}C]-fenpropathrin and [benzyl-^{14}C]-fenpropathrin at rates equivalent to 0.224 kg ai/ha. Fruit and leaves were extracted at harvest 19 DALT).

The total radioactive residues were 0.1 mg/kg and 0.4 mg/kg in fruits after treatments with benzyl and cyclopropyl labelled compound and consisted of the parent compound in about 66% of the benzyl label and 28% of conjugated metabolites. Their proportion was about the opposite for cyclopropyl label. The non-extractable residues were between 5.5% and 6.7%. Because of their low level, the radioactivity could not be fully characterised.

In tomato plants, the parent compound was present in 36–39% of TRR (0.1-0.04 mg/kg). Of the identified metabolites only fenpropathrin-$(CH_2OH)_2$ was present in free form (2.7–3.1% TRR). Numerous other metabolites were in conjugated forms. Non-extractable residues amounted to 7.4–9.3%.

In another study where tomato plants were treated in greenhouse four times with [cyclopropyl1-^{14}C]-fenpropathrin and[phenoxyphenyl-^{14}C]-fenpropathrin at a rate equivalent to 0.224 kg ai/ha. Fruits and plant materials, sampled 3 days after last application, contained the parent compound in 96–98% of TRR. Polar metabolites amounted to 1.3% of TRR. The surface rinses contained 98–99% of the parent compound determined in the fruits.

Beans

Pinto bean plants grown in greenhouse were treated three times with [cyclopropyl-1-^{14}C]-fenpropathrin and [benzyl-^{14}C]-fenpropathrin at a rate equivalent to 0.224 kg ai/ha. Samples were collected 15 days after the final application. Leaves and plant parts contained 98.8%, bean pods and seeds contained 1.1% and 0.1% of the residue. In beans treated with benzyl- and cyclopropyl-labelled compound, the residue in seed was composed of the parent compound (4.1% and 0.1% of TRR), conjugated metabolites (61–51% TRR) free metabolites (17–4%TRR) and un-extractable residues 18.2%–45% TRR. The bean leaves contained 46.7% parent compound and conjugates of PBald (19.5%TRR) after treatment with benzyl labelled compound. After treatment with cyclopropyl-labelled compound the residue composed of 46.4% parent fenpropathrin and conjugates of TMPA-CH_2OH (16.7%TRR). The other metabolites were present at < 10% TRR.

Cotton

Two studies were conducted treating cotton plants with [phenoxyphenyl-^{14}C]-fenpropathrin and [cyclopropyl-1-^{14}C]-fenpropathrin.

In the first study the plants were treated in greenhouse four times with syringe applying a total of ca. 4.7–4.8 mg ^{14}C-fenpropathrin. In the leaves at harvest 66 and 111 days after treatments with phenoxyphenyl- or cyclopropyl labelled compound the total remaining radio activity included 70% TRR and 55% TRR parent compound, respectively Most of the remaining radio activity was tentatively accounted for PBacid (2.% TRR) and trans-TMPA-COOH (11%TRR) mainly in conjugated forms. All other metabolites were below 2%TRR.

Plants grown on soils treated with 0.5 kg/ha of fenpropathrin contained ^{14}C residues in very low concentration (0.002 mg/kg in leaves and 0.01 mg/kg in bolls), demonstrating limited tendency for translocation.

In the second study outdoor cotton plants were treated four times at a rate equivalent to 0.336 kg ai/ha. Seeds collected 21 day after last treatment contained total radioactivity 1.14 mg/kg and 1.59 mg/kg, while the foliage contained 78.6 mg/kg and 67.7 mg/kg fenpropathrin equivalent after treatment with phenoxyphenyl- and cyclopropyl-labelled fenpropathrin, respectively. The seed, lint and foliage contained the parent fenpropathrin in 93.8%, 96.2% and 69.2% TRR, respectively,

after treatment with phenoxyphenyl -labelled compound. The seed contained 12 metabolites each at < 0.005 mg/kg concentration. Following the application of cyclopropyl-labelled fenpropathrin the parent compound amounted to 85.6%, 100% and 67.4% TRR in seed, lint and foliage, respectively. A small number of metabolites were also detected, but not identified.

Cabbage

Cabbage plants were treated on the 3rd-4th leaves with [cyano-^{14}C]-fenpropathrin), [cyclopropyl-^{14}C]-fenpropathrin and [phenoxyphenyl-^{14}C]-fenpropathrin at a rate equivalent to about 0.09 kg ai/ha. The cabbages were sampled immediately after application and at 3, 7, 14, 21, 28, 35 and 42 days after application. The proportions of parent fenpropathrin in 28-day samples after treatment with cyano-, cyclopropyl- and phenoxphenyl-fenpropathrin were 16.9%, 15.8% and 12.9% of the applied dose, respectively, and it was present at somewhat lower proportion in 48-day samples. The major part of the residue (23-26% AD) composed of the conjugates of 2'-OH-fenpropathrin-CH_2OH, 4'-OH-fenpropathrin-CH_2OH, 2'-OH-fenpropathrin-$(CH_2OH)_2$ and 4'-OH-fenpropathrin-$(CH_2OH)_2$ and TMPA-CH_2OH-lactone-conjugate (11%). The other metabolites were present at ≤ 10% TRR after treatments with cyclopropyl- and phenoxyphenyl-labelled compounds.

Most of the recovered radiocarbon was in the treated leaves and less than 1.2% of the applied radiocarbon was found in the untreated shoots indicating that fenpropathrin and its metabolites hardly translocate from the application site to other parts of the plant.

Fate of hydrogen cyanide (HCN) and TMPA in abscised leaves

The fate of HCN and TMPA in abscised leaves of apple, kidney bean, cabbage, mandarin orange, tomato and vine was studied. Two abscised leaves from each plant were placed in 100 ml distilled water containing ^{14}C-TMPA at a concentration of 1.0 ppm. After cultivation for five days the leaves were extracted with methanol:chloroform:water (4:2:1).

TMPA was readily converted in plants to more polar products. The metabolic pathways for TMPA varied dependent upon species of plant. The glucose ester was a main product in apple and vine leaves. In orange, cabbages and bean leaves, the malonylglucoside was mainly formed.

Further on, two abscised cabbage leaves were treated for four hours with distilled water containing K^{14}CN and then transferred to K^{14}CN-free distilled water. The study demonstrated that if hydrogen cyanide were liberated during the hydrolysis of fenpropathrin, it would be rapidly converted to natural products.

Summary of plant metabolism

Metabolism of fenpropathrin has been studied in apples, tomatoes, beans, cotton and cabbage.

The general pattern of degradation in all the plant studies include break of the ester linkage to produce 3-phenoxybenzoic acid (PBacid) and the corresponding alcohol (PBalc) and aldehyde (PBald). From the acid side of the molecule, the main metabolite is TMPA which can give rise to TMPA-CH_2OH and TMPA-CH_2OH lactone. PBacid can be hydroxylated at various positions on the phenoxy ring to produce, 2'-or 4'-OH-PBacid.

The majority of radioactivity was found in leaf samples. Low levels of radioactivity were found in fruit/beans. The parent fenpropathrin amounted to the major part of the residue. Fenpropathrin and its metabolites hardly translocate from the application site to other parts of the plant.

Environmental fate

In soil

Studies on the metabolism of fenpropathrin in aerobic soil carried out with [phenoxyphenyl-^{14}C]-fenpropathrin demonstrated that fenpropathrin is degraded in the soil by a combination of photochemical and microbial processes. After 365 days, 18.4% of the dose remained as parent with accumulated volatiles accounting for 59.9% (99.8% of which was CO_2) and un-extractable residues for 17.8%. Metabolism proceeds via cleavage of the ester bonds, hydroxylation, and hydrolysis of the cyano group to $CONH_2$ and COOH groups. Metabolites included desphenyl-fenpropathrin, 4'-OH-fenpropathrin, phenoxybenzoic acid, and $CONH_2$-fenpropathrin, which was further degraded to COOH-fenpropathrin. The estimated half-life was about 4 weeks in moist soil (70–75% field capacity) and 16 weeks in a dryer soil with 16% water content.

Photodegradation studies were carried out with fenpropathrin labelled with ^{14}C in the cyano group, the phenoxyphenyl ring or C-1 position of the cyclopropyl ring. Irradiation greatly enhanced degradation of the fenpropathrin. The main degradation product under irradiation with all three labels was $CONH_2$-fenpropathrin which reached a maximum in the three soils after 5–7 days during the 14-day exposition.

Fenpropathrin is moderately stable in soil under aerobic condition. The photolysis increased the degradation of the surface residues.

Hydrolytic degradation

Fenpropathrin is stable to hydrolysis in water at pH 5 and pH 7 but it is hydrolysed at a moderate rate at pH 9.

Rotational crops

No study was submitted on rotational crops.

Methods of analysis

Analytical methods have been developed for determination of residues of fenpropathrin in plant and animal matrices. In general, the methods involve solvent extraction, clean-up by either silica gel or Florisil column, GLC using electron capture detection. Additional purification using gel permeation chromatography (GPC) was performed for oily matrices. The main variations depending on the substrates are on extraction and clean-up procedures. Fruits and vegetables may be homogenized with water, shaken with acetone, and extracted with dichloromethane, using NaCl to minimize emulsification. After drying with anhydrous sodium sulphate and clean-up by silica gel column chromatography, the solvent is evaporated at < 40 ºC and the residue dissolved in acetone before determination by gas chromatography with electron capture detection. Other extraction procedures involve direct extraction of the homogenized material suspension in water or homogenization with methanol instead of water. The methods were generally validated at 0.01 mg/kg LOQ level. The RSD of recoveries was < 20%

A multi residue method (DFG S19) was validated for the determination of fenpropathrin in plant materials of high water content and acidic plant matrices applying GC-MS detection (m/z 181 and 265 for quantification and 125, 152, 209 and 349 for confirmation).

In a supervised trial on soya bean, the residues were determined with LC-MS/MS utilising the transition of m/z 350→125. The LOQ was 0.01mg/kg.

Stability of residues in stored analytical samples

The stability of fenpropathrin residues in commodities under frozen conditions has been investigated in apples, orange, cotton, pears, grapes, tomato and its processed products as well as in products of animal origin.

Fenpropathrin was shown to be stable at least for the indicated periods (month) in: apple, orange, cotton, pears and grapes (12);cucumber (8); grape juice, dry pomace (14) wet pomace (12), hydrated raisins and raisin waste (11); melons (6); non-bell peppers (10); olives, olive oil (~7); orange oil and orange dried peel (11); raspberries (7); squash (7.5); strawberries (6); tomato (6), tomato paste (5), tomato juice (5) and wet and dry tomato pomace (5) tomato waste (5).

The residues were stable in eggs for 5 months, and milk and kidney at least for 2.5 months.

Definition of the residue

Livestock animal metabolism studies were conducted on lactating goats (50 ppm in feed) and laying hens (0.5 and 5 mg/kg body weight) applying [phenoxyphenyl-^{14}C]- and [cyclopropyl-1-^{14}C]-fenpropathrin.

In milk, at around the plateau at 3–5 days, the parent compound amounted to the major part of residues 28% TRR, (0.02 mg/kg) and 66% TRR, (0.086 mg/kg), respectively. The major metabolites were PBacid-glycine (46% TRR) from phenoxy label and all other metabolites were below 3%TRR from cyclohexyl label.

Following the treatments with 50 ppm [phenoxyphenyl-^{14}C]-fenpropathrin the average residues of the parent fenpropathrin amounted to 0.50 mg/kg (78%TRR) in fat, 0.011 mg/kg (45% TRR) in muscle, 0.14 mg/kg (3.2% TRR) in liver and 0.01 mg/kg (1.2% TRR) in kidney. The major metabolites in these tissues were PBacid-glycine (20–39% TRR), PBacid (11–38% TRR) and 4'-OH-PBacid (11% TRR). The other metabolites were present at lower than 10% TRR.

After the goats were administered with [cyclopropyl-1-^{14}C]-fenpropathrin, the average residues comprised of the parent compound 0.55 mg/kg (81% TRR) in fat, 0.005 mg/kg (11% TRR) in muscle, 0.11 mg/kg (2.5% TRR) in liver and 0.0076 mg/kg (1.5% TRR) in kidney. The major metabolites in these tissues were TMPA-CH_2OH-lactone (19–41% TRR), TMPA (18%TRR), TMPA-CH_2OH (11–16%TRR). The other metabolites were below 5%TRR.

In hens, the parent fenpropathrin was a major residue 0.043 mg/kg (31%TRR) and 0.038 mg/kg (9.7%TRR) in eggs following treatments with benzyl- and cyclopropyl-labelled compounds. The only metabolite exceeding 10% TRR was TMPA-CH_2-OH from cyclopropyl label. Following dosing with benzyl label, the average concentration of parent compound was 0.43 mg/kg (29%TRR) in fat, 0.029 mg/kg (1.6% TRR) in muscle, 0.096mg/kg (7%TRR) in kidneys and 0.014 mg/kg (1% TRR) in liver. After dosing with cyclopropyl label, the average concentration of parent compound was 0.033 mg/kg, (1.55%TRR) in muscle, 0.21 mg/kg (10% TRR) in kidneys, 0.036 mg/kg (2% TRR) in liver. The main metabolites from hens dosed with the benzyl-labelled compound were 3-OH-Bacid (4–29%TRR) or 4'-OH-PBacid (4–16% TRR and PBacid 3.2–24% TRR). While from the cyclopropyl-labelled group the TMPA (6–26% TRR) and its CH_2-OH, COOH, CH_2-OH-lactone derivatives (9–41%TRR) were the major metabolites. Several of these metabolites are also formed from other pyrethroid insecticides.

The parent fenpropathrin was the major residue in milk, meat and eggs and it was detected at low concentrations in liver and kidney. The polar metabolites listed above and the minor ones identified are of no toxicological significance.

The Meeting concluded that the parent fenpropathrin is a suitable marker for animal commodities for both enforcement and dietary risk assessment.

As the fenpropathrin residue concentrates in the fat, based on the distribution of residues in various tissues, supported by the $logP_{ow}$ of 6.0 for fenpropathrin, the Meeting concluded that the fenpropathrin residue is fat soluble.

The fate of fenpropathrin residues was studied in apples, beans, cabbages, cotton and tomatoes. The parent fenpropathrin is the major residue in apple fruits (92–94% TRR), tomato fruits (30–66% TRR), in bean leaves (46% TRR), bean seeds (up to 4.1% TRR), in cabbage leaf extract (up to 16% TRR) and cotton seed (up to 94% TRR). The major metabolites were the conjugates of 2'-OH-fenpropathrin-$(CH_2OH)_2$ and of 4'-OH-fenpropathrin-$(CH_2OH)_2$ (max 19–22% TRR in cabbage), all other metabolites (1.3–9.8%TRR) were < 10% TRR in case of all labelled compounds.

The nature of metabolites is similar to that goats and hens. The polar metabolites listed above are of no toxicological significance.

The Meeting concluded that the parent fenpropathrin is suitable marker for plant commodities for both enforcement and dietary risk assessment.

Validated analytical methods, suitable for enforcement, are available for detecting fenpropathrin in various matrices.

The Meeting agreed in the following residue definition:

Definition of residue for compliance with MRL and for estimation of dietary intake for animal and plant commodities is the parent fenpropathrin.

The residue is fat soluble.

Results of supervised residue trials on crops

The Meeting received supervised trial data on citrus fruits, pome fruits, stone fruits, berries and small fruits, fruiting vegetable, cucurbits, olives, soya beans, cotton, tree nuts, coffee beans and tea.

The HR values were estimated based on the residues measured in single samples.

Citrus fruits

A total of 31 supervised trials were conducted in the United States on citrus fruits (18 on oranges, 6 on lemons and 7 on grapefruit). The current maximum GAP for citrus in the USA consists of two applications at 0.45 kg ai/ha with a total seasonal rate of 0.90 kg ai/ha and a PHI of 1 day.

The average residues in duplicate composite samples derived from treatments corresponding to US GAP were: in oranges: 0.05, 0.07, 0.12, 0.18, 0.25, 0.26, 0.27, 0.33, 0.33, 0.46, 0.53, 0.96, 1.2 mg/kg; in lemons: 0.51, 0.56, 1.2 mg/kg; in grapefruits: 0.12, 0.18, 0.2, 0.34, 0.34, 0.37, 0.47 mg/kg.

The Meeting noted that the GAP in USA is for citrus fruits, that the residue populations were not significantly different (Kruskal-Wallis H-test) and the median residues were within the 5 times range. Furthermore, the Meeting concluded that the residue date sets for lemons, oranges and grapefruits are suitable for estimation of residue levels for the citrus group. The meeting agreed to combine the datasets which in rank order were: 0.05, 0.07, 0.12, 0.12, 0.18, 0.18, 0.2, 0.25, 0.26, 0.27, 0.33, 0.33, 0.34, 0.34, 0.37, 0.46, 0.47, 0.51, 0.53, 0.56, 0.96, 1.2, 1.2 mg/kg.

The Meeting estimated a maximum residue value of 2mg/kg and, based on the processing factor of 0.065, HR of 0.098 mg/kg and STMR values 0.02 mg/kg for citrus fruit group.

Pome fruits

Forty-seven supervised trials on pome fruit (27 in apples and 20 in pears) were conducted in the USA in 1984-1987, using a higher number of applications and total seasonal rates compared to the GAP in the USA (up to 0.9 kg ai/ha and a PHI of 14 days).

Four trials in apple and pear complied with current US GAP. The residues were: in apple: 0.48, 0.58, 0.88 and 1.1 mg/kg; and in pear:0.27, 0.3, 1.2 and 1.8 mg/kg.

The Meeting noted that the GAP in USA is for pome fruit, that the residue populations were not significantly different and that the median residues were within the 5 times range.

The Meeting concluded that the residues in apples and pears could be combined: 0.27,0.3, 0,48, 0.58, 0.88, 1.1, 1.2 and 1.8 mg/kg.

The Meeting noted that in one of the pear samples the residue was 2 mg/kg, and estimated a maximum residue level of 3 mg/kg, HR of 2 mg/kg and STMR of 0.73 mg/kg

The Meeting withdraws its previous recommendation for maximum residue levels of 5 mg/kg

The meeting noted that the short-term intakes of apples and pears for children are 390% and 280% of ARfD, respectively.

There is no alternative GAP available to be considered.

Stone fruits

Supervised trials were carried out in USA on peaches (10), cherries (6) and plums (7) according to US GAP (2 × 0.45 kg ai/ha, 3 days PHI).

The average residues in duplicate composite samples derived from treatments corresponding to US GAP were: in peach: 0.44, 0.58, 0.65, 0.66, 0.70, 0.71, 0.73, 0.92, 1.0, 1.0 mg/kg; in plums; 0.18, 0.22, 0.23, 0.25, 0.32, 0.35, 0.67 mg/kg; and in cherries: 1.4, 1.5, 1.8, 1.9, 3.3, 3.4 mg/kg.

Since the residue populations are not similar, residue levels were estimated separately for each commodity.

The meeting estimated maximum residue, HR and STMR values for subgroups of: peaches 3 mg/kg, 1.1 mg/kg and 0.71 mg/kg; plums 1 mg/kg, 0.71 mg/kg and 0.25 mg/kg; and cherries 7 mg/kg, 3.53, and 1.85 mg/kg, respectively.

The meeting noted that the short-term intakes of peaches and cherries are 190% and 140% of ARfD for children, respectively.

There is no alternative GAP to be considered.

Berries and other small fruits

Strawberry

Eleven out of 12 trials conducted on strawberry in USA matched the US GAP (applications at up to 0.45 kg ai/ha for a total of 0.9 kg ai/ha per season and a PHI of 2 days).

The average residues in duplicate composite samples derived from treatments corresponding to US GAP were: 0.26, 0.38, 0.39, 0.48, 0.48, 0.55, 0.63, 0.65, 0.69, and 1.2 mg/kg.

The Meeting estimated maximum residue level, HR and STMR values of 2 mg/kg, 1.2 mg/kg and 0.515 mg/kg, respectively.

Raspberry

Seven supervised trials on raspberries were conducted in the USA in 2005 with higher rate and shorter PHI (total 0.9 kg/ha with 2 days PHI) than the current GAP for caneberries (applications at up to 0.34 kg ai/ha for a total of 0.67 kg ai/ha per season and a PHI of 3 days).

As no trial matched the GAP, recommendation cannot be made.

Grape

Twenty five supervised trials were conducted on grapes in the USA during 1983–2001 (2 × maximum rate of 0.45 kg ai/ha, the maximum seasonal rate of 0.9 kg/ha with 21 days PHI).

The trial data did not match the critical GAP of the USA. As a result no recommendations could be made.

The Meeting withdraws its previous recommendation of 5 mg/kg.

Assorted tropical and subtropical fruits – Edible peel

Olives

Three supervised trials were conducted on olives in the USA during 2005 matching US GAP (3 × 0.34 kg ai/ha with total seasonal application rates of about 0.9 kg ai/ha and 7 days PHI).

The average residues in pitted olives from two composite samples derived from treatments corresponding to maximum application rates were in rank order: 1.9, 2.2, and 3.6 mg/kg.

Three residue values were not considered sufficient for the estimation of maximum residue levels in olives.

Fruiting Vegetables, Cucurbits

Cucumber

Six supervised trials on cucumber were conducted in the USA in 1994 and 1996, following the GAP in the USA for cucurbit vegetables (applications at the rate of up to 0.34 kg ai/ha at 7 days intervals for a total of 0.9 kg ai/ha/season; PHI is 7 days).

The Meeting noted that the trials were not conducted at maximum GAP. For multiple treatments proportionality could be applied. As a result no recommendations could be made.

Melon

Ten supervised trials on cantaloupe were conducted in the USA in 1994 following the GAP in the USA for cucurbits (applications at the rate of up to 0.34 kg ai/ha for a total of 0.9 kg ai/ha/season; PHI is 7 days).

The Meeting noted that the trials were not conducted at maximum GAP. As the number of applications and or the applied dosage rate differed from maximum GAP, the proportionality could not be applied. As a result no recommendation could be made.

Summer squash

Seven supervised trials on summer squash were conducted in the US in 1994 and 1996, following the GAP in the US for cucurbits (applications at the rate of up to 0.34 kg ai/ha for a total of 0.9 kg ai/ha/season; PHI is 7 days)

The Meeting noted that the trials were not conducted at maximum GAP. As the number of applications and or the applied dosage rate differed from maximum GAP, the proportionality could not be applied. As a result, no recommendation could be made.

Fruiting vegetables other than Cucurbits

Tomato

Nine supervised trials conducted on tomatoes in the USA in 1993 matching the US GAP for fruiting vegetables other than cucurbits (applications at the rate of 0.22-kg ai/ha at 7 days intervals but not more often than 7 days, PHI is 3 days) were received.

The average residues in two composite samples derived from treatments corresponding to maximum application rates, in ranked order, were: 0.05, 0.08, 0.11, 0.18, 0.19, 0.21, 0.27, 0.30, and 0.55 mg/kg.

Peppers

Ten supervised trials on peppers (6 on bell and 4 on non-bell) were conducted in the USA in 1996 and 1998. The application rates corresponded to US GAP (0.22 kg ai/ha up to 0.9 kg ai/ha, 3 days PHI), but samples were taken at 2 and 4 days instead of the 3 day PHI.

The average residues in two composite samples were: in Bell pepper: 0.10, 0.34, 0.37, 0.37, 0.50, 0.67 mg/kg; and Chili pepper: 0.24, 0.31, 0.38, 0.40 mg/kg

The Meeting noted that the residues obtained 2–4 days after last application were in a relatively narrow residue range (2×median) leading to lower maximum residue estimate than would be generally expected. Therefore the residue values obtained at day 2 (-33% of PHI) were considered acceptable. (Only one residue data (0.50 mg/kg) was obtained at day 3 and one at day 4 (0.10 mg/kg).

The Mann-Whitney U-test confirmed that the above data could be combined for the estimation of the maximum residue level and STMR. The ranked order of residues, from supervised trials on peppers were: 0.10, 0.24, 0.31, 0.34, 0.37, 0.37, 0.38, 0.40, 0.50, and 0.67 mg/kg.

The Meeting noted that the GAP in USA is for fruiting vegetables, other than cucurbits and the residue populations were not significantly different (Kruskal-Wallis H-test) and the median residues were within 5 times range. However, the short-term intake for eggplants would exceed the ARfD by 110% for adults. Consequently, a recommendation for the fruiting vegetables crop group could not be made.

No alternative GAP was available for fruiting vegetables other than cucurbits.

The Meeting therefore agreed to estimate residue levels for individual commodities:

Tomato: maximum residue level of 1 mg/kg, HR of 0.64 mg/kg, STMR of 0.19 mg/kg.

Peppers including chili pepper: maximum residue level of 1 mg/kg, HR of 0.70 mg/kg, STMR of 0.37 mg/kg.

Chili peppers, dried (based on concentration factor of 7): maximum residue level of 7 mg/kg, HR of 4.9 mg/kg mg/kg, STMR of 2.59 mg/kg.

The meeting confirms its previous recommendation for maximum residue level of 1 mg/kg for tomatoes.

Pulses

Soya beans

Eight supervised trials on soya beans were conducted in Brazil in 2010 and 2013, following the GAP in Brazil (one applications at the rate of 0.045 kg ai/ha and a PHI of 30 days). Residues in all samples were below the limit of quantification (< 0.01 mg/kg).

The Meeting estimated a maximum residue and STMR values of 0.01 mg/kg.

Cotton

Thirty-two supervised trials on cotton were conducted in the USA in 1983–1989 with application rates up to 0.9 kg ai/ha and a PHI of 21 days. The current US GAP is up to 0.45 kg ai/ha with a seasonal maximum rate of 0.9 kg/ha and a PHI of 21 days.

As 5–10 applications were made with low dose rates, which do not represent the critical GAP, no recommendations could be made.

The Meeting withdraws its previous recommendation of 1 mg/kg.

Tree nuts

A total of ten supervised trials on tree nuts, 5 on almonds and 5 on pecans have been conducted in the US in 2003, with application rates of 0.45 and 0.9 kg ai/ha at 7 days intervals instead of the minimum 10 days specified on the label.

The following average residue levels in two composite samples were obtained from the trials on almonds and pecans:

Almond nutmeat: < 0.01(4), 0.03 mg/kg; and in pecans: < 0.01, 0.01, 0.02, 0.05, 0.06 mg/kg.

The Meeting noted that the GAP in USA is for tree nuts and the residue populations were not significantly different (Mann-Whitney U-test) and the median residues were within 5 times range. The Meeting agreed to combine the datasets for almonds and pecans which, in ranked order, were: < 0.01(4), < 0.<u>01</u>, <u>0.01</u>, 0.02, 0.03, 0.05, and 0.06 mg/kg.

As the highest residue in an individual samples was 0.1 mg/kg, the Meeting estimated a maximum residue level of 0.15 mg/kg, HR of 0.1 mg/kg and STMR value of 0.01 mg/kg.

Coffee Beans

Six supervised trials on coffee were conducted in Brazil in 2013 following the current GAP there (two applications at a maximum rate of up to 0.12 kg ai/ha and a PHI of 14 days).

Residues in composite samples, in ranked order, were: < 0.01(4), 0.01, and 0.02 mg/kg.

The Meeting estimated a maximum residue level of 0.03 mg/kg and STMR value of 0.01 mg/kg.

Tea

All supervised trials on tea were conducted in India during 2002–2004. The compound was applied according to the GAP in India (0.05–0.06 kg ai/ha with a PHI of 7 days) and with double rate.

Six trials on black tea and in one trial green tea leaves (0.13 mg/kg) were analysed

The residues in composite samples following application at the GAP rate were: < 0.05, 0.13, <u>0.14</u>(2), 0.17, 0.18, and 1.38 mg/kg.

The Meeting estimated a maximum residue level for green and black tea of 3 mg/kg and STMR value of 0.14 mg/kg.

The Meeting withdrew its previous recommendation of 2 mg/kg for maximum residue level for tea.

Animal feeds

Almond hulls

The US GAP specifies application rates of up to 0.45 kg ai/ha with a seasonal maximum of 0.9 kg ai/ha at 10 days intervals, and a PHI of 3 days.

In almond hulls, the ranked order of residue concentrations was 2.7, 2.9, 3.1, 3.5, and 3.6 mg/kg. The Meeting estimated a maximum residue level of 10 mg/kg, the highest residue is 3.6 mg/kg and the median residue is 3.1 mg/kg.

Cottonseed hull

The trial conditions did not match US GAP (2×0.45, max seasonal rate 0.9 mg/kg, PHI 21 days), no recommendations could be made.

Fate of residues during processing

Processing studies were carried out on plums, tomato, olives, oranges, cottonseed and tea.

The processing factors calculated and STMR-P values estimated are summarized below.

Summary of selected processing factors and STMR-P values for fenpropathrin

RAC/processed fraction	Processing factors					PF estimated	STMR-P (mg/kg)
RAC: Whole orange	-						
Juice	< 0.02	< 0.22				< 0.02	0.007
Oil	78.7	21.56				50.1	16.5
Wet peel	0.6	0.78	2.76		2.86	2.82	0.93
Dried peel	1.6	2.67				2.1	0.70
Pulp			0.06		0.07	0.065	0.021
RAC: Plum							
Dried plum	2.56					2.56	0.639
RAC: Tomato							
Canned	0.077	0.071	0.077			< 0.075	0.021
Wet pomace				9.9	9.8	9.8	1.867
Dry pomace				46	45.0	45	8.618
Tomato paste				0.78	0.75	0.77	0.145
Tomato juice				0.12	0.1	0.12	0.023

Note: The residues measured in RAC samples taken at the processing plants are considered as they better reflect the residues in unprocessed commodities than these measured in field samples

There is no concentration of residues in juice and molasses. Residues concentrate in oil (Pf=50.1), and dried peel (Pf=2.1).

The Meeting estimated a maximum residue level of 100 mg/kg and STMR-P of 16.5 mg/kg for citrus oil,

Drying concentrates the residues of fenpropathrin in plums by a factor of 2.6×; The Meeting estimated maximum residue level of 3 mg/kg, HR-P of 1.85 mg/kg and STMR-P of 0.65 mg/kg for dried plums (or prunes).

As no MRL could be estimated, the Meeting withdraws its previous recommendation of 3 mg/kg for cottonseed oil.

Residues in animal commodities

Estimation of dietary burden

The maximum and mean dietary burdens were calculated using the highest residues or median residues of fenpropathrin estimated at the current Meeting on a basis of the OECD Animal Feeding Table. Only almond hull, citrus pulp and tomato wet pomace can be used as animal feed based on recommended uses. The calculated maximum and mean animal burdens are summarised below

Summary of livestock dietary burdens (ppm of dry matter diet)

	US-Canada		EU		Australia		Japan	
	max	mean	max	Mean	max	mean	Max	mean
Beef cattle	0.09	0.09	0.045	0.045	1.46[a]	1.46[b]	0	0
Dairy cattle	0.43	0.04	0.18	0.18	1.46	1.46	0	0
Broilers	0	0	0	0	0	0	0	0
Layers	0	0	0	0	0	0	0	0

[a] Suitable for estimating maximum residue levels for milk, meat, fat and edible offal of cattle.
[b] Suitable for estimating STMRs for meat, fat and edible offal of cattle.

Farm animal feeding studies

Lactating Holstein cows were orally administered technical grade fenpropathrin (purity 92.5%) via gelatin capsules for 28 consecutive days in two equal portions at the morning and evening milkings. The treatment levels were 0, 25, 75 and 250 ppm fenpropathrin based upon the daily average food consumption.

Residues of fenpropathrin in the milk reached a plateau after three days. Average residues in the whole milk of the four cows of each group on Day 3 were 0.04, 0.17 and 0.33 mg/kg for the three dose levels. On Day 28, these levels were 0.04, 0.13 and 0.32 mg/kg. At the end of the three-day depuration period, residues had fallen to < 0.01, 0.02 and 0.04 mg/kg for the three levels. Pasteurization did not significantly reduce fenpropathrin residues in milk. The residues concentrated in milk fat by a factor of about 10 (from mean of 0.32 mg/kg in whole milk to 3.7 mg/kg in milk fat)

After 28 days of dosing, maximum and (average) residues, expressed in mg/kg, in muscle, kidney, liver and fat were 0.33 (0.2), 0.2 (0.16), 0.01 (0.01), and 4.1 (3.8) mg/kg, respectively, at the maximum 250 ppm dose level. The residues determined after feeding with 25 ppm fenpropathrin in feed, and the corresponding residues in tissues and milk resulted from the calculated mean and max dietary burden (1.46 ppm) are summarised below.

Dietary burden	Fat		Meat		Liver		Kidney		Milk
	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Mean
25 ppm	0.44	0.33	0.04	0.02	< 0.01	< 0.01	0.05	0.03	0.04
1.46 ppm	0.026	0.018	0.002	0.001	< 0.0006	< 0.0006	0.003	0.002	0.002

Based on the data available the Meeting estimated maximum residue levels of 0.03 mg/kg, HR value of 0.026 mg/kg and STMR value of 0.018 mg/kg for mammalian fat except milk fat.

The Meeting estimated, at the LOQ of 0.01 mg/kg, maximum residue level of 0.01 mg/kg for mammalian meat and edible offal and 0.01 mg/kg for milk. The HR values for meat and edible offal are 0.002 mg/kg and 0.003 mg/kg, respectively

The Meeting estimated STMR values of 0.001 mg/kg for mammalian meat, 0.002 mg/kg for mammalian, edible offal of, and 0.002 mg/kg for milk.

The Meeting withdraws its previous recommendations for cattle meat, edible offal and milk.

Laying hens

Laying hens were dosed at nominal concentrations of 0, 2.5, 7.5 and 25 ppm levels for a period of 28 days. The fenpropathrin residues were below 0.01 mg/kg in case of dose groups 2.5 and 7.5 ppm over the study period. Eggs derived from 25 ppm dose contained 0.02 mg/kg fenpropathrin from day 7. Residues in muscle, gizzard and liver samples were below the LOQ of 0.01 mg/kg in all dose groups. The fenpropathrin residue in fat was 0.02, 0.05 and 0.14 mg/kg for dose groups of 2.5, 7.5 and 25 ppm. Metabolites could only be detected in liver after dosing with 25 ppm were TMPA (0.05 mg/kg) and PBA-glycin (0.03 mg/kg). The distribution of residues between white and yolk was not studied.

Taking into account that poultry feed is not treated with fenpropathrin according to the uses evaluated by the present Meeting, the Meeting estimated maximum residues levels in poultry meat , fat, edible offal and eggs of 0.01 mg/kg*.

The Meeting estimated STMR values of 0 for poultry products

The Meeting withdraws its previous recommendations for poultry products.

RECOMMENDATIONS

On the basis of the data from supervised trials, the Meeting concluded that the residue levels listed below are suitable for establishing maximum residue limits and for IEDI assessment.

Definition of residue for compliance with MRL and for estimation of dietary intake for animal and plant commodities is fenpropathrin.

The residue in fat soluble.

DIETARY RISK ASSESSMENT

Long-term intake

The evaluation of fenpropathrin resulted in recommendations for MRLs and STMR values for 24 raw and processed commodities. Where data on consumption were available for the listed food commodities, dietary intakes were calculated for the 17 GEMS/Food Consumption Cluster Diets. The results are shown in Annex 3 of the 2014 Report.

The IEDIs in the seventeen Cluster Diets, based on the estimated STMRs were 1–10% of the maximum ADI (0.03 mg/kg bw). The Meeting concluded that the long-term intake of residues of fenpropathrin from uses that have been considered by the JMPR is unlikely to present a public health concern.

Short-term intake

The International Estimated Short-term Intake (IESTI) for fenpropathrin was calculated for 24 raw and processed commodities for which maximum residue levels and STMR values were estimated. The results are shown in Annex 4 to the 2014 Report.

For cherries, peaches, and pome fruits the IESTI represented 140%, 180% and 390% of the ARfD of 0.03 mg/kg bw, respectively. No alternative GAP was available. On the basis of information provided to the JMPR it was not possible to conclude that the estimate of short-term intake of fenpropathrin, from the consumption of cherries, peaches and pome fruits, was less than the ARfD.

The other commodities considered by the JMPR were within 0–80% of ARfD. The Meeting concluded that the short-term intake of fenpropathrin when used in ways that have been considered by the MPR is unlikely to present public health concern.