5.9 CYPERMETHRINS (118)

INCLUDES CYPERMETHRIN (118), ALPHA-CYPERMETHRIN AND ZETA-CYPERMETHRIN

RESIDUE AND ANALYTICAL ASPECTS

Cypermethrin was first evaluated by the 1979 JMPR and a number of times subsequently. It was reviewed for toxicology by the 2006 JMPR within the periodic review programme of the CCPR; the review included alpha-cypermethrin and zeta-cypermethrin, which had not previously been considered by the JMPR. The periodic review for residues was scheduled for 2008.

CCPR, at its 39th Session in 2007, noted that three manufacturers would submit residue data to JMPR on cypermethrins (including alpha and zeta cypermethrin) for consideration by the 2008 JMPR. Information and data were also provided by Australia, Japan, Malaysia and Thailand.

Separate monographs have been prepared for each of the three compounds, but they are considered together in a single appraisal.

The Meeting agreed that metabolism studies, environmental fate studies, methods of analysis and freezer storage stability studies of the cypermethrins were mutually supportive and should be considered together.

Comparison of composition

Isomer	cypermethrin	alpha-cypermethrin	zeta-cypermethrin
1R, cis-R	14	-	3
1S, cis-S	14	-	22
1R, cis-S	11	50	22
1S, cis-R	11	50	3
1R, trans-R	14	-	3
1S, trans-S	14	-	22
1R, trans-S	11	-	22
1S, trans-R	11	-	3

Animal metabolism

The Meeting received studies on lactating dairy cows and laying hens for both alpha-cypermethrin and cypermethrin. Studies on rats were reviewed by JMPR during the toxicology evaluation in 2006; rat studies were made available again.

After oral dosing of livestock with cypermethrins, much of the residues are readily excreted. The main component of the residue in tissues, milk and eggs is parent compound. The residue is fat soluble.

When a lactating dairy cow was orally dosed with [^{14}C]alpha-cypermethrin at the equivalent of 19 ppm in the diet over 5 days, the TRR quickly approached a plateau in milk. When milk was separated, 93% of the residue was in the cream suggesting fat solubility. TRR levels in tissue fat were approximately 20 times as high as in the muscle, also suggesting fat solubility.

Similar results were obtained from lactating dairy cow studies with cypermethrin. Levels of ^{14}C in the tissues from cypermethrin labelled in the cyclopropyl ring or the benzyl ring were much the same, suggesting that the ester bond was still intact in the residue.

When laying hens were orally dosed with [^{14}C]alpha-cypermethrin over 14 days, much of the ^{14}C was quickly excreted in the faeces. The TRR in eggs approached a plateau by days 7–9. Parent

alpha-cypermethrin was the major identified component in fat and eggs, and the distribution between tissue fat and muscle suggested fat solubility. Metabolites at low levels were produced by ester cleavage and hydroxylation of the phenoxy ring.

A study with cypermethrin dosing of laying hens produced similar results. Ester hydrolysis was the main initial metabolic pathway for cypermethrin. Parent cypermethrin was a significant part of the residue in fat and egg yolks. DCVA (3-(2,2-dichlorovinyl)2,2-dimethylcyclopropane carboxylic acid) was a major part of the residue in muscle and liver. A number of minor metabolites were identified, especially in liver, as resulting from ester cleavage and hydroxylation of the phenoxy group.

The metabolic pathways of the cypermethrins in rats, cattle and hens are qualitatively similar in the respect that the metabolic products result from ester hydrolysis and hydroxylation.

No specific information was provided on possible isomerisation during animal metabolism. However, in the abiotic hydrolysis experiments with alpha-cypermethrin, epimerization rates were more rapid than hydrolysis rates, which suggest that where hydrolysis occurs, epimerization is a possibility.

Plant metabolism

The Meeting received plant metabolism studies with cypermethrin on lettuce, sugar beet, maize, cotton and apples; alpha-cypermethrin on cabbages and wheat, and zeta-cypermethrin on maize.

When cypermethrins are applied to a crop, the highest residue occurs on parts of the plant exposed to direct application. Parent compound is the major identified residue with very little absorbed or translocated. Metabolites result from ester hydrolysis and hydroxylation processes. Exposed residues are subject to isomerisation, presumably by a photolytic process.

When [^{14}C]cypermethrin was applied to lettuce via syringe, cypermethrin was a major part of the residue in lettuce sampled 30 days later. In a second experiment with lettuce, the levels of TRR were much higher in the outer leaves than in the inner leaves.

In a later study, when [^{14}C]cypermethrin was sprayed on lettuce plants, which were harvested 18 and 21 days after the second application, the ^{14}C residue was mostly on the outer leaves and cypermethrin was the main residue component, suggesting that cypermethrin is not translocated.

In a cabbage study with [^{14}C]alpha-cypermethrin, the residue occurred mostly on the outer (exposed) leaves and alpha-cypermethrin was the major component. Very little of the alpha-cypermethrin moved elsewhere in the plant. The alpha-cypermethrin residue had undergone considerable cis-trans isomerisation, with the cis 2 component, originally constituting 100% of alpha-cypermethrin, falling to 44% and 54% of the cypermethrin residue in the old and new leaves respectively. The isomerisation was presumably a photochemical reaction.

In the wheat studies with alpha-cypermethrin, the highest residue of ^{14}C occurred in the chaff and straw, the part of the plant exposed to the application. Parent alpha-cypermethrin was a major component of the residue. Translocation to the grain was minor. Where alpha-cypermethrin was exposed to sunlight, it was subject to isomerisation. Identified metabolites, which were generally minor components of the residue, resulted from ester hydrolysis or hydroxylation of a benzene ring.

When [^{14}C]cypermethrin was foliar sprayed three times on sugar beet, parent cypermethrin was the main component of the residue in roots (TRR 0.48 and 0.68 mg/kg) and leaves (TRR 7.0 and 9.1 mg/kg) when the crop was harvested 3 weeks after the final application. Metabolite DCVA and its conjugates (glucoside, malonyl glucoside and glucoside disulfate) constituted 35% of the TRR in both foliage and roots.

When [^{14}C]cypermethrin was painted on leaves of maize plants, very little of the ^{14}C reached the ears or grain. Parent cypermethrin was the major component of the residue in parts of the plant that were directly treated constituting 64–82% of the TRR in forage, silage, fodder and husk + stalk.

DCVA and 3-phenoxybenzoic acid (and related degradation products) were identified in the residue as well as 4'-hydroxy-cypermethrin and cyperamide (-CN converted to $–CONH_2$).

The pattern of residues occurring in a maize metabolism study with foliar applied [^{14}C]zeta-cypermethrin was generally similar to that from the previous study with cypermethrin. A comparison of cis:trans ratios between the parent compound and the residue showed that the cis isomer was depleting more quickly. A parallel study with cypermethrin confirmed the similarity in residue behaviour between zeta-cypermethrin and cypermethrin. One difference was that the cis:trans ratio changed very little in the residue from cypermethrin labelled in the cyclopropyl ring.

When cotton was foliar sprayed with [^{14}C]cypermethrin and the crop harvested 74 and 88 days after treatment, parent cypermethrin was the major identified component of the residues, constituting 23–25% of TRR in the forage and 16% in the cotton seed. Numerous metabolites were identified that resulted from ester hydrolysis and hydroxylation.

In an experiment with apples where acetone solutions of [^{14}C]*cis*-cypermethrin and [^{14}C]*trans*-cypermethrin were applied to leaves or the surface of apples, residues remained mostly on the peel of apples harvested 22 days later. Part of the *cis*-cypermethrin had been converted to *trans*-cypermethrin (30% in leaf and 15% in apple peel), but not the reverse. Cypermethrin was the main component of the residue in apples. Metabolites resulting from ester hydrolysis were identified.

Environmental fate in soil

The Meeting received information on soil aerobic metabolism, soil photolysis and crop rotation.

The cypermethrins are generally not persistent in soils. Their residues in soils resulting from recommended uses should not contribute to the residues in root vegetables or to residues in succeeding crops. Identified soil metabolites result from ester hydrolysis. Cyperamide is produced in soil surface photolysis.

In laboratory soil metabolism studies, the half-lives were:

- alpha-cypermethrin at 20–25 °C: 20 days to 24 weeks (n = 3);
- cypermethrin at 20–25 °C: 6 days to 61 days (n = 10).

DCVA and 3-phenoxybenzoic acid were identified as soil metabolites.

In a series of soil metabolism studies at 25 °C with *cis*- and *trans*-cypermethrin, the percentage parent remaining after 52 weeks was 4.9–11% (n = 4) for *cis*-cypermethrin and 1.4–4.1% (n = 4) for *trans*-cypermethrin. 3-Phenoxybenzoic acid was identified as a metabolite.

The measured half-lives in soil surface hydrolysis studies were: alpha-cypermethrin 30 days; cypermethrin 470–690 hours (n = 4). DCVA, 3-phenoxybenzoic acid and cyperamide were identified as transformation products.

In a confined rotational crop study with wheat, cotton, lettuce and sugar beet, soil was treated with [^{14}C-benzyl ring]cypermethrin at the equivalent of 1 kg ai/ha and the crops were sown at 30, 60, 90 and 120 days later. Low levels of ^{14}C did enter all the crops, with concentrations lower as the time interval increased. The levels were too low for component identification. A parallel experiment with [^{14}C-cyclopropyl]cypermethrin and sugar beet produced similar results.

Metabolism in water-sediment systems

The Meeting received information on the fate of zeta-cypermethrin during aerobic aquatic metabolism.

Zeta-cypermethrin is not persistent in aerobic water-sediment systems with much of the residue being mineralized in a relatively short time.

The measured half-lives of parent zeta-cypermethrin in water-sediment systems at 20 and 25 °C were 8.8–12 days (n = 6). Identified metabolites were: 3-phenoxybenzoic acid, DCVA, DCVA dicarboxylic acid. Metabolites reached their maximum concentrations before the end of the experiments (duration 30 and 99 days), so were also metabolizing further. The degree of mineralization in 30 days was 47% and 11% and in 99 days was 16%, 21%, 52% and 57%.

Methods of analysis

The Meeting received descriptions and validation data for numerous analytical methods for residues of the cypermethrins in raw agricultural commodities, processed commodities, feed commodities, animal tissues, milk and eggs.

Residue analytical methods for the cypermethrins rely on GC-ECD, GC-MS or LC-MS-MS. Typically the residues can be measured in most matrices to an LOQ of 0.01 mg/kg (0.05 mg/kg in some older studies). Multiresidue method DFG S-19 is suitable for residue analysis of cypermethrin.

Stability of residues in stored analytical samples

Information was received on the freezer storage stability of:

- alpha-cypermethrin residues in apple, cattle fat, cattle kidney, cattle liver, cattle milk, cattle muscle, lettuce, oilseed rape plant, oilseed rape pod, oilseed rape seeds, soya bean, tomato, wheat, wheat grain, wheat green plant and wheat straw.
- cypermethrin residues in apples, cabbage, cotton seed, egg, green peas, lettuce, lettuce, poultry liver, poultry muscle, rape seed, soya beans, tomatoes and wheat grain.
- zeta-cypermethrin residues in dry pea grain, molasses, sugar beet dried pulp, sugar beet roots, wheat grain and white sugar.

Residues were apparently stable at freezer temperature for the intervals tested except for a few studies where no conclusion could be reached because of experimental problems. In an oilseed rape plant, pods and seeds study with alpha-cypermethrin, no samples were analysed until 4.5–5 months after fortification when residues were 40–50% of the nominal fortification level.

In an alpha-cypermethrin study on apples, residues were apparently stable for 52 weeks (110%) but had declined to 65% by week 84.

The results of a cypermethrin study on eggs were inconclusive because of low analytical method recoveries.

Residue definition

The parent compound (whether cypermethrin, alpha-cypermethrin or zeta-cypermethrin) is the dominant component of the residue in crop commodities and in tissues, milk and eggs from oral dosing of livestock. In animal metabolism, it displays the properties of a fat-soluble compound.

Some isomerisation and differential decay rates for different isomers occur for exposed residues in the field, so the composition of the residue is not necessarily identical with that of the applied compound.

The current residue definition, cypermethrin (sum of isomers), is a suitable analyte for enforcement purposes.

The Meeting decided that the residue would continue to be defined as fat-soluble.

The Meeting recommended a residue definition for the cypermethrins.

For plants and animals. Definition of the residue (for compliance with the MRL and for estimation of dietary intake)*: cypermethrin (sum of isomers).*

The residue is fat soluble.

Use pattern

The Meeting received information on the use patterns and labels for alpha-cypermethrin, cypermethrin and zeta-cypermethrin from many countries.

Results of supervised residue trials on crops

The Meeting received supervised trials data for alpha-cypermethrin, cypermethrin and zeta-cypermethrin.

Alpha-cypermethrin: citrus, apples, pears, cherries, peaches, grapes, strawberries, olives, leek, onion, broccoli, Brussels sprouts, cabbage head, cauliflower, cucumber, melon, egg plant, sweet peppers, sweet corn, tomato, kale, leafy cabbage, lambs lettuce, lettuce, spinach, peas, beans, soya beans, potato, sugar beet, turnip, asparagus, artichoke, barley, maize, oats, rice, sorghum, wheat, almond, cotton, linseed, rapeseed, cocoa, parsley, alfalfa, pea fodder and forage, bean fodder and forage, barley fodder and forage, maize fodder and forage, oats fodder and forage, rice fodder and forage, wheat fodder and forage, sugar beet leaves or tops, cotton fodder, rape seed fodder, hops and tea.

Cypermethrin: grapes, carambola, olives, durian, litchi, longan, mango, papaya, leek, onion, broccoli, Brussels sprouts, cabbage head, cauliflower, melon, okra, peppers Chilli, tomato, lettuce, spinach, peas, beans, carrot, potato, sugar beet, artichoke, asparagus, barley, maize, wheat, wheat, cotton seed, rapeseed, alfalfa, pea fodder and forage, bean fodder and forage, barley fodder and forage, maize fodder and forage, wheat fodder and forage and sugar beet leaves or tops.

Zeta-cypermethrin: pome fruits, stone fruits, onion, broccoli, cucurbits, peppers, tomatoes, sweet corn, endive, lettuce, lettuce, spinach, mustard greens, peas, field beans, soya bean seed, sugar beet, sugar beet, maize, barley, wheat, oats and triticale, rice, sugar cane, peanuts, oilseed rape, cotton seed, coffee, alfalfa, pea fodder and forage, bean fodder and forage, barley fodder and forage, sweet corn fodder and forage, maize fodder and forage, oats and triticale straw, wheat fodder and forage, rice straw and sugar beet tops.

Where multiple sets of sufficient residue data were available on a commodity for more than one compound or with different uses (e.g., field and glasshouse), the set of data first chosen to support an MRL for that commodity was the one producing the highest estimated maximum residue level.

Where multiple sets of sufficient residue data were available for commodities in a Codex Commodity Food Group and where the Meeting decided to recommend a Commodity Group MRL, the set of data first chosen to support the MRL for that commodity group was the one producing the highest estimated maximum residue level.

The cypermethrins are used at quite low application rates, often around the 10–50 g ai/ha. For some commodities, residue levels arising from such low application rates may not produce detectable residues even on the day of application. For example, the median residue produced on the day of treatment by a 10 g ai/ha application would be expected to be at 0.01 mg/kg or lower for apples, Brussels sprouts, cucumber, melons, oranges, peppers, plums, summer squash and tomatoes.

Questions would usually be raised about the validity of a supervised trial where residues were not detected on the day of application to an exposed commodity, but allowance must be made for the low application rate.

No residue data were received for mushrooms. The Meeting withdrew the previous recommendation of 0.05* mg/kg for mushrooms.

Citrus fruits

No suitable GAP was available to evaluate the alpha-cypermethrin trials on citrus. The Meeting withdrew the previous recommendation of 2 mg/kg for citrus fruits.

Pome fruits

Polish GAP allows the use of alpha-cypermethrin on apple trees at 0.018 kg ai/ha with a PHI of 7 days. In two French trials matching Polish GAP (± 30% application rate), alpha-cypermethrin residues on apples were 0.01 and 0.05 mg/kg. In 6 German trials on apples matching Polish GAP (± 30% application rate), alpha-cypermethrin residues were: 0.05, 0.05, 0.05, 0.07, 0.08 and 0.17 mg/kg.

No suitable GAP was available to evaluate the remaining alpha-cypermethrin apple trials or the pear trials.

US GAP for pome fruit allows the use of zeta-cypermethrin at 0.056 kg ai/ha with a 14 days PHI. In 23 US trials matching GAP, zeta-cypermethrin residues on apples were: 0.11, 0.11, 0.11, 0.12, 0.12, 0.13, 0.13, 0.13, 0.13, 0.13, 0.14, 0.15, 0.20, 0.21, 0.21, 0.22, 0.23, 0.24, 0.25, 0.25, 0.28 and 0.31 mg/kg.

US GAP for pome fruit allows the use of zeta-cypermethrin at 0.056 kg ai/ha with a 14 days PHI. In 12 US trials matching GAP, zeta-cypermethrin residues on pears were: 0.05, 0.05, 0.06, 0.07, 0.24, 0.29, 0.31, 0.33, 0.39, 0.43, 0.49and 0.56 mg/kg.

The Meeting decided to use the combined apple and pear zeta-cypermethrin data, 34 trials, for a pome fruit recommendation, rank order, median underlined: 0.05, 0.05, 0.06, 0.07, 0.11, 0.11, 0.11, 0.12, 0.12, 0.13, 0.13, 0.13, 0.13, 0.13, 0.14, 0.15, <u>0.20</u>, <u>0.21</u>, 0.21, 0.22, 0.23, 0.24, 0.24, 0.25, 0.25, 0.28, 0.29, 0.31, 0.31, 0.33, 0.39, 0.43, 0.49 and 0.56 mg/kg.

On the basis of the zeta-cypermethrin data, the Meeting estimated a maximum residue level of 0.7 mg/kg for pome fruits to replace the previous recommendation of 2 mg/kg. The Meeting estimated STMR and HR values of 0.205 and 0.56 mg/kg respectively for pome fruits.

Stone fruits

Romanian GAP allows the use of alpha-cypermethrin on cherry and peach trees at a spray concentration of 0.0015 kg ai/hL and a PHI of 7 days.

In three French trials on cherries matching Romanian GAP, alpha-cypermethrin residues on cherries were < 0.05, 0.06 and 0.11 mg/kg.

In one French trial on peaches matching Romanian GAP, alpha-cypermethrin residues on peaches were 0.02 mg/kg.

In South Africa, alpha-cypermethrin may be used on peaches with a spray concentration of 0.0005 kg ai/hL and an interval to harvest of 14 days. In two South African trials according to GAP conditions, residues in the peaches were < 0.05 and 0.06 mg/kg.

No suitable GAP was available to evaluate the remaining alpha-cypermethrin peach trials.

US GAP for stone fruit allows the use of zeta-cypermethrin at 0.056 kg ai/ha with a 14 days PHI.

In 12 US trials matching stone fruit GAP, zeta-cypermethrin residues on cherries were: 0.52, 0.52, 0.53, 0.57, 0.58, <u>0.58</u>, <u>0.60</u>, 0.64, 0.77, 0.80, 0.86 and 0.94 mg/kg. This data set was used for maximum residue level estimation.

In 18 US trials matching stone fruit GAP, zeta-cypermethrin residues on peaches were: 0.08, 0.09, 0.09, 0.09, 0.09, 0.09, 0.10, 0.10, <u>0.10</u>, <u>0.10</u>, 0.11, 0.13, 0.13, 0.14, 0.14, 0.14, 0.15 and 0.16 mg/kg.

In 12 US trials matching stone fruit GAP, zeta-cypermethrin residues on plums were: 0.06, 0.06, 0.06, 0.06, 0.07, 0.08, 0.15, 0.18, 0.18, 0.21, 0.21 and 0.27 mg/kg.

The Meeting noted that zeta-cypermethrin cherry data were probably a different population from the peach and plum data and should not be combined. The Meeting noted that the GAP was for 'stone fruit' and decided to recommend a stone fruits MRL based on the cherry data.

On the basis of the zeta-cypermethrin cherry data, the Meeting estimated a maximum residue level of 2 mg/kg for stone fruits to replace the previous recommendations for cherries, nectarines, peaches and plums. The Meeting estimated STMR and HR values of 0.59 and 0.94 mg/kg respectively for stone fruits.

Grapes

French GAP for grapes allows the use of alpha-cypermethrin at 0.015 kg ai/ha with a 14 days PHI.

In 39 French and German trials on grapes matching French GAP (± 30% application rate), alpha-cypermethrin residues on grapes were (rank order, median underlined): < 0.01 (6), 0.01 (8), 0.02 (6), 0.03 (4), 0.04, < 0.05(10), 0.05, 0.06, 0.06 and 0.07 mg/kg.

Greek and Portuguese GAPs for grapes allow the use of alpha-cypermethrin at 0.015 kg ai/ha with a 7 days PHI.

In 18 Greek, Italian and Spanish trials on grapes matching Greek and Portuguese GAP (± 30% application rate), alpha-cypermethrin residues on grapes were: < 0.01 (4), 0.01 (4), 0.03, 0.03, 0.04, 0.05, 0.05, < 0.05 (4) and 0.05 mg/kg.

In 18 French trials on grapes matching Greek and Portuguese GAP (± 30% application rate), alpha-cypermethrin residues on grapes were: < 0.01 (10), 0.01, 0.01, 0.03, 0.04, 0.06, 0.08, 0.08 and 0.09 mg/kg. This data set was used for maximum residue level estimation.

No suitable GAP was available for evaluating the cypermethrin trials on grapes.

On the basis of the 18 alpha-cypermethrin trials in France matching Greek and Portuguese GAP, the Meeting estimated a maximum residue level of 0.2 mg/kg for grapes. The Meeting estimated STMR and HR values of 0.01 and 0.09 mg/kg respectively for grapes.

Strawberries

Alpha-cypermethrin may be used in Greece and Italy on glasshouse strawberries at 0.050 kg ai/ha with a PHI of 3 days. No glasshouse trials on strawberries were available at an application rate of 0.050 kg ai/ha.

Alpha-cypermethrin may be used on strawberries in the field in France at an application rate of 0.011 kg ai/ha with harvest 3 days later.

In 16 strawberry trials in Belgium, France, Germany, Netherlands and the UK matching French GAP (± 30% application rate), alpha-cypermethrin residues (rank order, median underlined) were: 0.005, 0.006, < 0.01 (11), 0.02, 0.02, 0.03 mg/kg.

Greek GAP allows the use of alpha-cypermethrin on strawberries in the field at 0.030 kg ai/ha with harvest 3 days later.

In eight strawberry trials in Greece, Italy and Spain matching Greek GAP (± 30% application rate), alpha-cypermethrin residues (rank order, median underlined) were: < 0.01 (5), 0.02, 0.02 and 0.05 mg/kg. This data set was used for maximum residue level estimation.

The two data populations are quite similar. The Meeting agreed to use the eight trials from Greece, Italy and Spain as the basis for the residue estimations.

On the basis of the eight alpha-cypermethrin trials in Greece, Italy and Spain matching Greek GAP, the Meeting estimated a maximum residue level of 0.07 mg/kg for strawberries. The Meeting estimated STMR and HR values of 0.01 and 0.05 mg/kg respectively for strawberries.

Olives

In Greece, alpha-cypermethrin may be used on olive trees at 0.030 kg ai/ha with a 7-days PHI. No trials were available to support the Greek GAP.

In Algeria, alpha-cypermethrin is registered for use on olive trees at a spray concentration of 0.002 kg ai/hL with harvest 14 days later.

In eight trials on olives in Greece and Spain where alpha-cypermethrin was used according to Algerian GAP (± 30% spray concentration), alpha-cypermethrin residues were: < 0.05 mg/kg (8). Residues were present in some samples from the trials, so it is not an 'essentially zero residue' situation and the STMR and HR are estimated equivalent to the LOQ.

No relevant GAP was available to evaluate the cypermethrin trials on olives.

On the basis of the eight alpha-cypermethrin trials in Greece and Spain matching Algerian GAP, the Meeting estimated a maximum residue level of 0.05* mg/kg for olives. The Meeting estimated STMR and HR values of 0.05 and 0.05 mg/kg respectively for olives.

Carambola

Cypermethrin is registered for use on carambola in Malaysia at 0.023 kg ai/ha with a PHI of 3 days.

In five carambola trials from Malaysia with cypermethrin use matching GAP, residues were (rank order, median underlined): < 0.02, < 0.02, < 0.<u>02</u>, 0.03 and 0.09 mg/kg.

The Meeting recognized that carambola is a minor crop and that five trials were sufficient for estimating a maximum residue level.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in carambola of 0.2, 0.02 and 0.09 mg/kg respectively.

Durian

In Thailand, cypermethrin is registered for use on durians at a high-volume spray concentration of 0.0125 kg ai/hL with harvest 14 days later.

In six durian trials from Thailand with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.04, 0.08, <u>0.10</u>, <u>0.17</u>, 0.38 and 0.47 mg/kg. No information was available on residues in edible portion.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in durian of 1, 0.135 and 0.47 mg/kg respectively.

Litchi

In Thailand, cypermethrin is registered for use on litchis at a high-volume spray concentration of 0.0075 kg ai/hL with harvest 14 days later.

In six litchi trials from Thailand with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.25, 0.41, <u>0.45</u>, <u>0.54</u>, 0.57 and 0.79 mg/kg. No information was available on residues in edible portion.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in litchis of 2, 0.495 and 0.79 mg/kg respectively.

Longan

In Thailand, cypermethrin is registered for use on longans at a high-volume spray concentration of 0.0075 kg ai/hL with harvest 14 days later.

In six longan trials from Thailand with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.25, 0.27, 0.28, 0.32, 0.36 and 0.47 mg/kg. No information was available on residues in edible portion.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in longans of 1, 0.30 and 0.47 mg/kg respectively.

Mango

In Thailand, cypermethrin is registered for use on mangos at a high-volume spray concentration of 0.005 kg ai/hL with harvest 5 days later.

In six mango trials from Thailand with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.09, 0.10, 0.15, 0.23, 0.25 and 0.35 mg/kg. No information was available on residues in edible portion.

The cypermethrin data on mangos from Malaysia could not be evaluated because no suitable GAP was available.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in mango of 0.7, 0.19 and 0.35 mg/kg respectively.

Papaya

In Malaysia, cypermethrin is registered for use on papaya at an application rate of 0.0275 kg ai/ha with harvest 14 days later.

In six papaya trials from Malaysia with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.08, 0.10, 0.12, 0.15, 0.15 and 0.23 mg/kg. No information was available on residues in edible portion.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in papaya of 0.5, 0.135 and 0.23 mg/kg respectively.

Leek

In Germany, alpha-cypermethrin is registered for use on leeks at an application rate of 0.009 kg ai/ha with harvest 14 days later.

In eight leek trials from Germany with alpha-cypermethrin use matching GAP, residues were (rank order, median underlined): < 0.01 (4), 0.01, 0.02, 0.02 and 0.03 mg/kg.

In Spain, alpha-cypermethrin is registered for use on leeks at an application rate of 0.03 kg ai/ha with harvest 2 days later.

In two leek trials from France, one from Italy and one from Spain with alpha-cypermethrin use approximately matching GAP, residues were: 0.02, 0.03, 0.06 and 0.11 mg/kg.

No suitable GAP was available for evaluating the cypermethrin trials on leeks in France, Germany and Poland.

The number of trials on leeks matching Spanish GAP was too few to make a recommendation.

On the basis of the eight alpha-cypermethrin trials in Germany matching GAP, the Meeting estimated a maximum residue level of 0.05 mg/kg for leeks. The Meeting estimated STMR and HR values of 0.01 and 0.03 mg/kg respectively for leeks.

Onion

In Germany, alpha-cypermethrin is registered for use on onions at an application rate of 0.013 kg ai/ha with harvest 14 days later.

In 16 onion trials with alpha-cypermethrin use matching German GAP from Germany (4), France (6), Netherlands (4) and the UK (2), residues were: < 0.01 mg/kg (16). This data set was used for maximum residue level estimation.

No suitable GAP for onions was available to evaluate the cypermethrin residue trials from France, Germany, Greece, Italy, Poland, Spain and UK.

In Brazil, zeta-cypermethrin may be applied to onions at a spray concentration of 0.0036 kg ai/hL with a 5 days PHI.

In one trial in Brazil at GAP and a second trial at double application rate, zeta-cypermethrin residues in onion bulbs were < 0.05 mg/kg (2).

In USA, zeta-cypermethrin is registered for use on onions at an application rate of 0.056 kg ai/ha with harvest 7 days later.

In two US trials with zeta-cypermethrin on onions matching GAP, residues in onion bulbs were < 0.01 mg/kg (2).

Residues in the green onions were 0.19 and 0.57 mg/kg.

On the basis of the alpha-cypermethrin trials in Europe matching German GAP, the Meeting estimated a maximum residue level of 0.01* mg/kg for bulb onions. The Meeting estimated STMR and HR values of 0.01 and 0.01 mg/kg respectively for cypermethrin residues in bulb onions.

The data on green onions (2 trials) were insufficient to estimate a maximum residue level.

Broccoli

In Denmark, alpha-cypermethrin is registered for use on broccoli at an application rate of 0.015 kg ai/ha with harvest 7 days later.

In 16 broccoli trials with alpha-cypermethrin use matching Danish GAP from Denmark (2), France (4), Germany (4), Netherlands (2) and the UK (4), residues were (rank order, median underlined): < 0.01 (3), 0.01 (4), <u>0.02</u> (7), 0.03 and 0.03 mg/kg.

In Greece, alpha-cypermethrin is registered for use on broccoli at an application rate of 0.03 kg ai/ha with harvest 7 days later.

In four broccoli trials with alpha-cypermethrin use matching Greek GAP from Greece (1), France (1), Italy (1) and Spain (1), residues were: 0.01, 0.01, 0.02 and 0.03 mg/kg.

In Spain, cypermethrin is registered for use on broccoli at a spray concentration of 0.01 kg ai/hL with harvest 7 days later.

In one trial in France matching Spanish GAP for cypermethrin use, residues were 0.04 mg/kg.

In USA, zeta-cypermethrin is registered for use on broccoli at an application rate of 0.056 kg ai/ha with harvest 1 day later.

In two US trials with zeta-cypermethrin use on broccoli matching GAP, residues were < 0.05 and 0.57 mg/kg.

Brussels sprouts

In UK, alpha-cypermethrin is registered for use on Brussels sprouts at an application rate of 0.01 kg ai/ha with harvest 7 days later.

In 16 trials with alpha-cypermethrin use matching the UK GAP (± 30% application rate) from UK (4), Belgium (2), France (4), Germany (4) and Netherlands (2), residues were (rank order, median underlined): < 0.01 (6), 0.01 (4), 0.02 (4), 0.03 and 0.05 mg/kg.

In Greece, alpha-cypermethrin is registered for use on Brussels sprouts at an application rate of 0.03 kg ai/ha with harvest 7 days later.

In four Brussels sprouts trials with alpha-cypermethrin use matching Greek GAP from Greece (1), France (1), Italy (1) and Spain (1), residues were: < 0.01, < 0.01, 0.01 and 0.02 mg/kg.

In UK, cypermethrin is registered for use on Brussels sprouts at an application rate of 0.025 kg ai/ha with no PHI specified.

In nine trials with cypermethrin use on Brussels sprouts matching GAP of the UK (accepting highest residue from 0–7 days after application) from UK (3), Germany (5) and Poland (1), residues were (rank order, median underlined): < 0.01 (4), 0.01, and 0.02 (4) mg/kg.

Cabbage, head

In UK, alpha-cypermethrin is registered for use on cabbages at an application rate of 0.01 kg ai/ha and a PHI of 7 days.

In 53 trials with alpha-cypermethrin use on cabbage matching the UK GAP (± 30% application rate) from the UK (21), Belgium (2), France (10) and Germany (20), residues were (rank order, median underlined): < 0.01 (17), 0.01 (4), 0.02 (6), 0.03, < 0.05 (13), 0.05 (4), 0.06, 0.07, 0.10 (3) , 0.11, 0.12 and 0.65 mg/kg. This data set was used for maximum residue level estimation.

In Denmark, alpha-cypermethrin is registered for use on cabbages at an application rate of 0.015 kg ai/ha and with a PHI of 7 days.

In nine trials with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (2), France (4) and UK (3), residues were: 0.03 and < 0.05 (8) mg/kg.

In the UK, cypermethrin is registered for use on cabbages at an application rate of 0.025 kg ai/ha with no PHI specified.

In nine trials with cypermethrin use on cabbage matching the UK GAP (accepting highest residue from 0–7 days after application) from UK (2), France (2) and Germany (5), residues were (rank order, median underlined): < 0.01 (7), 0.05 and 0.19 mg/kg.

Cauliflower

In UK, alpha-cypermethrin is registered for use on cauliflower at an application rate of 0.01 kg ai/ha and with a PHI of 7 days.

In 41 trials with alpha-cypermethrin use on cauliflower matching the UK GAP (± 30% application rate) from the UK (17), Denmark (2), France (5), Germany (13) and Netherlands (4), residues were (rank order, median underlined): < 0.01 (24), 0.01 (5), 0.02, < 0.05 (9), 0.05 and 0.09 mg/kg.

In Italy, alpha-cypermethrin is registered for use on cauliflower at an application rate of 0.03 kg ai/ha and with a PHI of 7 days.

In eight trials with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (3), France (3), Greece (1) and Spain (1), residues were: < 0.01 (7) and 0.01mg/kg.

In the UK, cypermethrin is registered for use on cauliflowers at an application rate of 0.025 kg ai/ha with no PHI specified.

In six trials with cypermethrin use on cauliflower matching the UK GAP (accepting highest residue from 0–7 days after application) from the UK (2), France (2) and Germany (5), residues were: < 0.01 (3), 0.02, 0.03 and 0.03 mg/kg.

Brassica vegetables – summary

The Meeting noted that broccoli, Brussels sprouts, cabbages and cauliflowers are the major commodities of the Brassica vegetables group and that the cabbage data produced the highest maximum residue level. Alpha-cypermethrin is registered for use on the crop group Brassica vegetables in Spain, demonstrating that residues could occur on any of the Brassica vegetables.

On the basis of the alpha-cypermethrin cabbage data from 53 trials in Europe matching the UK GAP, the Meeting estimated a maximum residue level of 1 mg/kg for Brassica vegetables confirming the previous recommendation of 1 mg/kg. The Meeting estimated STMR and HR values of 0.02 and 0.65 mg/kg respectively for cypermethrin residues in Brassica vegetables.

Cucumber

In Denmark, alpha-cypermethrin is registered for use on greenhouse cucumbers at an application rate of 0.015 kg ai/ha and with a PHI of 7 days.

In 17 trials on protected cucumbers with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (3), France (4), Germany (2), Greece (2), Italy (2), Netherlands (2) and Spain (2), residues were: < 0.01 mg/kg (17).

Italian GAP allows alpha-cypermethrin use on greenhouse cucumbers at 0.05 kg ai/ha with harvest 7 days later.

In eight trials on protected cucumbers with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (1), Belgium (1), Denmark (1), France (2), Germany (1), Greece (1) and Spain (1), residues were: < 0.01 (4) and 0.01 mg/kg (4).

The Meeting combined the data from the Danish GAP and Italian GAP as essentially of one population: < 0.01 (11) and 0.01 mg/kg (3).

Zeta-cypermethrin is registered for use on cucumbers in the USA with an application rate of 0.056 kg ai/ha and a PHI of 1 day.

In six US trials with zeta-cypermethrin use on cucumbers matching GAP, residues were: < 0.05 mg/kg (6).

Melon

Alpha-cypermethrin is registered for use on greenhouse melons in Greece with an application rate of 0.05 kg ai/ha and a PHI of 7 days.

In eight trials with alpha-cypermethrin use on glasshouse melons matching Greek GAP (± 30% application rate) from Greece (1), Belgium (1), Denmark (1), France (2), Germany (1), Italy (1) and Spain (1), residues were: < 0.01 (5), 0.02, 0.03 and 0.05 mg/kg. This data set was used for maximum residue level estimation.

Alpha-cypermethrin is registered for use on field-grown melons in France with an application rate of 0.03 kg ai/ha and a PHI of 7 days.

In eight trials with alpha-cypermethrin use on field-grown melons matching French GAP (± 30% application rate) from France (3), Greece (1) Italy (2) and Spain (2), residues were: < 0.01 (7) and 0.03 mg/kg.

In Spain, cypermethrin may be used on melons with a spray concentration of 0.01 kg ai/hL and with harvest 3 days later.

In nine trials with cypermethrin use on melons matching Spanish GAP from Spain (4), France (2) and Italy (3), residues were: < 0.01 (5), 0.01, 0.01, 0.02 and 0.02 mg/kg.

Zeta-cypermethrin is registered for use on cantaloupe in the USA with an application rate of 0.056 kg ai/ha and a PHI of 1 day.

In six US trials with zeta-cypermethrin use on cantaloupe matching GAP, residues were: < 0.02 and < 0.05 mg/kg (5).

In three alpha-cypermethrin trials and five cypermethrin trials, residues exceeded the LOQ in the fruit but residues in the pulp were all < LOD. However, it is not clear evidence of a nil residue.

Cucurbit fruiting vegetables – summary

The Meeting noted that cucumber and melons are two of the important commodities of the cucurbit vegetables group and that the melon data produced the highest maximum residue level. Alpha-cypermethrin is registered for use on the cucurbits crop group in Spain, demonstrating that residues could occur on any of the cucurbits.

On the basis of the alpha-cypermethrin trials on glasshouse melons in Europe matching Greek GAP, the Meeting estimated a maximum residue level of 0.07 mg/kg for cucurbit fruiting vegetables. On the basis of the whole melon data, the Meeting estimated STMR and HR values of 0.01 and 0.05 mg/kg respectively for cypermethrin residues in cucurbit fruiting vegetables.

Because melons have inedible peel, the Meeting estimated STMR and HR values for melons of 0.01 and 0.01 mg/kg respectively, based on the melon pulp data.

Eggplant

In France, alpha-cypermethrin may be used on egg plant at 0.012 kg ai/ha with harvest 7 days later. In a plastic tunnel trial and a glasshouse trial in France in line with French GAP, residues in egg plant were < 0.01 and 0.01 mg/kg.

The Meeting decided to use tomato data from a similar greenhouse use to support an eggplant maximum residue level.

In Denmark, alpha-cypermethrin is registered for use on greenhouse tomatoes at an application rate of 0.015 kg ai/ha and with a PHI of 7 days. In 18 trials on protected tomatoes with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (3), France (5), Germany (2), Greece (2), Italy (2), Netherlands (2) and Spain (2), residues were: < 0.01 (14), 0.01, 0.01, 0.02 and 0.02 mg/kg.

On the basis of the alpha-cypermethrin trials on greenhouse tomatoes in Europe, the Meeting estimated a maximum residue level of 0.03 mg/kg for egg plant (extrapolation of tomato data to egg plant) to replace the previous recommendation of 0.2 mg/kg. The Meeting estimated STMR and HR values of 0.01 and 0.02 mg/kg respectively for cypermethrin residues in egg plant.

Sweet peppers

Alpha-cypermethrin is registered in Greece for use on greenhouse sweet peppers with an application rate of 0.05 kg ai/ha and a PHI of 7 days.

In six trials with alpha-cypermethrin use on greenhouse sweet peppers matching Greek GAP from Greece (1), Belgium (1), France (2), Italy (1) and Spain (1), residues were: 0.01, 0.02(3), 0.03 and 0.03 mg/kg.

Alpha-cypermethrin is registered in Greece for use on field-grown sweet peppers with an application rate of 0.03 kg ai/ha and a PHI of 7 days.

In eight trials with alpha-cypermethrin use on field-grown sweet peppers matching Greek GAP from Greece (2), France (2), Italy (2) and Spain (2), residues were: < 0.01 (4), 0.02 (3) and 0.03 mg/kg.

Zeta-cypermethrin is registered in the USA for use on peppers at 0.056 kg ai/ha with a 1-day PHI.

In six US trials with zeta-cypermethrin use on bell peppers matching GAP, residues were: < 0.02, < 0.02, < 0.05 (3) and 0.07 mg/kg. This data set was used for maximum residue level estimation.

On the basis of the zeta-cypermethrin trials on bell peppers in USA, the Meeting estimated a maximum residue level of 0.1 mg/kg for sweet peppers to replace the previous recommendation of 0.5 mg/kg for peppers. The Meeting estimated STMR and HR values of 0.05 and 0.07 mg/kg respectively for cypermethrin residues in sweet peppers.

Chilli peppers

In Thailand, cypermethrin is registered for use on Chilli peppers at a high-volume spray concentration of 0.025 kg ai/hL with harvest 7 days later.

In six Chilli pepper trials from Thailand with cypermethrin spray concentration 0.019 kg ai/hL (24% below GAP concentration, but within tolerance), residues 7 days after spraying were (rank order, median underlined): 0.24, 0.25, 0.45, 0.54, 0.62 and 0.69 mg/kg.

Zeta-cypermethrin is registered in the USA for use on peppers at 0.056 kg ai/ha with a 1-day PHI.

In three US trials with zeta-cypermethrin use on Chilli peppers matching GAP, residues were: < 0.02, < 0.05, and 0.19 mg/kg.

On the basis of the cypermethrin trials on Chilli peppers in Thailand, the Meeting estimated a maximum residue level of 2 mg/kg for Chilli peppers to replace the previous recommendation of 0.5 mg/kg for peppers. The Meeting estimated STMR and HR values of 0.495 and 0.69 mg/kg respectively for cypermethrin residues in Chilli peppers.

Okra

In Thailand, cypermethrin is registered for use on okra at a high-volume spray concentration of 0.011 kg ai/hL with harvest 5 days later.

In six okra trials from Thailand matching GAP conditions, residues 5 days after spraying were (rank order, median underlined): 0.01, 0.02, 0.05, 0.11, 0.18 and 0.20 mg/kg.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in okra of 0.5, 0.08 and 0.20 mg/kg respectively.

Sweet corn

No relevant GAP was available to evaluate the alpha-cypermethrin data on sweet corn.

Zeta-cypermethrin is registered in the USA for use on sweet corn at 0.056 kg ai/ha with a 3-days PHI.

No residues were detected (LOD = 0.01 mg/kg) in any sample in nine US trials with zeta-cypermethrin use on sweet corn matching GAP. Also, residues were not detected in a trial with application rate at 0.11 kg ai/ha. The LOQ in these trials was 0.05 mg/kg.

The Meeting estimated a maximum residue level of 0.05* mg/kg for sweet corn, which is the same as the previous recommendation. The Meeting estimated STMR and HR values of 0 and 0 mg/kg respectively for cypermethrin residues in sweet corn.

Tomato

In Denmark, alpha-cypermethrin is registered for use on greenhouse tomatoes at an application rate of 0.015 kg ai/ha and with a PHI of 7 days.

In 18 trials on protected tomatoes with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (3), France (5), Germany (2), Greece (2), Italy (2), Netherlands (2) and Spain (2), residues were: < 0.01 (14), 0.01, 0.01, 0.02 and 0.02 mg/kg.

In France, alpha-cypermethrin is registered for use on tomatoes at an application rate of 0.011 kg ai/ha and with a PHI of 3 days.

In 26 trials on field-grown tomatoes with alpha-cypermethrin use matching French GAP (± 30% application rate) from France (12), Belgium (2), Germany (12), residues were: < 0.01 (23), 0.01, < 0.02 and < 0.02 mg/kg.

In Italy, alpha-cypermethrin is registered for use on field-grown tomatoes at an application rate of 0.03 kg ai/ha and with a PHI of 7 days.

In 13 trials on field-grown tomatoes with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (2), France (6), Greece (1), and Spain (4), residues were: < 0.01 (9), 0.01 (3) and 0.02 mg/kg.

In Italy, alpha-cypermethrin is registered for use on glasshouse tomatoes at an application rate of 0.05 kg ai/ha and with a PHI of 7 days.

In seven trials on protected tomatoes with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (1), Belgium (1), France (1), Germany (2), Greece (1), and Spain (1), residues were: < 0.01 (4), 0.01, 0.02 and 0.02 mg/kg.

Alpha-cypermethrin may be used on tomatoes in Brazil at 0.03 kg ai/ha with a 5-days PHI. In one trial matching GAP, residues were 0.03 mg/kg.

Alpha-cypermethrin may be used on tomatoes in South Africa at 0.01 kg ai/ha with a 4-days PHI. In 2 trials matching GAP, residues were both below LOQ (< 0.05 mg/kg).

No suitable GAP was available for evaluating the cypermethrin trials on tomatoes.

Zeta-cypermethrin may be used on tomatoes in Brazil at 0.02 kg ai/ha with a 5-days PHI.

In three zeta-cypermethrin trials on tomatoes in Brazil matching GAP conditions, residues 5 days after spraying were < 0.02, 0.02 an 0.04 mg/kg.

Zeta-cypermethrin may be used on tomatoes in USA at 0.056 kg ai/ha with a 1-day PHI.

In 12 zeta-cypermethrin trials on tomatoes in USA matching GAP conditions, residues 1 day after spraying were (rank order, median underlined): < 0.05 (6), 0.05, 0.06, 0.07, 0.08, 0.08 and 0.08 mg/kg. This data set was used for maximum residue level estimation.

On the basis of the zeta-cypermethrin trials on tomatoes in USA, the Meeting estimated a maximum residue level of 0.2 mg/kg for tomatoes to replace the previous recommendation of 0.5 mg/kg. The Meeting estimated STMR and HR values of 0.05 and 0.08 mg/kg respectively for cypermethrin residues in tomatoes.

Endive

Zeta-cypermethrin is registered for use on endives in Italy with a spray concentration of 0.0026 kg ai/hL and a PHI of 7 days.

In three zeta-cypermethrin trials on endives in Italy matching GAP conditions, residues were: 0.27, 0.36 and 0.38 mg/kg.

Lettuce

In Italy, alpha-cypermethrin is registered for use on glasshouse lettuce at an application rate of 0.05 kg ai/ha and with a PHI of 7 days.

In eight trials on protected lettuce with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (1), Belgium (1), Denmark (1), France (2), Germany (1), Greece (1), and Spain (1), residues were: 0.09, 0.21, 0.27, 0.30, 0.30, 0.57, 0.68 and 0.68 mg/kg.

In Italy, alpha-cypermethrin is registered for use on field-grown lettuce at an application rate of 0.03 kg ai/ha and with a PHI of 7 days.

In 12 trials on field-grown lettuce with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (4), France (2), Greece (2), and Spain (4), residues were: < 0.01, 0.04, 0.04, 0.06, 0.07 (3), 0.10, 0.11, 0.12, 0.13 and 0.52 mg/kg. This data set was used for maximum residue level estimation.

In Germany, alpha-cypermethrin is registered for use on lettuce at an application rate of 0.009 kg ai/ha and with a PHI of 3 days.

In 27 trials on lettuce with alpha-cypermethrin use matching German GAP (± 30% application rate) from Germany (17), Belgium (1), Denmark (2), France (2) and UK (5), residues were: 0.01, 0.01, 0.02, 0.02, 0.03, 0.04, < 0.05, 0.05, 0.05, 0.06, 0.06, 0.07, 0.07, 0.09, 0.10 (4), 0.11, 0.12, 0.15, 0.17, 0.17, 0.19, 0.21, 0.25 and 0.26 mg/kg.

Cypermethrin residue data on lettuce could not be evaluated because no relevant GAP was available.

Zeta-cypermethrin may be used on head lettuce in USA at 0.056 kg ai/ha with a 5-days PHI.

The US zeta-cypermethrin trials on head lettuce were sampled at days 3 and 7. From the 12 trials, the average decline rate of residues was calculated (half-life of residues = 7.2 days), equivalent to a 30% decline in residues in 3.7 days. Day 3 data are therefore an acceptable substitute for day 5 data (< 30% difference in 2 days interval).

In 12 zeta-cypermethrin trials on head lettuce in USA matching GAP conditions, except that day-3 data (or day-7, if higher) are used instead of day-5 data, residues were (rank order, median underlined): 0.16, 0.29, 0.34, 0.48, 0.75, 0.95, 1.4, 1.6, 1.9, 2.4, 2.5 and 2.8 mg/kg.

Zeta-cypermethrin is registered for use on lettuce in Italy with a spray concentration of 0.0026 kg ai/hL and a PHI of 7 days.

In three zeta-cypermethrin trials on lettuce in Italy matching GAP conditions, residues were: 0.18, 0.18 and 0.28 mg/kg.

Zeta-cypermethrin may be used on leaf lettuce in USA at 0.056 kg ai/ha with a 1-day PHI.

In eight zeta-cypermethrin trials on leaf lettuce in USA matching GAP conditions, residues were (rank order, median underlined): 1.5, 1.6, 2.3, 2.3, 2.4, 2.4, 2.7 and 3.3 mg/kg.

On the basis of the zeta-cypermethrin trials on head lettuce in USA, the Meeting estimated STMR and HR values of 1.18 and 2.8 mg/kg respectively for cypermethrin residues in head lettuce. However, the IESTI calculated from the HR (2.8 mg/kg) for head lettuce exceeded the ARfD and the Meeting examined data from an alternative GAP as suitable for establishing an MRL.

On the basis of the zeta-cypermethrin trials on leaf lettuce in USA, the Meeting estimated STMR and HR values of 2.35 and 3.3 mg/kg respectively for cypermethrin residues in leaf lettuce. However, the IESTI calculated from the HR (3.3 mg/kg) for leaf lettuce exceeded the ARfD and the Meeting examined data from an alternative GAP as suitable for establishing an MRL.

Kale

No suitable GAP was available for evaluating the alpha-cypermethrin trials on kale.

Leafy cabbage, lambs lettuce

In France, alpha-cypermethrin may be used on lettuce and similar at 0.011 kg ai/ha with harvest 7 days later. This GAP was accepted as including leafy cabbage. The same use pattern applies to lambs lettuce.

In four trials on leafy cabbage with alpha-cypermethrin use matching French GAP (± 30% application rate) from France (2) and Netherlands (2), residues were: 0.15, 0.21, 0.22 and 0.35 mg/kg.

In two trials on lambs lettuce with alpha-cypermethrin use matching French GAP, residues were 0.28 and 0.29 mg/kg.

The numbers of trials were too few to support recommendations.

Spinach

No suitable GAP was available to evaluate the alpha-cypermethrin trials on spinach in France, Germany and Netherlands.

In Spain, cypermethrin is approved for use on spinach at a spray concentration of 0.01 kg ai/hL with harvest 7 days later.

In three trials on spinach with cypermethrin use matching Spanish GAP (± 30% application rate) from France (1) and Germany (2), residues were: 0.34, 0.45 and 0.50 mg/kg.

Zeta-cypermethrin may be used on spinach in USA at 0.056 kg ai/ha with a 1-day PHI.

In eight zeta-cypermethrin trials on spinach in USA matching GAP conditions, residues were (rank order, median underlined): 2.8, 3.1, 3.4, <u>3.4</u>, <u>3.6</u>, 4.5, 5.0 and 5.7 mg/kg.

On the basis of the zeta-cypermethrin trials on spinach in USA, the Meeting estimated STMR and HR values of 3.5 and 5.7 mg/kg respectively for cypermethrin residues in spinach.

However, the IESTI calculated from the HR (5.7 mg/kg) for spinach exceeded the ARfD and the Meeting examined data from an alternative GAP.

The three cypermethrin trials on spinach were insufficient on their own to estimate a maximum residue level

Mustard greens

No suitable GAP was available to evaluate the zeta-cypermethrin trials on mustard greens in USA.

Leafy vegetables group – summary

The Meeting noted that lettuce and spinach are major commodities of the leafy vegetables group and that the spinach data produced the highest estimated maximum residue level. However, some trials data for lettuce and spinach at higher GAPs could not be used because the calculated IESTI values exceeded the ARfD. For lettuce, an assessment was possible on data from an alternative GAP. Alpha-cypermethrin is registered for use on 'vegetables' in Bulgaria, demonstrating that residues could occur on any of the leafy vegetables.

On the basis of the alpha-cypermethrin trials on protected lettuce in Europe matching Italian GAP, the Meeting estimated an HR value of 0.68 mg/kg for cypermethrin residues in leafy vegetables. However, the IESTI calculated with an HR of 0.68 mg/kg for spinach exceeded the ARfD, suggesting preference for an alternative GAP.

On the basis of the 12 alpha-cypermethrin trials on field-grown lettuce in Italy, France, Greece and Spain matching Italian GAP, the Meeting estimated a maximum residue level of 0.7 mg/kg for leafy vegetables to replace the previous recommendations for kale, lettuce and spinach. The Meeting estimated STMR and HR values of 0.07 and 0.52 mg/kg for cypermethrin residues in leafy vegetables.

Peas – legume vegetables

In Denmark, alpha-cypermethrin is registered for use on peas at an application rate of 0.015 kg ai/ha and with a PHI of 7 days.

In 16 trials on peas with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (2), France (4), Germany (4), Netherlands (2) and the UK (4) residues in peas (seeds) were all below LOQ: < 0.01 (16).

No suitable GAP was available for evaluating the alpha-cypermethrin data on pea pods.

In Spain, cypermethrin is registered for use on peas with a spray concentration of 0.01 kg ai/hL and a 7-days PHI.

In six trials on peas with cypermethrin use matching Spanish GAP (± 30% application rate) from France (4) Germany (2), residues in pea pods were: 0.02, 0.02, 0.03, 0.05, 0.06 and 0.13 mg/kg.

In Italy, cypermethrin is registered for use on peas with a spray concentration of 0.0075 kg ai/hL and a 14-days PHI.

In three trials on peas with cypermethrin use matching Italian GAP (± 30% application rate) from France (1) Germany (2), residues in peas (seeds) were all below LOQ: < 0.01 (2) and < 0.02 mg/kg. In 1 trial, residues in pea pods were measured at 0.09 mg/kg.

In France, zeta-cypermethrin is registered for use on peas at 0.018 kg ai/ha and with a 7-days PHI.

In 14 trials on peas with zeta-cypermethrin use matching French GAP (± 30% application rate) from France (7), Italy (3) and the UK (4), residues in shelled peas were all non-detects or below LOQ: < 0.01 mg/kg (14).

In 10 trials on peas with zeta-cypermethrin use matching French GAP (± 30% application rate) from France (7), Italy (1) and the UK (2), residues in pea pods were: < 0.01 (4), 0.02 (4), 0.03 and 0.03 mg/kg.

In the UK, zeta-cypermethrin is registered for use on peas at 0.015 kg ai/ha and with a 14-days PHI.

In two trials on peas with zeta-cypermethrin use matching the UK GAP (± 30% application rate) from France (2), residues in and shelled peas were below LOQ: and < 0.05 mg/kg (2).

In USA, zeta-cypermethrin is registered for use on peas at 0.056 kg ai/ha with a 1-day PHI for succulent peas.

In six zeta-cypermethrin trials on peas in USA matching GAP conditions, residues in succulent shelled peas were: < 0.03 (3), < 0.05, 0.05 and 0.06 mg/kg.

Beans – legume vegetables

In France, alpha-cypermethrin may be used on beans at 0.03 kg ai/ha with harvest 7 days later.

In 18 trials on beans with alpha-cypermethrin use matching French GAP (± 30% application rate) from France (13), Greece (1), Italy (2) and Spain (2), residues in bean pods were: < 0.01, 0.01, 0.02 (4), 0.03, < 0.05 (8), 0.07, 0.09 and 0.11 mg/kg.

In Denmark, alpha-cypermethrin may be used on beans at 0.015 kg ai/ha with harvest 7 days later.

In 18 trials on beans with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Belgium (2), France (6), Germany (2), Netherlands (4) and the UK (4), residues in bean pods were: < 0.01 (4), 0.01 (5), 0.02 (6), 0.03, 0.03 and 0.04 mg/kg.

In Spain, cypermethrin may be applied to beans with a spray concentration of 0.01 kg ai/hL with a 3-days PHI.

In eight trials on beans with cypermethrin use matching Spanish GAP (± 30% application rate) from Spain (2), France (1), Germany (2), Greece (1), Italy (1) and the UK (1), residues in bean pods were: 0.01, 0.02, 0.02, 0.02, 0.03, 0.03, 0.05 and 0.08 mg/kg.

Zeta-cypermethrin may be used on beans in the UK at 0.015 kg ai/ha with a 14-days PHI.

In 12 zeta-cypermethrin trials on beans in the UK matching GAP conditions, residues on the whole bean or bean pods were (rank order, median underlined): < 0.01 (3), 0.02, 0.02, <u>0.22</u>, <u>0.22</u>, 0.26, 0.30, 0.32, 0.41 and 0.45 mg/kg. This data set was used for maximum residue level estimation.

In USA, zeta-cypermethrin is registered for use on beans at 0.056 kg ai/ha with a 1-day PHI for succulent beans.

In six zeta-cypermethrin trials on beans in USA matching GAP conditions, residues on the whole pods were: < 0.05, 0.07, 0.09, 0.21, 0.29 and 0.30 mg/kg.

In six zeta-cypermethrin trials on beans in USA matching GAP conditions, residues on the succulent shelled beans were all non-detects: < 0.01 mg/kg (6).

Legume vegetables – summary

Because of sufficient data on peas and beans, the Meeting agreed that a legume vegetable group maximum residue level should be estimated. In Bulgaria, alpha-cypermethrin is registered for use on 'vegetables', which includes peas and beans with and without pods, suggesting that residues could occur on any of the legume vegetables.

On the basis of the zeta-cypermethrin trials on beans in the UK (residues on whole bean or bean pods), the Meeting estimated a maximum residue level of 0.7 mg/kg for legume vegetables. The Meeting estimated STMR and HR values of 0.22 and 0.45 mg/kg respectively for cypermethrin residues in legume vegetables.

Peas - pulses

In Spain, cypermethrin is registered for use on peas with a spray concentration of 0.01 kg ai/hL and a 7-days PHI.

In six trials on peas with cypermethrin use matching Spanish GAP (± 30% application rate) from France (4) Germany (2), residues in peas (seeds) were all not detected or below LOQ: < 0.01 mg/kg (6).

In UK, zeta-cypermethrin is registered for use on peas at 0.015 kg ai/ha and with a 14-days PHI.

In three trials on peas with zeta-cypermethrin use matching the UK GAP (± 30% application rate) from UK, residues in and pea seeds were below LOQ: < 0.01 mg/kg (3).

In USA, zeta-cypermethrin is registered for use on peas at 0.056 kg ai/ha with a PHI for dried peas of 21 days.

In two zeta-cypermethrin trials on peas in USA matching GAP conditions, residues in dry shelled peas were: < 0.05 mg/kg (2).

Beans – pulses

See 'beans – legumes' for GAP on beans.

Numerous data (all below LOQ) were available on bean seeds with various application rates and intervals between application of alpha-cypermethrin and harvest. The following data for bean seed arise from trials where the application rate was 0.015 kg ai/ha (the GAP rate) or higher and the PHI was between 0 and 7 days:< 0.01(15), < 0.05 mg/kg (8). The 23 trials originate from France (7), Italy (1), Netherlands (2), Spain (2) and the UK (11).

In USA, zeta-cypermethrin is registered for use on beans at 0.056 kg ai/ha with a 21-days PHI for dried beans.

In seven zeta-cypermethrin trials on beans in USA matching GAP conditions, residues on the dried beans were: < 0.01 (5) and < 0.05 mg/kg (2).

Soya bean

No relevant GAP was available to evaluate the alpha-cypermethrin trials on soya bean in Brazil.

In Brazil, zeta-cypermethrin is registered for use on soya beans at 0.015 kg ai/ha with a 15-days PHI or at 0.05 kg ai/ha with a 30-days PHI.

In three zeta-cypermethrin trials in soya bean in Brazil with conditions in line with GAP, residues in soya beans were < 0.05 mg/kg (3).

In USA, zeta-cypermethrin is registered for use on soya beans at 0.056 kg ai/ha with a 21-days PHI.

In two zeta-cypermethrin trials in soya bean in USA with conditions in line with GAP, residues in soya beans were < 0.03 mg/kg (2). Thirteen other trials were reported where the interval between final treatment and harvest was 28-30 days (longer than the specified 21 days), In each case the residue was below the limit of detection (0.03 mg/kg).

The Meeting accepted the 30-days data in support of the GAP data.

Pulses - summary

The Meeting noted that dry peas, beans and soya beans are major commodities of the pulses group and that the soya bean data produced the highest estimated maximum residue level. Residues were not present in the pulses, but the soya bean data had been produced by an analytical method with the highest LOQ. Alpha-cypermethrin is registered for use on 'pulses' in Spain, suggesting that alpha-cypermethrin could be used on any pulse crop.

On the basis of the cypermethrin soya bean data, the Meeting estimated a maximum residue level of 0.05* mg/kg for pulses to replace the previous recommendation for soya bean (dry). The Meeting estimated an STMR value of 0.05 mg/kg for cypermethrin residues in pulses.

Potato

Alpha-cypermethrin is registered for use on potato crops in France with an application rate of 0.0125 kg ai/ha and a PHI of 21 days.

Because the residues in the tubers are below LOQ (0.01 mg/kg) we can accept data also from trials with higher application rates and shorter PHIs. There are 36 potato trials that meet these criteria. Residues in the tubers in the 36 trials were all below LOQ (0.01 mg/kg).

Cypermethrin is registered for use on potato crops in Poland with an application rate of 0.02 kg ai/ha and a PHI of 30 days. As before, we can accept trials with higher application rates and

shorter PHIs. There are 12 potato trials with cypermethrin that meet the criteria. Residues in the tubers were all below LOQ (0.01 mg/kg).

The metabolism studies suggest non-translocation of cypermethrin, so it is not expected to migrate to the tubers. A number of the supervised trials on potatoes were at exaggerated rates, which suggests an "essentially zero" residue situation.

Carrot

Cypermethrin is registered for use on carrot crops in Spain with a spray concentration of 0.01 kg ai/hL and a PHI of 7 days.

In six trials on carrots with cypermethrin use matching Spanish GAP (± 30% application rate) from Germany (3) and UK (3), residues in carrots were all below the LOD (0.003 mg/kg). Note that the LOQ for the analytical method in these trials was 0.01 mg/kg. Residues were detected in carrots in trials with higher application rates.

Sugar beet

Alpha-cypermethrin is registered for use on sugar beet crops in Germany with an application rate of 0.01 kg ai/ha and no specified PHI.

In eight alpha-cypermethrin trials on sugar beet in Germany with conditions in line with GAP, the highest residues in sugar beet root on any day of the trial were: < 0.01 (3), < 0.02 (4) and 0.07 mg/kg. This data set was used for maximum residue level estimation.

Alpha-cypermethrin is registered for use on sugar beet crops in Greece with an application rate of 0.03 kg ai/ha and a 14-days PHI.

In seven alpha-cypermethrin trials on sugar beet in Greece (2), Italy (3) Spain (2), with conditions in line with Greek GAP, residues in sugar beet root were all below LOQ (0.01 mg/kg):

The cypermethrin trials on sugar beet could not be evaluated because no suitable GAP was available.

In USA, zeta-cypermethrin is registered for use on sugar beet at 0.056 kg ai/ha with a 21-days PHI.

In eight zeta-cypermethrin trials in sugar beet in USA with conditions in line with GAP, residues in sugar beet root on day 21 after the final application were all non-detects (< 0.02 mg/kg).

On the basis of the alpha-cypermethrin trials on sugar beet in Germany, the Meeting estimated a maximum residue level of 0.1 mg/kg for sugar beet. The Meeting estimated an STMR value of 0.01 mg/kg for cypermethrin residues in sugar beet.

Root and tuber vegetables - summary

The Meeting noted that potatoes, carrots and sugar beet are major commodities of the root and tuber vegetables group and that residues did not exceed LOQ except for sugar beet from one trial.

On the basis of the alpha-cypermethrin and cypermethrin data for potatoes and carrots, the Meeting estimated a maximum residue level of 0.01* mg/kg for root and tuber vegetables (except sugar beet) to replace the previous recommendation of 0.05* mg/kg. The Meeting estimated STMR and HR values of 0.01 and 0.01 mg/kg respectively for cypermethrin residues in root and tuber vegetables (except sugar beet).

Asparagus

Alpha-cypermethrin is registered for use on asparagus crops in Germany with an application rate of 0.0125 kg ai/ha and no specified PHI.

In seven alpha-cypermethrin trials on asparagus in France with conditions in line with German GAP, the residues in asparagus stalks were all below LOQ: < 0.01 (3), and < 0.02 mg/kg (4).

In Thailand, cypermethrin is registered for use on asparagus at a high-volume spray concentration of 0.025 kg ai/hL with harvest 3 days later.

In two asparagus trials from Thailand matching GAP conditions, residues 3 days after spraying were: 0.06 and 0.18 mg/kg.

The two Thai trials were insufficient for estimating a maximum residue level.

On the basis of the alpha-cypermethrin trials on asparagus in France, the Meeting estimated a maximum residue level of 0.01* mg/kg for asparagus. The Meeting estimated an STMR value and an HR value of 0.01 and 0.01 mg/kg respectively for cypermethrin residues in asparagus.

Artichoke

In Italy, alpha-cypermethrin is registered for use on artichokes at 0.03 kg ai/ha with a PHI of 7 days.

In four trials on artichokes with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (1), France (1), Greece (1) and Spain (1), residues in artichokes were: 0.02, 0.02, 0.03 and 0.04 mg/kg.

No suitable GAP was available to evaluate the cypermethrin trials on artichoke from France and Spain.

On the basis of the alpha-cypermethrin trials on artichokes matching Italian GAP, the Meeting estimated a maximum residue level of 0.1 mg/kg for artichoke. The Meeting estimated an STMR value and an HR value of 0.025 and 0.040 mg/kg respectively for cypermethrin residues in artichokes.

Barley

In Denmark, alpha-cypermethrin may be used on barley at 0.015 kg ai/ha with harvest 42 days later.

In 26 trials on barley with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (2), France (4), Germany (18) and the UK (2), residues in barley grain were (rank order, median underlined): < 0.01 (4), 0.01, 0.02 (4), 0.03 (4), 0.04 (4), 0.05, 0.05, 0.06, 0.06, 0.08, 0.09, 0.17, 0.17 and 0.22 mg/kg. This data set was used for maximum residue level estimation.

In Poland, cypermethrin may be used on cereals at 0.03 kg ai/ha and a PHI of 30 days.

In seven trials on barley with cypermethrin use matching Polish GAP (± 30% application rate) from Poland (2), France (2), Hungary (1) and the UK (2), residues in barley grain were (rank order, median underlined): 0.05, 0.05, 0.09, 0.10, 0.11, 0.12 and 0.19 mg/kg.

In Germany, zeta-cypermethrin may be used on barley at 0.015 kg ai/ha and a PHI of 35 days.

In 10 trials on barley with zeta-cypermethrin use matching German GAP (± 30% application rate) from Germany (4), France (3) and the UK (3), residues in barley grain were (rank order, median underlined): 0.01, < 0.02, 0.02, 0.02, 0.02, 0.03, 0.03, 0.04, 0.17 and 0.19 mg/kg.

Maize

In France, alpha-cypermethrin may be used on maize at 0.03 kg ai/ha with a PHI of 21 days.

Because the residues in maize grain were below LOQ irrespective of application rates or interval between treatment and harvest, trials with higher application rates or shorter PHIs are acceptable in supporting the residue evaluation for the selected GAP.

In six trials on maize with alpha-cypermethrin use in France matching French GAP or at higher rates or briefer PHIs, residues in maize grain were all below LOQ (0.01 mg/kg).

In Austria, cypermethrin may be used on maize at a spray concentration of 0.0075 kg ai/hL with a PHI of 49 days. In one cypermethrin trial in France at 0.015 kg ai/hL (2× Austrian GAP), residues in maize kernels harvested 29 days after treatment were not detected (LOD = 0.003 mg/kg). The other cypermethrin-maize trials could not be evaluated because no relevant GAP was available.

In USA, zeta-cypermethrin is registered for use on maize at 0.056 kg ai/ha with a PHI of 30 days to grain harvest.

In 25 zeta-cypermethrin trials on maize in USA with conditions in line with GAP, residues in maize grain were either below LOD (23 trials < 0.01 mg/kg) or below LOQ (2 trials < 0.05 mg/kg).

In Brazil, zeta-cypermethrin is registered for use on maize at 0.020 kg ai/ha with a PHI of 20 days.

In seven zeta-cypermethrin trials on maize in Brazil with application rates equal to or higher than required by Brazilian GAP, residues in maize grain were all below LOQ (0.05 mg/kg).

The other zeta-cypermethrin trials on maize could not be evaluated because no suitable GAP was available.

Oats

In Germany, alpha-cypermethrin may be used on cereals at 0.013 kg ai/ha with a PHI of 35 days.

In seven alpha-cypermethrin trials on oats in Germany with conditions in line with GAP, residues in oat grain on days 35-39 after the final application were: < 0.01, 0.01, < 0.02 (4) and 0.05 mg/kg.

No suitable GAP was available for evaluating the zeta-cypermethrin trials on oats and triticale.

Rice

No suitable GAP was available for evaluating the alpha-cypermethrin trials on rice.

In USA, zeta-cypermethrin is registered for use on rice at 0.056 kg ai/ha with a PHI of 14 days.

In 22 zeta-cypermethrin trials on rice in USA with conditions in line with US GAP, residues in rice grain (rank order, median underlined) were: 0.15, 0.39, 0.39, 0.40, 0.41, 0.42, 0.45, 0.49, 0.54, 0.56, <u>0.57</u>, <u>0.57</u>, 0.59, 0.59, 0.61, 0.63, 0.63, 0.73, 0.74, 0.75, 0.87 and 1.1 mg/kg. This data set was used for maximum residue level estimation.

Sorghum

No suitable GAP was available for evaluating the alpha-cypermethrin trials on sorghum.

Wheat

In Denmark, alpha-cypermethrin may be used on wheat at 0.015 kg ai/ha with harvest 42 days later.

In 39 trials on wheat with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Belgium (2), France (18), Germany (17) and the UK (2), residues in wheat grain were (rank order, median underlined): < 0<u>.01</u> (21), 0.01, 0.02, < 0.02 (3), < 0.05 (12) and 0.36 mg/kg. The

0.36 mg/kg appears out-of-context with all the other data on wheat grain; it also disagrees with residue levels in the grain at days 28 and 34 from the same trial (< 0.05 and < 0.05 mg/kg). The residue value was disregarded.

No suitable GAP was available for evaluating the other alpha-cypermethrin trials on wheat.

In France, cypermethrin is registered for use on cereals at 0.025 kg ai/ha with no specified PHI.

In eight trials on wheat with cypermethrin use matching French GAP (± 30% application rate) from Germany (2), Hungary (2), Poland (2) and the UK (2), residues in wheat grain were (rank order, median underlined): < 0.01 (5), 0.01, 0.02 and 0.02 mg/kg.

No GAP information was available to support evaluation of the 4 trials with post-harvest treatment of wheat with cypermethrin.

In Germany, zeta-cypermethrin is registered for use on wheat at 0.015 kg ai/ha with a 35-days PHI.

In 16 trials on wheat with zeta-cypermethrin use matching German GAP (± 30% application rate) from Germany (8), France (3), Italy (2), Spain (1) and the UK (2), residues in wheat grain were: < 0.01 (13), 0.01, 0.01 and 0.02 mg/kg.

In USA, zeta-cypermethrin is registered for use on wheat at 0.056 kg ai/ha with a 14-days PHI for grain, forage or hay harvest.

In two zeta-cypermethrin trials on wheat in USA with conditions in line with GAP, residues in wheat grain on days 14-15 after the final application were < 0.05 and 0.05 mg/kg.

Cereal grains – summary

Alpha-cypermethrin is registered for use on 'cereals' in Belgium, Bulgaria and Spain, suggesting that residues could occur on any of the cereal grains. The Meeting agreed to estimate a rice maximum residue level and a cereal grains (except rice) group maximum residue level.

On the basis of the alpha-cypermethrin trials on barley matching Danish GAP, the Meeting estimated a maximum residue level of 0.3 mg/kg for cereal grains (except rice) to replace the previous recommendations for barley, maize and wheat. The Meeting estimated an STMR value of 0.035 mg/kg for cypermethrin residues in cereal grains (except rice).

On the basis of the zeta-cypermethrin trials on rice in USA, the Meeting estimated a maximum residue level of 2 mg/kg for rice. The Meeting estimated an STMR value of 0.57 mg/kg for cypermethrin residues in rice.

Sugar cane

In USA, zeta-cypermethrin is registered for use on sugar cane at 0.056 kg ai/ha with a 21-days PHI.

In nine zeta-cypermethrin trials on sugar cane in USA with conditions in line with GAP, residues in cane stems (foliage removed) on days 20-21 after the final application were: < 0.01 (4), < 0.05 (2), 0.05, 0.09 and 0.17 mg/kg.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in sugar cane of 0.2, 0.05 and 0.17 mg/kg respectively.

Almond

No suitable GAP was available for evaluating the alpha-cypermethrin trials on almond.

Cotton

In Colombia, alpha-cypermethrin is registered for use on cotton at 0.035 kg ai/ha with a 15-days PHI.

In two alpha-cypermethrin trials on cotton in Colombia with conditions in line with GAP (± 30% application rate), residues in cotton seed were below LOQ (0.01 mg/kg).

In South Africa, alpha-cypermethrin is registered for use on cotton at 0.035 kg ai/ha with a 28-days PHI.

In one alpha-cypermethrin trial on cotton in South Africa with conditions approximating GAP (application rate 0.03 kg ai/ha and PHI 16 days), residues in cotton seed were below LOQ (0.01 mg/kg).

In Greece, alpha-cypermethrin is registered for use on cotton at 0.03 kg ai/ha with a 7-days PHI.

In eight alpha-cypermethrin trials on cotton in Greece (3) and Spain (5) with conditions in line with Greek GAP (± 30% application rate), residues in cotton seed were mostly below LOQ: < 0.01 (7) and 0.02 mg/kg.

In Italy, cypermethrin is registered for use on cotton at a spray concentration of 0.005 kg ai/hL with a 21-days PHI.

In eight cypermethrin trials on cotton in Greece (4) and Spain (4) with application spray concentrations 2× to 3× concentration specified by Italian GAP and with sampling 21 days after the final treatment, residues in cotton seed were all less than LOD (0.015 mg/kg).

In Brazil, zeta-cypermethrin is registered for use on cotton at an application rate of 0.05 kg ai/ha and with a PHI of 15 days.

In seven zeta-cypermethrin trials on cotton in Brazil with conditions in line with GAP (± 30% application rate), residues in cotton seed were all below LOQ: < 0.02 (4) and < 0.05 mg/kg (3). Parallel trials with 2× application rate also produced no residues above LOQ.

No suitable GAP was available to evaluate the other cotton seed data.

Peanuts

In USA, zeta-cypermethrin is registered for use on peanuts at 0.056 kg ai/ha with a 7-days PHI.

In 11 zeta-cypermethrin trials on peanuts in USA with conditions in line with GAP, residues in peanut kernels on day 7 after the final application were all non-detects (< 0.02 mg/kg). The LOQ for the analyses was 0.05 mg/kg.

Linseed

In Belgium, alpha-cypermethrin may be used on linseed at 0.013 kg ai/ha with no specified PHI.

In two alpha-cypermethrin trials on linseed in France with conditions in line with Belgian GAP (± 30% application rate), residues in linseed were both below LOQ: < 0.01 mg/kg.

The Meeting noted that the linseed data were consistent with data from the other oilseeds, where the residues do not generally penetrate the seed pods to reach the seeds.

Oilseed rape

In France, alpha-cypermethrin may be used on oilseed rape at 0.011 kg ai/ha with a PHI of 49 days.

In 21 alpha-cypermethrin trials on oilseed rape in France (10), Germany (9) and Spain (2) with conditions in line with French GAP (± 30% application rate), residues in rape seed were: < 0.01 (8), < 0.05 (11), 0.06 and 0.42 mg/kg. The Meeting noted that the 0.42 mg/kg residue was reported in

an old trial (1986) with no field or laboratory reports, so it was not possible to confirm the validity of this residue value, which seemed out-of-context. The residue value was disregarded. This data set was used for maximum residue level estimation.

In Poland, cypermethrin is registered for use on oilseed rape at 0.03 kg ai/ha with a PHI of 21 days.

In nine cypermethrin trials on oilseed rape in France (2), Greece (4) and Spain (3) with conditions in line with Polish GAP (± 30% application rate), residues in rape seed were: < 0.003 (5), < 0.01 (3) and 0.01 mg/kg.

In Germany, zeta-cypermethrin is registered for use on oilseed rape at 0.01 kg ai/ha with a PHI of 56 days.

In six zeta-cypermethrin trials on oilseed rape in Germany (4) and the UK (2) with conditions in line with German GAP (± 30% application rate), residues in rape seed were: < 0.01 mg/kg (6).

Oilseed group – summary

The Meeting noted that cotton seed, peanuts and oilseed rape are major commodities of the oilseeds group and that the oilseed rape data produced the highest estimated maximum residue level.

On the basis of the alpha-cypermethrin oilseed rape data from trials in France, Germany and Spain with conditions aligned with French GAP, the Meeting estimated a maximum residue level of 0.1 mg/kg for oilseed to replace the previous recommendations for peanut and oilseed except peanut. The Meeting estimated an STMR value of 0.05 mg/kg for cypermethrin residues in oilseed.

Cacao and coffee

In Malaysia, alpha-cypermethrin may be used on cacao at 0.01 kg ai/ha (200 l/ha spray) with a PHI of 7 days.

In an alpha-cypermethrin trial on cacao in Malaysia with conditions in line with GAP (spray concentration 0.005 kg ai/hL), residues in cocoa on day 7 after the final application were < 0.01 mg/kg.

The data were insufficient to support the estimate of a maximum residue level for cacao.

No suitable GAP was available to evaluate the alpha-cypermethrin data on coffee.

Zeta-cypermethrin may be used on coffee in Brazil at 0.015 kg ai/ha with a 14-days PHI.

In five zeta-cypermethrin trials on coffee in Brazil with conditions in line with GAP (± 30% application rate), residues in coffee beans were: < 0.05 mg/kg (5). In 2 more trials at higher application rates (0.04 kg ai/ha), residues were also below LOQ (< 0.05 mg/kg).

On the basis of the zeta-cypermethrin trials on coffee in Brazil, the Meeting estimated a maximum residue level of 0.05* mg/kg for coffee beans, confirming the previous recommendation. The Meeting estimated an STMR value of 0 mg/kg for cypermethrin residues in coffee beans.

Parsley

No suitable GAP was available to evaluate the single trial on parsley.

Dried Chilli pepper

The 2007 JMPR recommended that, where the residues on fresh Chilli peppers are available, a concentration factor of 7 should be used for the estimation of maximum residue levels in dried Chilli peppers. The concentration factor should be used to multiply the actually measured residue values in the fresh chilli peppers.

In Thailand, cypermethrin is registered for use on Chilli peppers at a high-volume spray concentration of 0.025 kg ai/hL with harvest 7 days later. In six Chilli pepper trials from Thailand with cypermethrin spray concentration 0.019 kg ai/hL (24% below GAP concentration, but within tolerance), residues 7 days after spraying were (rank order, median underlined): 0.24, 0.25, 0.45, 0.54, 0.62 and 0.69 mg/kg.

Conversion of the fresh Chilli pepper data to dried Chilli pepper data (multiply by 7) produces: 1.7, 1.8, 3.2, 3.8, 4.3 and 4.8 mg/kg.

On the basis of the cypermethrin trials on Chilli peppers in Thailand and a processing factor of 7, the Meeting estimated a maximum residue level of 10 mg/kg for dried Chilli peppers. The Meeting estimated STMR and HR values of 3.5 and 4.8 mg/kg respectively for cypermethrin residues in dried Chilli peppers.

Alfalfa

No suitable GAP was available to evaluate the alpha-cypermethrin or cypermethrin trials on alfalfa.

In USA, zeta-cypermethrin is registered for use on alfalfa at 0.056 kg ai/ha with a 3-days PHI for cutting or grazing.

In zeta-cypermethrin trials on alfalfa in USA with conditions in line with GAP, residues in alfalfa hay on day 3 after an application were: 8.2, 9.0, 9.5, 11, 14 and 18 mg/kg. After an allowance for 89% dry matter in alfalfa hay, the median and high residue become 11.5 and 20 mg/kg, respectively. This data set was used for maximum residue level estimation.

In six zeta-cypermethrin trials (each with 3 cuts, highest residue chosen) on alfalfa in USA with conditions in line with GAP, residues in alfalfa forage on day 3 after an application were: 2.3, 2.8, 3.5, 3.8, 4.5 and 11 mg/kg.

On the basis of the zeta-cypermethrin trials on alfalfa in USA, the Meeting estimated a high residue level and an STMR value of 11 and 3.65 mg/kg respectively for cypermethrin residues in alfalfa forage. The Meeting also estimated a maximum residue level, an STMR value and a high residue level of 30, 11.5 and 20 mg/kg respectively, for cypermethrin residues in alfalfa hay.

Pea fodder and forage

In Denmark, alpha-cypermethrin is registered for use on peas at an application rate of 0.015 kg ai/ha. No information was available on restrictions on cutting and grazing, so, in each trial, the high residue on the plant material was accepted as residues on pea forage.

In 29 alpha-cypermethrin trials on peas in Denmark (2), France (4), Germany (4), Netherlands (2) and the UK (17) with conditions in line with Danish GAP (± 30% application rate), residues in pea forage were (rank order, median underlined):0.06, 0.07, 0.07, 0.08, 0.16, 0.23, 0.25, 0.25, 0.28, 0.29, 0.35, 0.42, 0.42, 0.43, 0.45, 0.48, 0.51, 0.56, 0.62, 0.64, 0.64, 0.65, 0.65, 0.65, 0.71, 0.74, 0.80, 0.83 and 0.86 mg/kg.

Samples described as 'haulms' are accepted as straw.

In 10 alpha-cypermethrin trials on peas in France (4), Germany (2), and the UK (4) with conditions in line with Danish GAP (± 30% application rate), residues in pea straw were (rank order, median underlined): 0.24, 0.27, 0.27, 0.35, 0.37, 0.37, 0.39, 0.55, 0.58 and 1.0 mg/kg. After an allowance for 88% dry matter in pea hay (or straw), the median and high residue become 0.42 and 1.1 mg/kg, respectively. This data set was used for maximum residue level estimation.

In Greece, alpha-cypermethrin is registered for use on peas at an application rate of 0.03 kg ai/ha. No information was available on restrictions on cutting and grazing, so, in each trial, the highest residue on the plant material was accepted as residues on pea forage.

In three alpha-cypermethrin trials on peas in, France (1), Italy (1) and Spain (1) with conditions in line with Greek GAP (± 30% application rate), residues in pea forage were: 0.27, 0.72 and 1.0 mg/kg.

In four alpha-cypermethrin trials on peas in, France (1), Greece (1), Italy (1) and Spain (1) with conditions in line with Greek GAP (± 30% application rate), residues in pea straw were: 0.23, 1.1, 1.2 and 1.5 mg/kg.

In Spain, cypermethrin is registered for use on peas with a spray concentration of 0.01 kg ai/hL.

In three cypermethrin trials on peas in France (2) and Germany (1) with conditions in line with Spanish GAP (± 30% application rate), residues in pea straw were: 1.4, 2.6 and 4.1 mg/kg.

In France, zeta-cypermethrin is registered for use on peas at 0.018 kg ai/ha.

In 17 zeta-cypermethrin trials on peas in France (4), Italy (4) and the UK (9) with conditions in line with French GAP (± 30% application rate), residues in pea straw were: < 0.02, 0.03, < 0.05, 0.10, 0.13, 0.17, 0.19, 0.22, 0.28, 0.3, 0.33, 0.39, 0.41, 0.5, 0.66, 0.99 and 1.0 mg/kg.

On the basis of the 10 alpha-cypermethrin trials on peas in France, Germany and the UK matching Danish GAP, the Meeting estimated a maximum residue level, an STMR value and a high residue level of 2, 0.42 and 1.1 mg/kg respectively for cypermethrin residues in pea hay or pea fodder.

On the basis of the alpha-cypermethrin trials on peas matching Danish GAP, the Meeting estimated an STMR value and a high residue level of 0.45 and 0.86 mg/kg respectively for cypermethrin residues in pea forage (pea vines, green).

Bean fodder and forage

In France, alpha-cypermethrin may be used on beans at 0.03 kg ai/ha. No information was available on restrictions on cutting and grazing, so, in each trial, the highest residue on the plant material was accepted as residues on bean forage.

In 18 alpha-cypermethrin trials on beans in France (10), Greece (1), Italy (2), Spain (2) and the UK (3) with conditions in line with French GAP (± 30% application rate), residues in bean forage were (rank order, median underlined): 0.07, 0.26, 0.38, 0.50, 0.53, 0.84, 0.86, 0.89, 0.91, 0.92, 0.92, 0.98, 1.0, 1.1, 1.4, 1.4, 1.4 and 1.5 mg/kg.

In seven alpha-cypermethrin trials on beans in France (1), Italy (1), Spain (2) and the UK (3) with conditions in line with French GAP (± 30% application rate), residues in bean straw were (rank order, median underlined): 0.32, 0.32, 0.49, 0.51, 0.73, 0.76 and 1.1 mg/kg. Bean straw was assumed to have the same dry matter content as pea hay or straw. After an allowance for 88% dry matter in bean straw, the median and high residues become 0.58 and 1.3 mg/kg, respectively. This data set was used for maximum residue level estimation.

In Denmark, alpha-cypermethrin may be used on beans at 0.015 kg ai/ha.

In 18 alpha-cypermethrin trials on beans in Belgium (2), France (4), Germany (2), Netherlands (4) and the UK (6) with conditions in line with Danish GAP (± 30% application rate), residues in bean forage were (rank order, median underlined): 0.22, 0.25, 0.25, 0.28, 0.33, 0.34, 0.34, 0.36, 0.37, 0.39, 0.39, 0.39, 0.42, 0.52, 0.52, 0.54, 0.82 and 0.86 mg/kg.

In 12 alpha-cypermethrin trials on beans in France (4), Netherlands (2) and the UK (6) with conditions in line with Danish GAP (± 30% application rate), residues in bean straw were (rank order, median underlined): 0.07, 0.31, 0.36, 0.39, 0.39, 0.40, 0.44, 0.49, 0.54, 0.58, 0.59 and 0.64 mg/kg.

In Spain, cypermethrin may be applied to beans with a spray concentration of 0.01 kg ai/hL.

In seven cypermethrin trials on beans in France (1), Germany (2), Italy (1), Spain (2) and the UK (1) with conditions in line with Spanish GAP (± 30% application rate), residues in bean forage were (rank order, median underlined): 0.44, 0.49, 0.52, <u>0.71</u>, 1.5, 1.8 and 2.1 mg/kg.

Zeta-cypermethrin may be used on beans in the UK at 0.015 kg ai/ha.

In four zeta-cypermethrin trials on beans in the UK with conditions in line with GAP (± 30% application rate), residues in bean straw were: 0.13, 0.26, 0.30 and 0.47 mg/kg.

On the basis of the seven alpha-cypermethrin trials on beans (bean straw data) in France, Italy, Spain and the UK matching French GAP, the Meeting estimated a maximum residue level, an STMR value and a high residue level of 2, 0.58 and 1.3 mg/kg respectively for cypermethrin residues in bean fodder.

On the basis of the cypermethrin trials on beans matching Spanish GAP, the Meeting estimated a high residue level and an STMR value of 2.1 and 0.71 mg/kg respectively for cypermethrin residues in bean forage.

Barley straw and fodder

No information was available on restrictions on cutting and grazing, so, in each trial, the highest residue in the plant material was accepted as residues in barley forage. In some trials multiple samplings at various time intervals from 0 days up to approximately 3 weeks were available, while in other trials only one sampling, most often day zero, was available. Residue concentrations in forage were quite persistent; for example, residue concentrations in plant material 2 or 3 weeks after treatment sometimes exceeded the measured values at day 0.

In Denmark, alpha-cypermethrin may be used on barley at 0.015 kg ai/ha.

In 28 alpha-cypermethrin trials on barley in Denmark (2), France (4), Germany (14), Greece (2), Italy (2), Spain (2) and the UK (2) with conditions in line with Danish GAP (± 30% application rate), residues in barley forage (plant) were (rank order, median underlined): 0.16, 0.20, 0.23, 0.24, 0.28, 0.30, 0.32, 0.34, 0.35, 0.35, 0.35, 0.36, 0.38, <u>0.38</u>, <u>0.40</u>, 0.41, 0.44, 0.45, 0.49, 0.52, 0.52, 0.52, 0.57, 0.62, 0.66, 0.67, 0.72 and 0.80 mg/kg.

In 31 alpha-cypermethrin trials on barley in France (8), Germany (16), Greece (2), Italy (2), Spain (2) and the UK (2) with conditions in line with Danish GAP (± 30% application rate), residues in barley straw were (rank order, median underlined): < 0.01 (4), 0.05, 0.06, 0.08, 0.17, 0.22, 0.22, 0.22, 0.22, 0.22, 0.24, 0.29, <u>0.30</u>, 0.32, 0.34, 0.37, 0.38, 0.46, 0.48, 0.53, 0.54, 0.66, 0.68, 0.70, 0.73, 0.83, 0.83, 0.89 and 1.1 mg/kg. After an allowance for 89% dry matter in barley straw, the median and high residues become 0.34 and 1.2 mg/kg, respectively.

In Poland, cypermethrin may be used on cereals at 0.03 kg ai/ha.

In four cypermethrin trials on barley in France (1), Hungary (1), Poland (1) and the UK (1) with conditions in line with Polish GAP (± 30% application rate), residues in barley forage (plant) were: 0.37, 0.48, 0.51 and 0.72 mg/kg.

In seven cypermethrin trials on barley in France (2), Hungary (1), Poland (2) and the UK (2) with conditions in line with Polish GAP (± 30% application rate), residues in barley straw were: 0.30, 0.33, 0.33, <u>0.33</u>, 0.37, 0.40, 0.62 mg/kg. After an allowance for 89% dry matter in barley straw, the median and high residues become 0.37 and 0.70 mg/kg, respectively.

In Germany, zeta-cypermethrin may be used on barley at 0.015 kg ai/ha.

In 10 zeta-cypermethrin trials on barley in France (1), Germany (4), Italy (2), Spain (1) and the UK (2) with conditions in line with German GAP (± 30% application rate), residues in barley forage (plant) were: 0.08, 0.11, 0.15, 0.29, <u>0.33</u>, <u>0.33</u>, 0.46, 0.75, 0.94 and 1.4 mg/kg.

In 13 zeta-cypermethrin trials on barley in France (2), Germany (4), Italy (2), Spain (1) and the UK (4) with conditions in line with German GAP (± 30% application rate), residues in barley straw were: < 0.05 (2), 0.08, 0.13, 0.14, 0.19, 0.20, 0.25, 0.32, 0.52, 0.67, 1.8 and 2.1 mg/kg. After an allowance for 89% dry matter in barley straw, the median and high residues become 0.22 and 2.4 mg/kg, respectively.

The Meeting noted that the highest STMR and highest 'high residue' did not necessarily originate from the same compound for barley straw and forage. The highest values were chosen for the final estimates.

On the basis of the zeta-cypermethrin trials on barley matching German GAP, the Meeting estimated a high residue level of 1.4 mg/kg for cypermethrin residues in barley forage. On the basis of alpha-cypermethrin trials on barley matching Danish GAP, the Meeting estimated an STMR value of 0.39 mg/kg for barley forage.

Maize fodder and forage

In France, alpha-cypermethrin may be used on maize at 0.03 kg ai/ha.

In four alpha-cypermethrin trials on maize in France with conditions in line with GAP, residues in maize plants and silage were: < 0.01 (2), 0.19 and 0.32 mg/kg.

No suitable GAP was available to evaluate the cypermethrin trials on maize fodder and forage.

In USA, zeta-cypermethrin is registered for use on maize at 0.056 kg ai/ha, with PHIs of 30 days for stover (fodder) and 60 days for forage (silage). Zeta-cypermethrin is also registered for use on sweet corn at 0.056 kg ai/ha.

In 19 zeta-cypermethrin trials on maize in USA with conditions in line with GAP, residues in maize forage were all below LOQ and most below LOD: < 0.01 (12), < 0.05 (6) and < 0.1 mg/kg.

In 24 zeta-cypermethrin trials on maize and sweet corn in USA with conditions in line with GAP, residues in maize stover (fodder) were: < 0.05, < 0.5, 0.55, 0.64, 0.73, 0.77, 0.91, 0.95, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.5, 1.5, 1.7, 1.7, 1.7, 2.4, 2.4, 2.4, 3.0 and 4.7 mg/kg. After an allowance for 83% dry matter in maize stover, the median and high residue become 1.6 and 5.7 mg/kg, respectively.

In France, zeta-cypermethrin may be used on maize at 0.0375 kg ai/ha.

In 14 zeta-cypermethrin trials on maize in France with conditions in line with GAP, residues in maize silage were: < 0.05 (13) and 0.10 mg/kg.

On the basis of the zeta-cypermethrin trials on maize (data on maize silage) matching French GAP, the Meeting estimated a high residue value and an STMR value of 0.1 and 0.05 mg/kg respectively for cypermethrin residues in maize forage.

Oats straw and fodder

In Germany, alpha-cypermethrin may be used on cereals at 0.013 kg ai/ha, with a PHI of 35 days.

In seven alpha-cypermethrin trials on oats in Germany with conditions in line with GAP, residues in oats straw were: 0.08, 0.31, 0.43, 0.44, 0.45, 0.56 and 0.75 mg/kg. After an allowance for 90% dry matter in oats straw, the median and high residues become 0.49 and 0.83 mg/kg, respectively.

No suitable GAP was available to evaluate the zeta-cypermethrin trials on oats straw.

Rice straw and fodder

No suitable GAP was available to evaluate the alpha-cypermethrin trials on rice straw and fodder.

In USA, zeta-cypermethrin is registered for use on rice at 0.056 kg ai/ha with a PHI of 14 days.

In 22 zeta-cypermethrin trials on rice in USA with conditions in line with US GAP, residues in rice straw (rank order, median underlined) were: 0.11, 0.15, 0.16, 0.27, 0.29, 0.32, 0.34, 0.35, 0.35, 0.37, 0.39, 0.49, 0.49, 0.57, 0.60, 0.61, 0.64, 0.65, 0.79, 1.4, 1.5 and 1.8 mg/kg. After an allowance for 90% dry matter in rice straw, the median and high residue become 0.49 and 2.0 mg/kg, respectively.

Wheat straw and fodder

No information was available on restrictions on cutting and grazing, so, in each trial, the highest residue in the plant material was accepted as residues in wheat forage. In some trials multiple samplings at various time intervals from 0 days up to approximately 4-5 weeks were available, while in other trials only one sampling, most often day zero, was available. Residues in the plant material were quite persistent; for example residues 3-4 weeks after treatment sometimes exceeded the day 0 residues. In some trials, multiple sampling times for wheat straw were also available.

In Denmark, alpha-cypermethrin may be used on wheat at 0.015 kg ai/ha.

In 28 alpha-cypermethrin trials on wheat in Belgium (2), France (6), Germany (12), Greece (2), Italy (2), Spain (2) and the UK (2), with conditions in line with Danish GAP (± 30% application rate), residues in wheat plants were: 0.04, 0.06, 0.16, 0.18, 0.19, 0.21, 0.23, 0.23, 0.23, 0.25, 0.28, 0.32, 0.36, 0.38, 0.38, 0.41, 0.43, 0.47, 0.47, 0.48, 0.53, 0.54, 0.54, 0.55, 0.58, 0.62, 0.62 and 1.4 mg/kg.

In 60 alpha-cypermethrin trials on wheat in Belgium (2), France (23), Germany (27), Greece (2), Italy (2), Spain (2) and the UK (2), with conditions in line with Danish GAP (± 30% application rate), alpha-cypermethrin residues in wheat straw were: 0.01, 0.01, 0.02, 0.03, 0.03, 0.05, 0.06, 0.08, 0.09, 0.15, 0.15, 0.16, 0.16, 0.16, 0.17, 0.17, 0.19, 0.20, 0.21, 0.25, 0.27, 0.29, 0.30, 0.32, 0.34, 0.34, 0.37, 0.37, 0.37, 0.37, 0.38, 0.44, 0.44, 0.47, 0.48, 0.48, 0.50, 0.52, 0.54, 0.54, 0.58, 0.58, 0.60, 0.62, 0.66, 0.68, 0.73, 0.75, 0.75, 0.81, 0.91, 0.92, 0.94, 0.95, 1.1, 1.2, 1.3, 1.5, 1.7 and 2.2 mg/kg.

In France, cypermethrin is registered for use on cereals at 0.025 kg ai/ha.

In four cypermethrin trials on wheat in Germany (1), Hungary (1), Poland (1) and the UK (1), with conditions in line with French GAP (± 30% application rate), residues in wheat plants were: 0.15, 0.36, 0.43 and 1.1 mg/kg.

In nine cypermethrin trials on wheat in France (1), Germany (2), Hungary (2), Poland (2) and UK (2), with conditions in line with French GAP (± 30% application rate), residues in wheat straw were: < 0.01, 0.21, 0.25, 0.26, 0.35, 0.43, 0.44, 0.48 and 0.57 mg/kg.

In Germany, zeta-cypermethrin is registered for use on wheat at 0.015 kg ai/ha.

In 11 zeta-cypermethrin trials on wheat in France (1), Germany (5), Italy (2), Spain (1) and the UK (2), with conditions in line with German GAP (± 30% application rate), residues in wheat plant were: 0.09, 0.13, 0.17, 0.22, 0.26, 0.38, 0.38, 0.57, 0.58, 0.74 and 0.86 mg/kg.

In 15 zeta-cypermethrin trials on wheat in France (3), Germany (5), Italy (2), Spain (1) and the UK (4), with conditions in line with German GAP (± 30% application rate), residues in wheat straw were: < 0.05, < 0.05, 0.08, 0.12, 0.12, 0.14, 0.18, 0.19, 0.19, 0.21, 0.27, 0.38, 0.5, 1.0 and 1.4 mg/kg.

In USA, zeta-cypermethrin is registered for use on wheat at 0.056 kg ai/ha with a 14-days PHI for grain, forage or hay harvest.

In 16 zeta-cypermethrin trials on wheat in USA in line with GAP, residues in wheat hay were: 0.61, 1.2, 1.5, 1.7, 1.7, 1.9, 2.1, 2.2, 2.5, 2.7, 3.2, 3.4, 3.8, 4.9, 5.3 and 5.5 mg/kg.

In 16 zeta-cypermethrin trials on wheat in USA in line with GAP, residues in wheat straw were: 0.70, 0.93, 0.98, 1.2, 1.8, 1.9, 2.2, 3.2, 3.2, 3.7, 3.8, 3.8, 3.9, 5.2, 6.0 and 6.1 mg/kg. After an allowance for 88% dry matter in wheat straw, the median and high residues become 3.6 and 6.9 mg/kg, respectively. This data set was used for maximum residue level estimation.

On the basis of the alpha-cypermethrin trials on wheat matching Danish GAP, the Meeting estimated a high residue level and an STMR value of 1.4 and 0.38 mg/kg respectively for cypermethrin residues in wheat forage.

Straw and fodder of cereal grains – summary

The Meeting noted that barley, maize, oats, rice and wheat are major commodities of the cereal grains group and that the wheat straw data produced the highest estimated maximum residue level.

On the basis of the 16 zeta-cypermethrin trials on wheat (data on wheat straw) matching US GAP, the Meeting estimated a maximum residue level of 10 mg/kg for straw and fodder (dry) of cereal grains to replace the previous recommendation of 5 mg/kg. The Meeting estimated an STMR value and a high residue value of 3.6 and 6.9 mg/kg respectively, for cypermethrin residues in straw and fodder (dry) of cereal grains.

Sugar beet leaves or tops

Alpha-cypermethrin is registered for use on sugar beet crops in Germany with an application rate of 0.01 kg ai/ha and no specified PHI.

In 16 alpha-cypermethrin trials on sugar beet in Germany with conditions in line with GAP, the highest residues in sugar beet leaf on any day of the trial were: 0.10, 0.21, 0.24, 0.27, 0.29, 0.31, 0.34, 0.34, 0.37, 0.45, 0.50, 0.56, 0.75, 0.86, 1.1 and 1.9 mg/kg.

Alpha-cypermethrin is registered for use on sugar beet crops in Greece with an application rate of 0.03 kg ai/ha and a 14-days PHI.

In eight alpha-cypermethrin trials on sugar beet in France (1), Greece (2), Italy (3) and Spain (2) with conditions in line with Greek GAP, residues in sugar beet leaf were: 0.03, 0.05, 0.06, 0.06, 0.07, 0.07, 0.09 and 0.16 mg/kg.

The cypermethrin trials on sugar beet could not be evaluated because no suitable GAP was available.

In USA, zeta-cypermethrin is registered for use on sugar beet at 0.056 kg ai/ha with a 21-days PHI.

In eight zeta-cypermethrin trials in sugar beet in USA with conditions in line with GAP, residues in sugar beet tops on day 21 after the final application were: 0.25, 0.30, 0.34, 0.34, 0.36, 0.39, 0.40 and 0.55 mg/kg.

On the basis of the alpha-cypermethrin trials on sugar beet in Germany, the Meeting estimated an STMR value and a high residue value of 1.5 and 8.3 mg/kg for cypermethrin residues in sugar beet leaves or tops.

Cotton fodder

In Greece, alpha-cypermethrin is registered for use on cotton at 0.03 kg ai/ha with a 7-days PHI.

In six alpha-cypermethrin trials on cotton in Greece (3) and Spain (3) with conditions in line with Greek GAP (± 30% application rate), residues in cotton plants were: 0.20, 0.21, 0.34, 0.38, 0.46 and 0.55 mg/kg.

On the basis of the alpha-cypermethrin trials on cotton matching Greek GAP and the data on cotton plants, the Meeting estimated an STMR value and a high residue value of 0.36 and 0.55 mg/kg respectively for cypermethrin residues in cotton fodder.

Rapeseed forage

In France, alpha-cypermethrin may be used on oilseed rape at 0.011 kg ai/ha with a PHI of 49 days.

In 10 alpha-cypermethrin trials on oilseed rape in France (6), Germany (2) and Spain (2) with conditions in line with French GAP application rate (accept data from PHIs 29–35 days), residues in plant without pods were: .< 0.05 (8), 0.11 and 0.24 mg/kg.

On the basis of the alpha-cypermethrin trials on oilseed rape matching French GAP, the Meeting estimated an STMR value and a high residue value of 0.05 and 0.24 mg/kg for cypermethrin residues in rapeseed forage.

Hops

No suitable GAP was available to evaluate the alpha-cypermethrin trials on hops.

Tea

No suitable GAP was available to evaluate the alpha-cypermethrin trials on tea. The Meeting withdrew the previous recommendation of 20 mg/kg for green and black tea.

Fate of residues during processing

The Meeting received information on the fate of alpha-cypermethrin residues during the processing of barley, grapes, olives, cabbage, gherkins, tomatoes, oilseed rape and oil palm; the fate of cypermethrin residues during the processing of wheat; and the fate of zeta-cypermethrin residues during the processing of apples, beans, maize, peach, peanuts, peas, plum, soya bean, spinach, sugar beet, sugar cane, sunflower seed, tomato and wheat.

Also information was provided on hydrolysis studies of alpha-cypermethrin and cypermethrin to assist with identification of the nature of the residue during processing.

Alpha-cypermethrin and cypermethrin were stable during hydrolysis conditions simulating pasteurisation, baking, brewing and boiling. Approximately 10–15% of alpha-cypermethrin was hydrolysed during sterilisation (pH 6, 120 ˚C for 20 minutes). DCVA and 3-phenoxybenzaldehyde were identified as the hydrolysis products. Cypermethrin was not tested under sterilisation conditions.

Processing factors have been calculated for residues of the cypermethrins in a number of food processes (following table). Factors are indicated with a'<' (less-than) sign when the residue in the processed commodity is below the LOQ of the analytical method. The calculation is then made on the LOQ of the analytical method and the residue concentration in the RAC. The median of observed values or the best estimate of the processing factors are summarized in the final column of the table.

The Meeting agreed that, because the common composition of the three compounds, a food processing factor obtained for residues of one compound would apply to the residues of the others in the current residue evaluation.

Calculated processing factors and the median or best estimate are summarized in the following table. Only those processes are included in the table that lead to STMR-P or HR-P values useful for dietary intake estimations or for livestock dietary burden calculations. Other processes and processing factors are provided in the monographs.

Compound	raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors.	Median or best estimate
Alpha-cypermethrin	barley	beer	< 0.17, < 0.5, < 0.03, < 0.04, < 0.04, < 0.09	< 0.03
Alpha-cypermethrin	grapes	pomace	1.8, 2.4, 2.8, 3.2, 3.2, 3.3, 4.6, 5.7	3.2
Alpha-cypermethrin	grapes	raisins	3.2, 3.4, 3.2, 3.4	3.3
Alpha-cypermethrin	grapes	wine	< 0.17, < 0.17, < 0.2, < 0.2, < 0.08, < 0.08, < 0.2, < 0.2	< 0.08
Alpha-cypermethrin	olives	oil meal	0.08, 0.09, 0.12, 0.25	0.11
Alpha-cypermethrin	olives	olive oil, crude	3.3, 4.6, 6.6, 8.5, 17.4, 13.9,	7.5
Alpha-cypermethrin	olives	olive oil, refined	6.1, 7.2, 9.3, 12.7	8.2
Alpha-cypermethrin	olives	olives, fermented	1.1, 1.1, 1.6, 2.0	1.3
Zeta-cypermethrin	plum	dried prune	3.6, 2.8	3.2
Alpha-cypermethrin	rape seed	crude rape seed oil	0.81, 1.6	1.6
Alpha-cypermethrin	rape seed	refined rape seed oil	1.0, 1.3	1.2
Alpha-cypermethrin	tomato	canned tomatoes	< 0.11, < 0.16, < 0.16, < 0.25	< 0.11
Alpha-cypermethrin	tomato	tomato juice	0.22, 0.25, 0.33, 0.33	0.29
Alpha-cypermethrin	tomato	tomato paste	1.0, 1.0, 1.1, 1.8	
Zeta-cypermethrin	tomato	tomato paste	< 0.56	
Summary	tomato	tomato paste	< 0.56, 1.0, 1.0, 1.1, 1.8	1.0
Zeta-cypermethrin	tomato	tomato puree	< 0.56	
Alpha-cypermethrin	tomato	tomato purée	0.33, 0.5, 0.5, 0.7	
Summary	tomato	tomato purée	0.33, 0.5, 0.5, < 0.56, 0.7	0.5
Cypermethrin	wheat grain	bran	2.6, 2.4	
Zeta-cypermethrin	wheat	bran	1.4	
Summary	wheat	bran	1.4, 2.4, 2.6	2.4
Cypermethrin	wheat grain	flour	0.27, 0.43	
Zeta-cypermethrin	wheat	flour	< 0.56	
Summary	wheat	flour	0.27, 0.43, < 0.56	0.43
Zeta-cypermethrin	wheat	germ	< 0.56	< 0.56

The processing factor for dried prunes (3.2) was applied to the estimated STMR and HR for plums (stone fruits 0.59 and 0.94 mg/kg) to produce STMR-P and HR-P values for dried prunes of 1.9 and 3.0 mg/kg respectively. The estimated HR-P falls below the estimated maximum residue level for stone fruits, so a separate maximum residue level for dried prunes is not needed.

The processing factors for grape pomace (3.2), and wine (< 0.08) were applied to the estimated STMR for grapes (0.01 mg/kg) to produce STMR-P values for grape pomace (0.032 mg/kg) and wine (< 0.001 mg/kg).

The processing factor for dried grapes (3.3) was applied to the estimated STMR and HR for grapes (0.01 and 0.09 mg/kg) to produce STMR-P and HR-P values for dried grapes (raisins) of 0.033 and 0.30 mg/kg, respectively.

The Meeting estimated a maximum residue level for cypermethrin in dried grapes (= currants, raisins, sultanas) of 0.5 mg/kg.

The processing factors for tomato puree (0.5), tomato juice (0.29) and canned tomato (< 0.11) were applied to the estimated STMR for tomatoes (0.05 mg/kg) to produce STMR-P values for tomato puree (0.025 mg/kg), tomato juice (0.015 mg/kg) and canned tomato (0.006 mg/kg).

The processing factors for crude olive oil (7.5) and refined olive oil (8.2) were applied to the estimated STMR for olives (0.05 mg/kg) to produce STMR-P values for crude olive oil (0.38 mg/kg) and refined olive oil (0.41 mg/kg)

The Meeting estimated a maximum residue level of 0.5 mg/kg for cypermethrin in both virgin olive oil and refined olive oil.

The processing factors for crude rape seed oil (1.6) and refined rape seed oil (1.2) were applied to the estimated STMR for rape seed (0.05 mg/kg) to produce STMR-P values for crude rape seed oil (0.08 mg/kg) and refined rape seed oil (0.06 mg/kg). These concentrations fall below the estimated maximum residue level for oilseeds, so maximum residue levels for the oils are not needed.

The processing factors for wheat bran (2.4), flour (0.43) and wheat germ (0.56) were applied to the estimated STMR for cereal grains (0.035 mg/kg) to produce STMR-P values for wheat bran (0.084 mg/kg), flour (0.015 mg/kg) and wheat germ (0.02 mg/kg).

The processing factor for beer from barley (< 0.03) was applied to the estimated STMR for barley grain (0.035 mg/kg) to produce an STMR-P value for beer of < 0.0011 mg/kg.

Residues in animal commodities

Livestock feeding

The meeting received lactating dairy cow feeding studies for alpha-cypermethrin and cypermethrin. The meeting also received laying hen feeding studies for alpha-cypermethrin and cypermethrin. The studies provided information on likely residues resulting in animal commodities, milk and eggs from residues of the cypermethrins in the animal diet.

Lactating dairy cows

Groups of 3 lactating Holstein dairy cows were dosed once daily via gelatin capsule with alpha-cypermethrin at nominal 4 ppm (1×), 12 ppm (3×) and 40 ppm (10×) in the dry-weight diet for 28 consecutive days. Milk was collected on 14 occasions for analysis. On day 29, within 24 h of the final dose, the animals were slaughtered for tissue collection.

Residues appeared in the fat but not in the other tissues, where residues were below LOQ (0.05 mg/kg) at the highest dose. The transfer factor between residue level in the fat and the dose (expressed as feed concentration) was similar for the three dosing levels. Residues in omental fat were: 4 ppm diet – < 0.05, 0.06 and 0.06 mg/kg; 12 ppm diet – 0.16, 0.14, 0.18 mg/kg; 40 ppm diet – 0.89, 0.42, 1.01 mg/kg.

Residue levels in milk quickly reached a plateau level, within 2 or 3 days. Again, the transfer factor between residue level in the milk and the dose (expressed as feed concentration) was similar for the two dosing levels where residues were measurable. No information was available on the residue level in milk fat.

Groups of 3 lactating Friesian-Holstein dairy cows were dosed orally once daily via gelatin capsule with cypermethrin at 0.028 mg/kg bw (1×), 0.085 mg/kg bw (3×) and 0.284 mg/kg bw (10×), for 28 consecutive days. Milk was collected throughout for analysis. Approximately 23 h after the final dose, the animals were slaughtered for tissue collection.

Cypermethrin residues were below LOQ (0.05 mg/kg) in muscle, kidney and liver at all dose levels. Cypermethrin residues were also below LOQ (0.005 mg/kg milk, 0.05 mg/kg tissue fat) in milk and tissue fat at the low dose. The residue levels in tissue fat at the 3× and 10× showed good proportionality.

Residue levels in milk reached a plateau within 3 days of the first dose and the composition of the cypermethrin (cis-trans ratio) also very soon reached a ratio of approximately 52:48 from the

original 40:60. No information was available on the distribution of the residue between the fat and non-fat milk fractions.

In another study, groups of lactating Holstein dairy cows fitted with ear tags containing cypermethrin were dosed once daily via gelatin capsule with cypermethrin at 0 ppm, 5 ppm (1×), 15 ppm (3×) and 50 ppm (10×) in the diet, for 28 consecutive days. Milk was collected on 12 occasions for analysis. Animals from each group were slaughtered within 24 hours of the final dose for tissue collection.

Residue levels of cypermethrin reached a plateau in milk at some time between 5 and 15 days after dosing was initiated. Residues of cypermethrin were just detectable in fat and cream from the ear-tag use only (LOQ 0.01 mg/kg). Residues of cypermethrin did not appear in the liver even at the highest dose, but were present in kidney and muscle (LOQ 0.01 mg/kg). Residue levels were much higher in fat than in other tissues and were approximately proportional to the dosing levels.

Residue data were available on milk and cream from day 7 where the residue concentrations in cream were on average 7 times the concentration in milk. No information was available on the lipid or water content of the cream.

Laying hens

Three groups of laying hens were dosed once daily via gelatin capsule with alpha-cypermethrin at the intended equivalent of 1.2 ppm, (1×), 6.1 ppm (5×) and 12 ppm (10×) in the diet for 28 consecutive days. Actual equivalent dietary concentrations were: 1.6 ppm, 7.2 ppm and 15 ppm. Eggs were collected approximately 3 times per week. Most of the birds were slaughtered within 24 h of the final dose for tissue collection and analysis.

Residues in liver and muscle from the highest dose group did not exceed LOQ (0.05 mg/kg). Residues in abdominal fat were: 1.6 ppm diet – < 0.05 (3) mg/kg; 7.2 ppm diet – 0.086, 0.088, 0.082 mg/kg; 15 ppm diet – 0.21 0.26 0.24 mg/kg. Residues in eggs and fat did not exceed the LOQ (0.01 and 0.05 mg/kg, respectively) for the low dose group. Residues in eggs from the highest dose group reached levels of 0.02-0.035 mg/kg. Residues in eggs from the middle dose group were in the range < 0.01–0.013 mg/kg

In another study, three groups of laying White Leghorn hens were dosed via gelatin capsule with cypermethrin at the equivalent of 2 ppm (1×), 6 ppm (3×) and 20 ppm (10×) in the diet for 28 consecutive days. Eggs were collected daily. Birds were slaughtered within 24 hours of the final dose for tissue collection.

Residues did not appear in the liver or muscle from the high dose group (LOQ 0.05 mg/kg) or in the fat or eggs from the low dose group. Residues in the fat were: 6 ppm diet – 0.066, 0.086, < 0.05 mg/kg; 20 ppm diet – 0.13, 0.19, 0.17 mg/kg. Cypermethrin appears in the yolk and not the albumen in eggs, as expected of a fat-soluble compound.

Direct animal treatment

The Meeting received studies on the residues arising in livestock from external treatment with alpha-cypermethrin as an ectoparasiticide.

In a South African study, cattle were plunge dipped in a 12000 litre dip prepared from an alpha-cypermethrin SC formulation at a nominal concentration of 70 mg/l and one animal was slaughtered on each of 4 intervals after dipping, i.e.,7, 14, 21 and 28 days later.

Alpha-cypermethrin residues were not detected (limit of detection 0.02 mg/kg) in any of the tissues from dipped animals slaughtered 1, 7, 14 and 21 days after treatment. In the 28-day animal, residues were present in perirenal fat at 0.02 mg/kg, but were below the detection limit in omental fat, muscle, kidney and liver.

In a UK study, four lactating dairy cows were topically dosed along the mid-dorsal line from upper neck to top of tail with 10 ml of a radiolabelled alpha-cypermethrin formulation at a dose equivalent to 150 mg ai/ animal. Samples of milk were collected and one animal was slaughtered at each of 7, 14, 28 and 35 days after dosing.

Concentrations of ^{14}C expressed as alpha-cypermethrin were below the limit of reliable measurement (0.01–0.03 mg/kg) in all tissue samples. A peak of radioactivity in the milk was observed at 1–2 days after treatment (highest values 0.012 and 0.014 mg/kg), but the ^{14}C concentrations expressed as alpha-cypermethrin were generally below 0.01 mg/kg.

In a second UK study, 20 cattle were topically dosed along the mid-dorsal line from shoulder to tail with 10 mL of a Pour On alpha-cypermethrin formulation at a dose equivalent to 150 mg ai/ animal. Animals were slaughtered 3, 7, 14, 21 and 28 days after treatment. Residues in fat decreased from 0.02–0.14 mg/kg 3 days after topical treatment to < 0.01–0.04 mg/kg 28 days after treatment.

No suitable registered direct uses of alpha-cypermethrin on livestock were available to permit evaluation of the supervised trials data on direct animal treatments.

Farm animal dietary burden

The Meeting estimated the dietary burden of cypermethrin in livestock on the basis of the diets listed in Annex 6 of the 2006 JMPR Report (OECD Feedstuffs Derived from Field Crops). Calculation from highest residue, STMR (some bulk commodities) and STMR-P values provides the levels in feed suitable for estimating MRLs, while calculation from STMR and STMR-P values for feed is suitable for estimating STMR values for animal commodities.

Estimated maximum and mean dietary burdens of farm animals

Dietary burden calculations for beef cattle, dairy cattle, broilers and laying poultry are provided in Annex 6. The calculations were made according to the livestock diets from US-Canada, EU and Australia in the OECD Table (Annex 6 of the 2006 JMPR Report).

	Livestock dietary burden, cypermethrin, ppm of dry matter diet					
	US-Canada		EU		Australia	
	max	mean	max	mean	max	mean
Beef cattle	20.7	7.9	24.4	8.3	31.4 [a]	11.3 [b]
Dairy cattle	13.8	5.3	17.1	7.6	21.6 [c]	8.3 [d]
Poultry - broiler	0.16	0.16	0.05	0.05	0.35	0.35
Poultry - layer	0.16	0.16	2.2 [e]	0.66 [f]	0.35	0.35

a Highest maximum beef or dairy cattle dietary burden suitable for MRL estimates for mammalian meat.

b Highest mean beef or dairy cattle dietary burden suitable for STMR estimates for mammalian meat.

c Highest maximum dairy cattle dietary burden suitable for MRL estimates for milk.

d Highest mean dairy cattle dietary burden suitable for STMR estimates for milk.

e Highest maximum poultry dietary burden suitable for MRL estimates for poultry meat and eggs.

f Highest mean poultry dietary burden suitable for STMR estimates for poultry meat and eggs.

Animal commodity maximum residue levels

Cattle

For MRL estimation, the high residues in the tissues were calculated by interpolating the maximum dietary burden (31.4 ppm) between the relevant feeding levels (12 and 40 ppm) from the alpha-cypermethrin dairy cow feeding study and using the highest tissue concentrations from individual animals within those feeding groups.

The STMR values for the tissues were calculated by interpolating the STMR dietary burden (11.3 ppm) between the relevant feeding levels (4 and 12 ppm) from the alpha-cypermethrin dairy cow feeding study and using the mean tissue concentrations from those feeding groups.

For milk MRL estimation, the high residues in the milk were calculated by interpolating the maximum dietary burden (21.6 ppm) between the relevant feeding levels (12 and 40 ppm) from the alpha-cypermethrin dairy cow feeding study and using the mean milk concentrations from those feeding groups.

The STMR value for milk was calculated by interpolating the STMR dietary burden (8.3 ppm) between the relevant feeding levels (0 and 12 ppm, because residues at 4 ppm feeding were below LOQ) from the alpha-cypermethrin dairy cow feeding study and using the mean milk concentrations from those feeding groups.

In the table, dietary burdens are shown in round brackets (), feeding levels and residue concentrations from the feeding study are shown in square brackets [] and estimated concentrations related to the dietary burdens are shown without brackets.

Dietary burden (ppm)					
Feeding level [ppm]	Milk	Muscle	Liver	Kidney	Fat
MRL					
	mean	highest	highest	highest	highest
MRL beef cattle (31.4) [12, 40]		0.04 [< 0.05, < 0.05]	0.04 [< 0.05, < 0.05]	0.04 [< 0.05, < 0.05]	0.76 [0.16, 1.01]
MRL dairy cattle (21.6) [12, 40]	0.031 0.016, 0.059]				
STMR					
	mean	mean	mean	mean	mean
STMR beef cattle (11.5) [4, 12, 40]		0.014 [< 0.05, < 0.05, < 0.05]	0.014 [< 0.05, < 0.05, < 0.05]	0.014 [< 0.05, < 0.05, < 0.05]	0.15 [0.057, 0.16, 0.77]
STMR dairy cattle (8.3) [0, 4, 12]	0.011 [0, < 0.01, 0.016]				

The data from the cattle feeding studies were used to support the estimation of maximum residue levels for mammalian meat and milk.

Residues in milk were estimated as 0.031 and 0.011 mg/kg resulting from the maximum (21.6 ppm) and STMR (8.3 ppm) dietary burdens respectively. A feeding study with cypermethrin in dairy cows showed that cypermethrin residue concentrations in the cream were, on average, 7 times the concentration in milk. With allowance of 50% fat in the cream, the estimated cypermethrin residues in milk fat were 0.43 and 0.15 mg/kg respectively from the two dietary burdens (0.031×7×2=0.43; 0.011×7×2=0.154).

The Meeting estimated a maximum residue level for cypermethrin in milks of 0.05 to replace the previous recommendation of 0.05 F mg/kg. The Meeting also estimated an STMR for milk of 0.011 mg/kg. The Meeting estimated a maximum residue level and an STMR value for milk fats of 0.5 and 0.15 mg/kg respectively.

The Meeting estimated a maximum residue level for cypermethrin in edible offal of 0.05* mg/kg, confirming the previous recommendation. The estimation is based on the liver and kidney data. The Meeting estimated an STMR value and an HR value of 0.014 and 0.04 mg/kg respectively for edible offal.

For muscle, the residue arising from a dietary burden of 31.4 ppm was below LOQ, 0.05 mg/kg. For fat, the residue arising from a dietary burden of 31.4 ppm was 0.76 mg/kg, while the residue resulting from a dietary burden of 11. 5 ppm was 0.15 mg/kg.

Because the available feeding study was on dairy cows and cypermethrin is fat-soluble with secretion in the milk, higher residues would be expected in the fat of beef cattle than in dairy cattle. The Meeting, allowing for the possible higher residues in beef cattle, estimated a maximum residue level for cypermethrin in mammalian meat (fat) of 2 mg/kg (an estimate for fat of dairy cows only would be 1 mg/kg). The Meeting estimated STMR and HR values for meat (fat) of 0.15 and 0.76 mg/kg respectively. The Meeting estimated STMR and HR values for meat (muscle) of 0.014 and 0.04 mg/kg respectively.

The Meeting was aware that CCRVDF had established veterinary drug MRLs for cypermethrin and alpha-cypermethrin in cattle muscle (50 µg/kg), cattle liver (50µg/kg), cattle kidney (50 µg/kg) and cattle fat (1000 µg/kg) and the same for sheep muscle (50 µg/kg), sheep liver (50µg/kg), sheep kidney (50 µg/kg) and sheep fat (1000 µg/kg).

The CCRVDF MRLs and the estimated maximum residue levels are apparently in agreement, except for the JMPR estimate of 2 mg/kg for mammalian meat (fat) and the CCRVDF value of 1000 µg/kg for cattle fat.

Poultry

In the table, dietary burdens are shown in round brackets (), feeding levels and residue concentrations from the feeding study are shown in square brackets [] and estimated concentrations related to the dietary burdens are shown without brackets.

Dietary burden (ppm)				
Feeding level [ppm]	Eggs	Muscle	Liver	Fat
MRL				
	highest	highest	highest	highest
MRL laying hens (2.2) [0, 1.6, 7.2]	0.0033 [0, < 0.01, 0.011]	0.007 [0, < 0.05, < 0.05]	0.007 [0, < 0.05, < 0.05]	0.027 [0, < 0.05, 0.088]
STMR				
	mean	mean	mean	mean
STMR laying hens (0.66) [0, 1.6, 7.2]	0.001 [0, < 0.01, 0.011]	0.002 [0, < 0.05, < 0.05]	0.002 [0, < 0.05, < 0.05]	0.0.008 [0, < 0.05, 0.088]

The data from the laying hen feeding studies were used to support poultry meat and egg MRLs.

For poultry liver and muscle, residues were below LOQ (0.05 mg/kg) even at the 15 ppm feeding level, so an estimate of the STMRs was made by dividing the dietary burden (0.66 ppm) by 15 ppm and multiplying by the LOQ (0.05 mg/kg) to produce a value of 0.002 mg/kg. An estimate of the HRs was made by dividing the dietary burden (2.2 ppm) by 15 ppm and multiplying by the LOQ (0.05 mg/kg) to produce a value of 0.0007 mg/kg.

For eggs, residues were below LOQ (0.01 mg/kg) at the 1.6 ppm feeding level, so an estimate of the STMR was made by dividing the dietary burden (0.66 ppm) by 7.2 ppm and multiplying by the residue at that dosing level (0.011 mg/kg) to produce a value of 0.001 mg/kg. Similarly, a calculation for the HR for eggs produced a value of 0.0033 mg/kg.

The Meeting estimated a maximum residue level of 0.01* mg/kg for eggs to replace the previous recommendation. It also estimated an STMR value and an HR value of 0.001 and 0.0033 mg/kg respectively for poultry eggs.

The Meeting estimated a maximum residue level, an STMR value and an HR value of 0.05*, 0.002 and 0.007 mg/kg respectively for poultry edible offal.

The Meeting estimated a maximum residue level of 0.05*mg/kg for poultry meat (fat). The Meeting also estimated an STMR value of 0.002 (muscle) 0.008 (fat) and an HR value of 0.007 (muscle) 0.027 (fat) mg/kg, respectively.

DIETARY RISK ASSESSMENT

Long-term intake

The evaluation of cypermethrin, alpha-cypermethrin and zeta-cypermethrin resulted in recommendations for MRLs and STMR values for raw and processed commodities. Where data on consumption were available for the listed food commodities, dietary intakes were calculated for the 13 GEMS/Food Consumption Cluster Diets. The results are shown in Annex 3.

The IEDIs in the thirteen Cluster Diets, based on estimated STMRs were 5–20% of the maximum ADI (0.02 mg/kg bw). The Meeting concluded that the long-term intake of residues of the cypermethrins 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 cypermethrin, alpha-cypermethrin and zeta-cypermethrin was calculated for the food commodities (and their processing fractions) for which maximum residue levels and HRs and STMRs were estimated and for which consumption data were available. The results are shown in Annex 4.

Initially, calculated IESTI values on residues in spinach, head lettuce and leaf lettuce, which are all leafy vegetables, exceeded the ARfD. Sufficient residue data related to an alternative GAP for head lettuce were available where a calculated IESTI did not exceed the ARfD, which allowed the estimation of a maximum residue levels for leafy vegetables that could be recommended as an MRL.

The IESTI varied from 0–40% of the ARfD (0.04 mg/kg bw) for the general population and from 0–90% of the ARfD for children 6 years and below. The Meeting concluded that the short-term intake of residues of the cypermethrins from used considered by the Meeting was unlikely to present a public health concern.