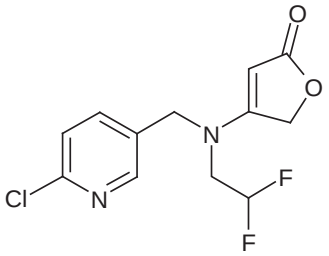
5.12 FLUPYRADIFURONE (285)

RESIDUE AND ANALYTICAL ASPECTS

Flupyradifurone (fpd) is an insecticide belonging to the chemical class of butenolides. It acts as an agonist of the nicotinic acetylcholine receptor. It was scheduled for evaluation as a new compound by the 2015 JMPR at the 46th Session of the CCPR (2014). It was evaluated for toxicology in 2015. An ADI of 0–0.08 mg/kg bw and an ARfD of 0.2 mg/kg bw were established.

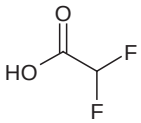
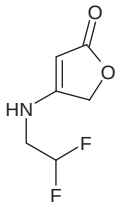
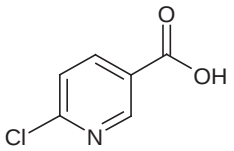
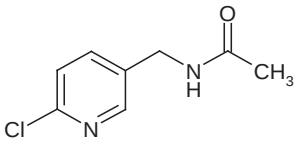
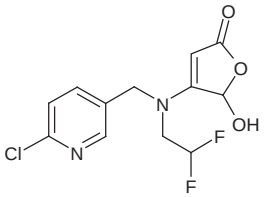
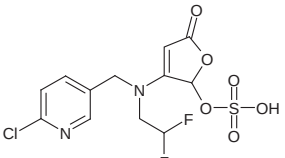
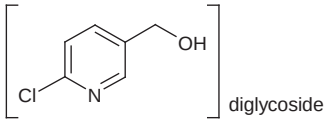
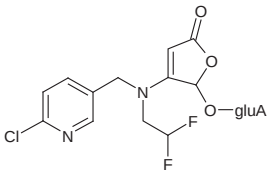
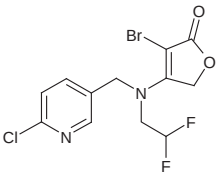
The manufacturer supplied information on identity, metabolism and environmental fate, methods of residue analysis, freezer storage stability, registered use patterns, supervised residue trials, fate of residues in processing and farm animal feeding studies.

The IUPAC name is 4-[(6-chloro-3-pyridylmethyl)(2,2-difluoroethyl)amino]furan-2(5H)-one.



Flupyradifurone

The structure of the key metabolites discussed, are shown below:

 Difluoroacetic acid (DFA)	 fpd-difluoroethyl-amino-furanone (DFEAF)	 6- chloronicotinic acid (6-CNA)
 fpd-acetyl-AMCP	 fpd-OH	 fpd-OH-SA
 fpd-CHMP-di-glyc	 fpd-OH-glu	 fpd-bromo

Plant metabolism

Flupyradifurone (fpd) metabolism in primary crops was investigated following either foliar applications (apple, cotton, and rice), soil granule/drench applications (tomato, potato, and rice) or by seed dressing (potato). Studies were conducted using [^{14}C]flupyradifurone labelled on the furanone or pyridinylmethyl moiety and using application rates representative of the supported uses. One study on tomato using soil drench applications and with ^{14}C-labelling on the difluoroethyl amino group was also submitted.

Acetonitrile and water extraction of tomato, potatoes, apples, cotton and paddy rice resulted in extraction efficiencies of 85–99.5% (tomato fruit), 94–98% (tomato flowers), 67–93% (potatoes), 50–99% (apple fruits), 94–98% (apple leaves), 67–90% (gin trash), 97–99% (cotton lint), 22–39% (cotton seed), 19–88% (rice kernel), 76–90% (rice husks) and 79–84% (rice straw).

[Furanone-4-^{14}C]-fpd or [pyridinylmethyl-^{14}C]-fpd was applied twice by soil drench applications to four tomato plants at rates of 300 g ai/ha at BBCH 15 (= 5th leaf on main shoot unfolded) and BBCH 51 (= first inflorescence visible and first bud erect). Parent was the main residue in both fruit and flowers (24–36% and 66–78% of the TRR respectively). The compound fpd-CHMP-di-glyc was observed in tomato fruit at 37% TRR. In a similar study, three tomato plants were treated twice at 300 g ai/ha by soil drench application with [ethyl-1-^{14}C]-fpd. The label specific metabolite difluoroacetic acid (DFA) was the main residue in both extracts (87% TRR in fruit and 60% TRR in flowers). Parent was present at 10% TRR in fruit and 33% TRR in flowers.

Two different methods of application to potatoes were described. In one experiment potato seed pieces were treated with either [furanone-4-^{14}C]-fpd or [pyridinylmethyl-^{14}C]-fpd at 254 or 274 g ai/ha. In the other experiment either [furanone-4-^{14}C]-fpd or [pyridinylmethyl-^{14}C]-fpd was sprayed in-furrow onto soil at 626 g ai/ha prior to planting of potato seed pieces. Parent was the main residue in extracts of both seed piece and in-furrow treatment for both labels (40–51% of the TRR). For the furanone label two metabolites, difluoroethyl-amino-furanone (DFEAF) and fpd-OH-glyc, were present at < 10% TRR (< 0.01 mg eq/kg). For the pyridinylmethyl label a number of metabolites were identified, the major being 6-chloropyridine-3-carboxylic acid (6-chloronicotinic acid or 6-CNA) at 18 and 22% TRR.

Apple trees were subjected to two different methods of application. In one experiment two apple trees were treated once with either [furanone-4-^{14}C]-fpd or [pyridinylmethyl-^{14}C]-fpd at 86 or 87 g ai/ha/ per metre canopy height at the end of flowering (BBCH 69). In another experiment, one apple tree was treated twice with both labelled parent at 86 or 87 g ai/ha/ per metre canopy height at the end of flowering (BBCH 69) and at 14 days before harvest. The main compound in apple fruits from the single application furanone experiment was glucose (or a corresponding isomeric carbohydrate) at 50% TRR while parent was detected at 7.4% TRR. In apple leaves, parent was detected at 26% TRR. Glucose was also a major component found in the apple fruits from the double application experiment (14% TRR. Parent was the main component in the extracts of apple fruits (71–74% TRR and leaves (58% TRR) of the double application furanone experiment. Parent was the main compound in apple fruits and leaves of the single (43% and 25% TRR respectively) and the double application (86–88% and 48% TRR respectively) experiments using the pyridinylmethyl label.

Two different methods of application to cotton were described. In one experiment cotton plants were treated once with either [furanone-4-^{14}C]-fpd or [pyridinylmethyl-^{14}C]-fpd at 209 or 206 g ai/ha at BBCH 16. In another type of experiment, one cotton plant was treated twice at 209 g ai/ha (furanone label) or 206 g ai/ha (pyridinylmethyl label) at BBCH 15–16 (unfolding of the 5th to 8th true leaf) and a second time at 176–177 g ai/ha at 14 or 15 days before harvest of the cotton bolls (BBCH 95–97). In both experiments cotton seeds with lint, lint and gin trash were harvested at maturity of seed (BBCH 99). The main compound in all cotton matrices for experiments with both labels, except for seeds of the single application experiment, was parent (23–73% TRRs), even after only one treatment with a long PHI (169 days). The fraction comprising the metabolites fpd-OH-glyc and fpd-acetic acid represented a major portion of the TRR in all sample matrices, except for seeds,

while another major compound in gin trash of the first application experiment was identified as fpd-OH. In seeds of the single application pyridinylmethyl label experiment, 6-CNA was the only component identified (16% TRR). It was also observed in gin trash of the single application pyridinylmethyl label experiment (18.5% TRR).

Two different methods of application to paddy rice were described. One consisted of a single granular treatment with either 409 g ai/ha [furanone-4-^{14}C]-fpd or 434 g ai/ha [pyridinylmethyl-^{14}C]-fpd applied during the transplanting of the rice seedlings. In the second experiment, [furanone-4-^{14}C]-fpd or [pyridinylmethyl-^{14}C]-fpd was applied twice as a spray treatment onto plants as well as the water surface. The first spray application took place directly after transplanting of the rice seedlings at a rate of 175–178 g ai/ha and the second approximately one month before harvest at a rate of 236–240 g ai/ha. In both experiments, the rice (kernels, husks and straw) was harvested at maturity (BBCH 89–92) at 127 DAT (granular) or 29 DAT (foliar). The main compound was parent in all rice matrices (57–78% of the TRR), except for rice kernels after granular application for the furanone label (23% TRR), where the main metabolite was the natural compound glucose/carbohydrates (27% TRR). In rice straw for both labels, fpd-bromo which was identified as the only major metabolite present (8–12% TRR) co-eluted with fpd-chloro.

A study was conducted to determine the fate of the difluoroethane moiety of parent flupyradifurone by determination of the non-radiolabelled difluoroacetic acid (DFA) content of extracts from the plant metabolism studies (apples, potatoes, cotton and rice) conducted with either [furanone-4-^{14}C]- or [pyridinylmethyl-^{14}C]-fpd. The application technique did not significantly influence the level, with residues of a similar order of magnitude after soil or foliar application. Residues in apple fruits were 0.04–0.23 mg/kg, in apple leaves 0.45–0.62 mg/kg, in potato tubers 0.13–0.18 mg/kg, in cotton seeds 0.02–0.03 mg/kg, in cotton gin trash 0.02–0.04 mg/kg, in rice straw 0.12–0.39 mg/kg, in rice husk 0.20–0.46 mg/kg and in rice grains 0.02–0.08 mg/kg.

High difluoroacetic acid concentrations after foliar spray application indicate that this metabolite is also formed in plants and not only in soil. Difluoroacetic acid represents a significant proportion of the residue in all edible matrices of primary crops when considering the results of the studies conducted with [^{14}C]flupyradifurone.

Summary of plant metabolism

Metabolism in primary crops was similar in all plant groups investigated. In the studies using [furanone-4-^{14}C]-fpd and [pyridinylmethyl-^{14}C]-fpd, parent flupyradifurone was consistently observed to be the major component of the radioactive residues, accounting for approximately 23 to 88% of the TRR in all plant parts analysed. As well as flupyradifurone, the following metabolites were identified in different plant matrices, the conjugate fpd-CHMP-diglycoside, up to 37% TRR (0.05 mg eq/kg) in tomato fruit and the metabolite 6-CNA in the range of 13–22% TRR (0.02 mg eq/kg) in tomato fruit, potato tuber and cotton seed, both resulting from the cleavage of the molecule at the ethylamine bond and containing the pyridinyl moiety. In contrast, metabolites containing the furanone moiety were close to non-detect and the radioactivity in the [^{14}C]furanone studies was mostly recovered as incorporated in natural glucoside and carbohydrate components, indicating an extensive degradation of the furanone counterpart.

The study conducted on tomato with the ^{14}C labelling on the difluoroethyl amino group showed that following soil drench application, significant proportions (87% TRR) and levels (0.17 mg/kg) of difluoroacetic acid (DFA) were present in tomato fruits. Samples from the radiolabelled studies were therefore re-analysed for non-radiolabelled DFA and residues, expressed as DFA equivalents, were measured in the range of 0.02–0.23 mg/kg in apple fruits, potato tuber, cotton seed and rice grain, irrespective of mode of application.

Rotational crops

Confined rotational crops

Studies were undertaken to investigate the metabolism of flupyradifurone in the representative crops wheat, Swiss chard and turnips from three consecutive rotations using either [furanone-4-^{14}C]-fpd or [pyridinylmethyl-^{14}C]-fpd sprayed onto the soil of a planting container at 436 and 433 g ai/ha respectively. The crops were each sown at 29, 135 and 296 days after the soil application, representing the first, second and third rotation. Raw agricultural commodities sampled included the immature samples forage and hay from wheat, and the immature samples from Swiss chard. All other samples (wheat straw and wheat grain, Swiss chard, turnip leaves and turnip roots) were harvested in each rotation at maturity. No studies were undertaken with labelling on the difluoroethyl amino group. A similar metabolic profile as observed for primary crops was observed in the confined rotational studies.

Parent compound and about 30 (furanone label) or 50 (pyridinylmethyl label) metabolites were detected in the conventional and exhaustive extracts of the various samples of the three rotations. Parent compound was the main component detected in all matrices of all rotations, except for wheat grain. Parent accounted for 34–64% (furanone label) or 28–62% (pyridinylmethyl label) of the TRR in the commodities at a 29 day PBI, 28–68% (furanone label) or 25–67% (pyridinylmethyl label) TRR at a 135 day PBI, and 18–72% (furanone label) or 20–69% (pyridinylmethyl label) TRR at a 296 day PBI, not considering grains. In wheat grains, only trace amounts of parent compound were detected (< 1% and 2% of the TRR) in the furanone label experiments and 1–14% of the TRR in the pyridinylmethyl label experiments. The highest proportion of parent compound was always detected in turnip leaves.

Samples from the confined rotational studies were also analysed for the presence of non-radiolabelled difluoroacetic acid (DFA). Significant levels of DFA were detected in all plant matrices of the first and second rotation except turnip roots. DFA represented a major proportion of the residues in the edible crops wheat grain, Swiss chard and turnip roots, as well as in wheat hay.

Field rotational crops

In the USA the total maximum seasonal application rate for a large range of crops is 409 g ai/ha. In Central America the total maximum seasonal application rate for potatoes, tomatoes and chilli peppers and melon, cucumbers and watermelons is 600 g ai/ha. Field crop rotational trials conducted in Europe have been made available to the Meeting.

In a European study, applications were either made to bare soil or to lettuce (primary crop or target crop) at 200 g ai/ha. In each rotation (25–33 days, 60–200 days and 260–330 days), three different crops were planted: a root crop (carrots or turnips), a leafy crop (lettuce), or a cereal (barley). Samples of the rotational crops were taken at their harvest times, as well as at one earlier interval and were analysed for residues of parent, DFA, DFEAF and 6-CNA.

In general parent compound was either absent or present at low levels (< 0.1 mg/kg). DFEAF was not detected in all commodities at all PHIs, while DFA was observed in most commodities at all PHIs (up to 0.63 mg/kg in cereal grain and up to 0.12 mg/kg in lettuce and root crops). Low residues of 6-CNA were detected in barley straw only.

Additional European studies involved two applications to bare soil at 125 g ai/ha with the rotational crops potatoes, cucumber, leek, French bean, onion, pea and winter rape planted approximately 30 days after the last application. Samples were taken at typical harvest maturity. No residues of parent or DFEAF were detected. Residues of 6-CNA were < 0.005 mg/kg (as 6-CNA) except in bean pods (up to 0.016 mg/kg) and pea dry (up to 0.017 mg/kg). DFA residues were detected in most samples: up to 0.25 mg/kg in potato; up to 0.23 mg/kg in leek; up to 0.41 mg/kg in

cucumber; up to 0.16 mg/kg in onion, up to 1.1 mg/kg in French bean; up to 2.3 mg/kg in field pea and up to 0.15 mg/kg in winter rape.

The field rotational crop studies indicate that while parent and 6-CNA may be observed at low levels, DFA is the major component of the residues.

Environmental fate

The Meeting received information on soil photolysis, aerobic and anaerobic soil metabolism, field dissipation and adsorption/desorption behaviour in different soils. Only those studies relevant to the current evaluation were considered.

A soil photolysis study showed that light was found to have little influence on the behaviour and degradation of flupyradifurone in soils. Flupyradifurone was found to be hydrolytically stable in aqueous solution at pH 4 to pH 9 (50 °C) for five days.

Aerobic laboratory studies were conducted in numerous soils from the USA, Europe and Brazil at 20 ± 2 °C and for periods of 117–120 days, using four different labelling positions. The studies showed that flupyradifurone is degraded in soil under aerobic conditions. The major routes of degradation are cleavage of the difluoroethyl group producing difluoroacetic acid, cleavage of the molecule at the pyridinylmethyl bridge, with subsequent oxidation to 6-chloronicotinic acid and mineralisation to CO_2 and formation of non-extractable residues. DT_{50} values ranged from 33 to 374 days, while DT_{90} values ranged from 209 to > 1000 days. Degradation of the flupyradifurone metabolite, 6-chloronicotinic acid (6-CNA), was studied under aerobic conditions in three English soils over 119 days. It was seen to degrade to CO_2 (84–92% of the applied dose at the end of the study). The rapid breakdown of 6-CNA (DT_{50} values 2.9 to 5.3 days) demonstrated that it will not persist in aerobic soils. DT_{50} values for difluoroacetic acid ranged from 32–74 days while DT_{90} values ranged from 149–245 days.

Field dissipation studies were carried out at six sites in Europe and three sites in both Canada and the USA. In general, the field behaviour of flupyradifurone was consistent with the model developed from the laboratory studies. The studies showed that the major routes of dissipation for flupyradifurone are biodegradation to 6-chloronicotinic acid and difluoroacetic acid and non-extractable residues followed by mineralisation to carbon dioxide. When DFA and 6-CNA were detected, the amounts always decreased over the period of the study. Flupyradifurone dissipated with DT_{50} values of 8 to 251 days in the field studies indicating that flupyradifurone has a potential for residue carry over to the following cropping season if application is performed annually.

Animal metabolism

The Meeting received animal metabolism studies with flupyradifurone in rats, hens and goats.

Rats

Evaluation of the metabolism studies in rats was carried out by JMPR 2015 and is not fully considered here.

In studies conducted in rats using [^{14}C]flupyradifurone, the majority (up to 90%) of radioactivity was excreted in urine within 24 hours. There was no evidence of tissue accumulation. While parent was the main compound detected in excreta (up to 50% of radioactivity in males and 70% in females) flupyradifurone was metabolised to eight identified metabolites and up to 19 unidentified metabolites involving hydroxylation, conjugation and cleavage reactions. The extent of metabolism was greater in male than female rats. Significant plant metabolites, including DFA, DFEAF, 6-CNA and fpd-OH were also observed in the rat metabolism studies.

Goats

Two studies on the metabolism of flupyradifurone were conducted with the test compound labelled in either the [furanone-4-^{14}C] or the [pyridinylmethyl-^{14}C]-position. In each study a lactating goat was dosed orally once daily for five consecutive days, at 28.8 or 24.4 ppm respectively. Milk was sampled twice daily, in the morning and afternoon. Animals were sacrificed approximately 6 hours after the last dose.

A total of 72 and 85% of the total administered dose was eliminated in the faeces and urine (0–102 hours) while TRRs in tissues were 1.7 and 1.2 mg eq/kg in liver, 1.5 and 1.9 mg eq/kg in kidney, 0.54 and 0.36 mg eq/kg in muscle and 0.27 and 0.11 mg eq/kg in total fat for the furanone and pyridinylmethyl labels respectively.

Acetonitrile and water extraction of liver, kidney, muscle, fat and milk resulted in extraction efficiencies of 73–93% (liver), 89–99% (kidney), 88–99% (fat), 95–99% (muscle) and 91–99% (milk).

Metabolism in ruminants was very limited. Parent was the only significant residue in muscle, fat and liver (60–88% TRR for the furanone label and 85–99% TRR for the pyridinylmethyl label). It was also the major component in milk with the pyridinyl label (89% TRR), but lactose was the major component in milk for the furanone label (67% TRR), while parent was found at 24% of the TRR.

Significant metabolism was demonstrated only in kidney, in which parent was present at 35–50.5% TRR for the pyridinylmethyl and furanone labels respectively, while the metabolite fpd-OH (hydroxylation in the 5 position of the furanone ring) was present at 15–16% TRR. Fpd-glucuronides, from hydroxylation followed by conjugation with glucuronic acid, were observed at 13–31% of the TRR in total, with four isomers up to 9% TRR each.

Hens

Two studies on the metabolism of flupyradifurone were conducted with the test compound labelled in either the [furanone-4-^{14}C] or the [pyridinylmethyl-^{14}C]-position. In each study six laying hens were dosed orally once daily for 14 consecutive days, at 17.1 or 16.2 ppm for the furanone and pyridinylmethyl labels respectively. Animals were sacrificed approximately 6 hours after the last dose.

A total of 78 and 96% of the total administered dose was eliminated in the excreta for the furanone and pyridinylmethyl labels respectively (cumulative after 14 days). In eggs 2.4 and 0.24% of the administered dose was recovered (cumulative after 14 days). A plateau level of approximately 1.0 mg eq/kg was reached at 9 days after the first administration for the furanone label and 0.08 mg eq/kg at six days after the first administration for the pyridinylmethyl label. TRRs in tissues were 2.2 and 0.44 mg eq/kg in liver, 1.1 and 1.1 mg eq/kg in kidney, 0.18 and 0.070 mg eq/kg in total skeletal muscle and 0.43 and 0.021 mg eq/kg in total fat for the furanone and pyridinylmethyl labels respectively.

Acetonitrile and water extraction of egg, muscle, fat and liver resulted in extraction efficiencies of 65–96% (eggs), 39–93% (muscle), 80–98% (fat) and 72–75% (liver).

Parent was generally a minor component in hen matrices, with the exception of muscle for the furanone label (14% TRR) and fat (15% TRR) and eggs (20% TRR) for the pyridinylmethyl label only. Fatty acids were the major metabolic product with the furanone label for eggs, fat, and liver (52–96% TRR). With the pyridinylmethyl label, fpd-acetyl-AMCP, from cleavage of both the furanone and difluoroethyl groups, was the major residue in eggs (23% TRR), muscle (40% TRR) and fat (29% TRR), while the major residue in liver was fpd-OH-SA from hydroxylation of the furanone (23% TRR).

Summary of animal metabolism

Whilst parent was the main compound detected in excreta of rats, flupyradifurone was metabolised to eight identified metabolites and up to 19 unidentified metabolites involving hydroxylation, conjugation and cleavage reactions.

Metabolism in ruminants was very limited. Parent flupyradifurone was the major portion of the residue in fat, muscle, and liver (60–99% TRR). The parent was also the major component in milk with the pyridinylmethyl label (89% TRR). Significant metabolism was demonstrated only in the kidney.

Metabolism in poultry was far more extensive than in ruminants. Parent was generally a minor component in hen matrices, with the exception of muscle for the furanone label (14% of the TRR) and fat (15% of the TRR) and eggs (20% of the TRR) for the pyridinylmethyl label only. Fatty acids were the major metabolic product with the furanone label for eggs, fat, and liver. With the pyridinylmethyl label, fpd-acetyl-AMCP, was the major residue in eggs, muscle and fat and the major residue in liver was fpd-OH-SA (23% TRR).

Difluoroacetic acid would not have been detected in the hen and goat metabolism studies as a labelled residue due to the positions of the radiolabels.

Methods of analysis

The Meeting received information on analytical methods suitable for the determination of residues of the active substance flupyradifurone and the metabolites DFA, DFEAF and 6-CNA in plant matrices and flupyradifurone and the metabolites DFA, fpd-acetyl-AMCP and fpd-OH in animal matrices.

The methods used for data collection and proposed for enforcement for plant and animal commodities are based on LC-MS/MS for plant and animal matrices. All methods involve extraction with acetonitrile/water. LOQs were generally 0.01 mg/kg for parent, DFEAF and 6-CNA and 0.02 mg/kg for DFA in plant commodities. In animal commodities, LOQs were generally 0.01 mg/kg for parent, fpd-acetyl-AMCP and fpd-OH and 0.01 or 0.02 mg/kg for DFA. Radio-validation experiments were carried out on the analytical methods for plant and animal commodities confirming the acceptability of the methods.

Stability of pesticide residues in stored analytical samples

The Meeting received information on the freezer storage stability of flupyradifurone in plant commodities.

Residues trial data are supported by the supplied storage studies which showed that flupyradifurone, DFEAF and DFA residues are stable for at least 18 months in high water, high acid, high oil, high protein and high starch content matrices, when stored frozen at approximately –18 °C. The storage periods in the storage stability studies cover the sample storage intervals in the residue trials.

All samples in the laying hen feeding study were analysed within thirty days of collection. Therefore, there was no necessity for freezer storage stability data. In the dairy cattle feeding study, tissues and milk samples were analysed within 25 days of collection for residues of parent, fpd-OH and fpd-AMCP and therefore freezer storage stability data was not required for these analytes. DFA residues were shown to be stable in animal commodities for up to 43 days in frozen storage.

Definition of the residue

Plants

In the metabolism studies on primary crops using [furanone-4-^{14}C]-fpd and [pyridinylmethyl-^{14}C]-fpd, flupyradifurone was consistently observed to be the major component of the radioactive residues, accounting for approximately 23–88% of the TRR in all plant parts analysed. Parent compound was the main component detected in almost all matrices of all rotations in the confined rotational crop trials accounting for 18–72% of the TRR.

The Meeting therefore considered that a residue definition of *Flupyradifurone* is appropriate for plant commodities for compliance with MRLs (enforcement).

Due to the fact that parent flupyradifurone was consistently the predominant residue in plants in the metabolism studies and was one of the two predominant components in the supervised field trials over a wide range of crops, parent should also be in the definition for risk assessment.

There are a number of other possible candidates for inclusion in the risk assessment definition.

DFA was detected at significant levels in apple fruit, potato tuber, cotton seed and rice grain, irrespective of method of application in the metabolism studies. Significant levels of DFA were also detected in all plant matrices of the first and second rotation, except turnip roots, in the confined rotational study. DFA was found in most crops included in the field rotation studies and was the only significant residue. DFA is considered to be 3 × more toxic than flupyradifurone (Toxicology report–JMPR 2015). DFA was also included in the data generation method and should be in the definition for risk assessment.

The metabolite fpd-difluoroethyl-amino-furanone (DFEAF), was a metabolite found in Swiss chard in all rotations of the confined rotational crop study at up to 17% TRR and at much lower levels in other crops. However, it was not detected in any of the field rotation studies. It was analysed in all residue trials conducted in primary and succeeding crops. DFEAF was usually not detected or residues were generally very low (< 5%) in most crops in comparison to the total observed residues. DFEAF was observed in the rat metabolism studies and was observed to be no more toxic than parent flupyradifurone. The Meeting therefore considered that DFEAF need not be included in the risk assessment residue definition for plants.

The metabolite 6-CNA was present at > 10% TRR in a number of plant metabolism studies, (13–22% TRR in tomato fruit, potato tuber and cotton seed) but was generally present at low residue levels (approximately 0.02 mg eq/kg). It was included in the residue trial analyses making a significant contribution to flupyradifurone residues in a number of crops such as beans, soya beans and cotton seed. 6-CNA is found to be no more toxic than parent flupyradifurone and will be included in the flupyradifurone residue definition for dietary assessment.

Given that DFA is considered to be 3 × more toxic than flupyradifurone (Toxicology report—JMPR 2015), the sum of parent, 6-CNA and 3 × DFA is the recommended residue definition for commodities of plant origin for risk assessment (dietary exposure assessment). Adjusting residues of DFA to parent equivalents, means there is no necessity for applying the toxicity factor of 3, as the molecular weight of parent flupyradifurone (288.68) is 3.0× the molecular weight of DFA (96.03). Residues of DFA have been expressed as parent equivalents in the submitted field trials.

The proposed residue definition for plant commodities for dietary risk assessment is the *Sum of flupyradifurone, difluoroacetic acid and 6-chloronicotinic acid, expressed as parent equivalents*.

Animals

Metabolism in ruminants was very limited. Parent flupyradifurone was the major portion of the residue in fat, muscle, and liver (60–88% TRR for the furanone label and 85–99% TRR for the

pyridinylmethyl label) and was also the major component in milk for the pyridinylmethyl label (89% TRR). Parent was present in the kidney at 35–50% TRR.

Metabolism in poultry was far more extensive than in ruminants. Parent was generally a minor component in hen matrices, with the exception of muscle for the furanone label (14% TRR) and fat (15% TRR) and eggs (20% TRR) for the pyridinylmethyl label only. Fatty acids were the major metabolic product for the furanone label in eggs, fat, and liver. With the pyridinylmethyl label, fpd-acetyl-AMCP, was the major residue in eggs (23% TRR) and the major residue in liver was fpd-OH-SA (23% TRR).

In terms of the estimated livestock animal dietary burden, fpd-OH-SA is expected to be present in poultry liver at up to 0.1 mg parent equiv./kg, compared to the HR for total flupyradifurone of 0.89 mg parent equiv./kg. This contribution to the total toxicological burden is considered to be minor since it is unlikely to be of greater toxicity than the unconjugated alcohol, which is covered by the parent. Therefore, fpd-OH-SA does not have to be included in the definition for dietary intake for animal commodities.

Difluoroacetic acid was not analysed for in the hen and goat metabolism studies. Residues of parent, DFA, fpd-OH and fpd-AMCP were determined in the lactating dairy cattle and laying hen feeding studies. No quantifiable residues of fpd-OH or fpd-AMCP were observed in any milk sample. The residue in milk was primarily (60–90%) parent. No quantifiable residues of fpd-AMCP were observed in any cow tissues and residues of fpd-OH (when present in cow tissues), were always much lower than residues of parent (the dominant residue at approximately 70–90%) and DFA. In the hen feeding study residues of parent, fpd-OH and fpd-AMCP were much lower than residues of DFA (usually greater than 90%) in eggs and tissues. After feeding at 19.4 ppm for 29 days, for example, mean residues in fat, liver and muscle were 0.275, 1.02 and 0.723 mg/kg of which 0.272, 1.01 and 0.719 mg/kg were DFA.

The proposed residue definition for animal commodities for compliance with MRLs (enforcement) is *Sum of flupyradifurone and difluoroacetic acid, expressed as parent equivalents*.

A residue definition of *Sum of flupyradifurone and 3 × difluoroacetic acid* is appropriate for commodities of animal origin for dietary risk assessment. As the molecular weight of flupyradifurone is 3.0× the molecular weight of DFA, it is not necessary to apply a toxicity factor for DFA, if the residues of DFA are expressed as parent equivalents.

The proposed residue definition for animal commodities for dietary risk assessment is *Sum of flupyradifurone and difluoroacetic acid, expressed as parent equivalents*.

The ratio of total residues (flupyradifurone + DFA) in muscle and fat in the livestock feeding studies support the conclusion that the total residue is not fat soluble (mean residues of fat/ muscle in the dairy cattle study at four feeding levels 0.48–0.72 and 0.37–0.52 in the laying hen study at four feeding levels). There is no evidence to suggest that there is significant potential for bioaccumulation in fat tissues.

Definition of the residue (for compliance with the MRL for plant commodities): *Flupyradifurone.*

Definition of the residue (for estimation of dietary intake for plant commodities): *Sum of flupyradifurone, difluoroacetic acid and 6-chloronicotinic acid, expressed as parent equivalents.*

Definition of the residue (for compliance with the MRL and for estimation of dietary intake for animal commodities): *Sum of flupyradifurone and difluoroacetic acid, expressed as parent equivalents.*

The Meeting agreed that the residue be designated as not fat soluble.

Results of supervised residue trials on crops

Supervised trials were available for the use of flupyradifurone on citrus fruits (grapefruit, lemons, mandarins and oranges), pome fruits (apples and pears), berries and other small fruits (blueberries, grapes and strawberries), assorted tropical and sub-tropical fruit—inedible peel (prickly pear), bulb vegetables (bulb onion and green onions), Brassica vegetables (broccoli, cabbage, and cauliflower), cucurbits (cucumber, melons and summer squash), fruiting vegetables other than cucurbits (tomatoes, chilli and sweet peppers and sweet corn), leafy vegetables (mustard greens, head and leafy lettuce and spinach), legume vegetables (common bean, snow peas, lima beans and garden peas), pulses (peas, beans and soya beans), root and tuber vegetables (carrots, radishes and potatoes), stalk and stem vegetables (celery), cereals (barley, wheat, sorghum and maize), tree nuts (almonds and pecans), oilseeds (cotton and peanuts), coffee and hops.

For maximum residue level estimation (compliance), residues of flupyradifurone parent have been considered. For dietary intake assessment (risk assessment), residues of flupyradifurone, DFA and 6-chloronicotinic acid expressed as parent equivalents (referred to as total residues of flupyradifurone), have been considered.

Product labels were available from the USA and Central America.

The Central American GAPs were the critical GAPs for citrus fruit, melon, cucumber and watermelon, tomatoes and chilli peppers and potatoes. None of the submitted trial data matched the Central American GAPs for any of these crops, so these will not be referred to further. The USA label has foliar and soil application GAPs for some crop groups. Only one of these methods of application is allowed per crop.

The following crops are listed on the USA label under rotational crops for immediate plant-back: Cereal grains (except rice), cotton, non-grass animal feeds (alfalfa and clover only), peanut, root vegetables (except sugar beet), tuberous and corm vegetables, leafy vegetables, Brassica (cole) leafy vegetables, legume vegetables (succulent or dried), fruiting vegetables, cucurbit vegetables, hops, citrus fruit, pome fruit, bush berry (except cranberry), low growing berry (except cranberry), small fruit vine climbing (except fuzzy kiwifruit), tree nut (except almond), prickly pear/ cactus pear.

Bulb vegetables (US crop Group 3-07, *Allium* Spp.) are on the current USA Sivanto 200SL label as a rotational crop only, with immediate plant-back interval.

The label states that for crops not listed in the immediate plant-back section of this label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant-back interval must be observed.

Residue trial data were submitted for bulb onions, green onions, almonds, almond hulls and coffee. As there is no submitted GAP for these crops, the trial data for these crops will not be discussed further.

Where mean values have been considered, if an individual observation is higher than the highest mean, this is also listed (as the HR). Where parent or DFA residues were not detected or were less than the LOQ (i.e., < 0.01 mg/kg for parent or 0.05 mg/kg for DFA) the LOQ value was utilised for maximum residue estimation and dietary intake assessment. For 6-CNA, values less than the LOQ were not added for calculation of total residues of flupyradifurone.

The following table shows how residues in the trials were added to give total residues of flupyradifurone.

Parent	DFA	6-CNA	Total
< 0.01	0.05	0.01	0.07
0.01	< 0.05	0.01	0.07
< 0.01	< 0.05	< 0.01	< 0.06
0.01	0.05	< 0.01	0.06
0.01	0.05	0.01	0.07

Citrus fruits, pome fruits, bush berries, grapes and tree nuts are normally cultivated as permanent crops and are not expected to be subject to a potential uptake of flupyradifurone residues from the soil.

The Meeting noted that the submitted plant metabolism studies show that parent flupyradifurone metabolises to a number of other compounds which, like parent, would be converted to 6-CNA by a common moiety imidacloprid analytical method. It is noted that the submitted residues trials indicate that the use of flupyradifurone results in residues of 6-CNA in a number of crops which would require changes to established imidacloprid MRLs or the establishment of new imidacloprid MRLs. As the submitted trials did not quantify total residues containing the 6-chloropyridyl moiety, the Meeting agreed that any attempt to estimate maximum residue levels for imidacloprid, resulting from the use of flupyradifurone, would not be robust. The Meeting recommends that the residue definition for imidacloprid be changed from that requiring a common moiety analytical method. Alternatively, some future trials of flupyradifurone could measure total residues containing 6-chloropyridyl, using a common moiety method.

Citrus Fruit

The USA foliar GAP for citrus fruit is two applications at 205 g ai/ha, 10 day retreatment interval (RTI), 1-day PHI). The USA soil application GAP for citrus fruit is one application at 409 g ai/ha, 30-day PHI).

Residue data for mandarins, grapefruit, lemons and oranges have been submitted according to the USA GAPs for foliar and soil application. Foliar applications were made using either concentrated or dilute sprays. The highest residue observations after foliar application have been selected from each trial for estimation of maximum residue levels and for dietary intake purposes, as these were always greater than the soil application residue observations.

The Meeting noted that the use in the USA is for the citrus fruit group. Although the median residues for each fruit differed by a factor of less than five, the Meeting decided to recommend maximum residue levels for the individual sub-groups of citrus fruit, as there are sufficient trials for each sub-group.

Mandarins

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in mandarins from supervised trials (foliar use pattern) according to the GAP in the USA was 0.12, 0.16, 0.35, 0.39, 0.51, 0.61 and 0.90 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in mandarins from supervised trials (foliar use pattern) according to the GAP in the USA was 0.14, 0.21, 0.40, 0.44, 0.56, 0.66 and 0.99 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for the subgroup mandarins of 1.5, 0.44 and 0.99 mg/kg respectively.

Pummelo and Grapefruits

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in grapefruit from supervised trials (foliar use pattern) according to the GAP in the USA was 0.16, 0.19, 0.19, 0.19, 0.27 and 0.29 mg/kg.

The ranked order of total residues of flupyradifurone in grapefruit from supervised trials (foliar use pattern) according to the GAP in the USA was 0.18, 0.21, 0.21, 0.21, 0.31 and 0.32 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for the subgroup pummelo and grapefruit of 0.7, 0.21 and 0.32 mg/kg respectively.

Lemons and Limes

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in lemons from supervised trials (foliar use pattern) according to the GAP in the USA was 0.12, 0.18, 0.23, 0.30, 0.35, 0.44 and 0.71 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in lemons from supervised trials (foliar use pattern) according to the GAP in the USA was 0.14, 0.20, 0.25, 0.32, 0.37, 0.55 and 0.73 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for the subgroup lemons and limes of 1.5, 0.32 and 0.73 mg/kg respectively.

Oranges, Sweet, Sour

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in oranges from supervised trials (foliar use pattern) according to the GAP in the USA was 0.067, 0.19, 0.25, 0.29, 0.34, 0.63, 0.70, 0.88, 1.2 and 2.1 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in oranges from supervised trials (foliar use pattern) according to the GAP in the USA was 0.087, 0.21, 0.27, 0.31, 0.36, 0.65, 0.72, 0.91, 1.2 and 2.2 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for the subgroup oranges, sweet, sour of 4, 0.505 and 2.2 mg/kg respectively.

Pome fruits

Residue trials were conducted in apples in the USA according to the critical GAP in the USA for pome fruit (two foliar applications at 205 g ai/ha, 10-day RTI, 14-day PHI). Applications were made using either concentrated or dilute sprays. The highest observations for estimation of maximum residue levels and for dietary intake purposes have been selected from each trial.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in apples from supervised trials according to the GAP in the USA were: 0.060, 0.084, 0.097, 0.12, 0.13, 0.14, 0.15, 0.18, 0.21, 0.22, 0.22, 0.25 and 0.30 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in apples from supervised trials according to the GAP in the USA were: 0.11, 0.13, 0.15, 0.17, 0.18, 0.19, 0.23, 0.25, 0.27, 0.28, 0.28, 0.30 and 0.62 mg/kg.

Residue trials were conducted in pears in the USA and Canada according to the critical GAP in the USA for pome fruit (two foliar applications at 205 g ai/ha, 10-day RTI, 14-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in pears from supervised trials according to the GAP in the USA was 0.18, 0.19, 0.20, 0.21, 0.22, 0.26, 0.32, 0.39 and 0.47 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in pears from supervised trials according to the GAP in the USA was 0.23, 0.29, 0.32, 0.44, 0.45, 0.49, 0.59, 0.63 and 0.69 mg/kg.

The use pattern in the USA is for Crop Group 11-10 (Pome Fruit). To consider a maximum residue level for a group, residues in individual crops should be similar (e.g. medians should not differ by more than 5 ×). In deciding whether to combine the datasets for apples and pears or to only utilise the data from the commodity with the highest residues, the Meeting noted that the populations of residues in apples and pears are sufficiently different (Mann-Whitney U-Test) and decided to use the data from pears to estimate a maximum residue level for the group Pome fruit.

Based on pear data only, the Meeting estimated a maximum residue level, an STMR and an HR of 0.9, 0.45 and 0.69 mg/kg for pome fruits.

Berries and other small fruits

Bush berries

Residue trials were conducted in blueberries (four low bush, 21 highbush and one rabbit eye) in the USA (nine trials), Canada (four), Australia (three), Chile (three), New Zealand (two), United Kingdom (two) and one each in Italy, Spain and Denmark, most according to the GAP in the USA for Crop Subgroup 13-07B (except cranberry) (two foliar applications at 205 g ai/ha, 7-day RTI, 3-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in blueberries from supervised trials carried out in the USA and Canada according to the GAP in the USA was 0.35, 0.42, 0.45, 0.57, 0.78, 1.2, 1.6 and 2.5 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in blueberries from supervised trials carried out in the USA and Canada according to the GAP in the USA was 0.40, 0.47, 0.50, 0.62, 0.83, 1.2, 1.6 and 2.6 mg/kg.

The Meeting noted that blueberries can be used as a representative crop for bush berries and estimated an STMR of 0.725 mg/kg, an HR of 2.6 mg/kg and a sub-group maximum residue level of 4 mg/kg for flupyradifurone on bush berries.

Grapes

Residue trials were conducted in grapes in the USA and Canada according to the critical GAP in the USA for foliar application for US crop subgroup 13-07F (two applications at 205 g ai/ha, 10-day RTI, 0-day PHI). In addition, soil drench trials were carried out according the USA GAP for soil application for subgroup 13-07F (one application at 409 g ai/ha, 30-day PHI). Residue observations in grapes arising from the foliar use pattern were higher than those arising from the soil use pattern in every trial, so these have been considered for estimation of the maximum residue level.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in grapes from supervised trials (foliar use pattern) according to the GAP in the USA was 0.31, 0.39, 0.46, 0.52, 0.57, 0.58, 0.69, 0.80, 1.0, 1.1 and 1.9 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in grapes from supervised trials (foliar use pattern) according to the GAP in the USA was 0.36, 0.44, 0.51, 0.57, 0.63, 0.63, 0.74, 0.85, 1.2, 1.2 and 2.0 mg/kg (HR 2.3 mg/kg).

Based on the dataset, the Meeting estimated a maximum residue level, an STMR and an HR for grapes of 3, 0.63 and 2.3 mg/kg respectively for grapes.

Strawberry

Residue trials were conducted in strawberries in the USA and Canada according to the critical GAP in the USA for application for US crop sub-group 13-07G (two foliar applications at 205 g ai/ha, 10-day RTI, 0-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in strawberries from supervised trials according to the GAP in the USA was 0.23, 0.33, 0.38, 0.38, 0.43, 0.51, 0.54, 0.54, 0.58 and 0.62 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in strawberries from supervised trials according to the GAP in the USA was 0.33, 0.38, 0.43, 0.43, 0.48, 0.57, 0.59, 0.59, 0.63 and 0.90 mg/kg (HR 0.94 mg/kg).

Based on the dataset, the Meeting estimated a maximum residue level, a median and a highest residue for strawberries of 1.5, 0.525 and 0.94 mg/kg respectively.

For strawberries no data from studies on relevant follow crops are available.

In field studies on succeeding crops, the mean, median and highest total residues in French beans were 0.98, 0.80 and 1.80 mg/kg respectively. In the absence of data for relevant follow crops the Meeting decided to add the mean residue found in French beans in field studies on succeeding crops of 0.98 mg/kg to the median residue obtained from strawberry residue trials of 0.525 mg/kg for an overall STMR for flupyradifurone in strawberries of 1.505 mg/kg. The Meeting also decided to add the highest residue of 1.80 mg/kg for French beans in the succeeding crop trials to 0.94 mg/kg (the highest residue found in strawberry field trials) for an overall HR of 2.74 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for strawberries of 1.5, 1.505 and 2.74 mg/kg respectively.

Assorted tropical and sub-tropical fruit—Prickly pear

Residue trials were conducted in prickly pear cactus in the USA according to the critical GAP in the USA (two applications at 205 g ai/ha, 7-day RTI, 21-day PHI). Residues were determined in fruit and pads. Four trials were carried out for each but only two trials for fruit (observed parent residues 0.10 and 0.12 mg/kg and total residues 0.15 and 0.17 mg/kg) and two for pads (observed parent residues 0.20 and 0.25 mg/kg and total residues 0.25 and 0.30 mg/kg) can be considered independent.

No maximum residue level was recommended due to the limited data (n = 2 independent trials).

Bulb vegetables

There is no registered use for bulb onions or green onions as a primary crop. Bulb vegetables (Group 3-07, *Allium* Spp.) are on the USA Sivanto 200SL label as a rotational crop only, with immediate plant-back interval.

Data from studies on onions and leeks as follow crops are available. In field studies on succeeding crops, mean, median and highest total residues in onions were 0.14, 0.12 and 0.28 mg/kg respectively. Mean, median and highest residues in leeks were 0.18, 0.13 and 0.39 mg/kg respectively. No residues of parent flupyradifurone were observed.

Based on the leek data (mean and highest residues), the Meeting estimated a maximum residue level, an STMR and an HR for bulb vegetables except fennel bulb of *0.01, 0.18 and 0.39 mg/kg respectively.

Brassica (cole or cabbage) vegetables, Head cabbages, Flowerhead brassicas

Residue trials were conducted in broccoli (four trials), cabbage (10 trials) and cauliflower (six trials) in the USA and Canada according to the GAP in the USA for Crop Group 5 (two foliar applications at 205 g ai/ha, 7-day RTI, 1-day PHI).

The Meeting noted that the GAP was for the Brassica vegetables group, and considered a group maximum residue level, however the medians for the broccoli and cauliflower data sets differed by greater than 5 ×.

Broccoli

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in broccoli heads and stalks from supervised trials according to the GAP in the USA was 0.37, 0.40, 0.95 and 1.9 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in broccoli from supervised trials according to the GAP in the USA was 0.46, 1.2, 2.5 and 3.3 mg/kg (HR 3.5 mg/kg).

The Meeting considered the data insufficient for estimating a maximum residue level for broccoli.

Cauliflower

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in cauliflower heads and stalks from supervised trials according to the GAP in the USA was 0.022, 0.032, 0.087, 0.11, 2.1 and 2.4 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in cauliflower heads and stalks from supervised trials according to the GAP in the USA was 0.11, 0.20, 0.26, 0.46, 2.2 and 2.5 mg/kg (HR 2.6 mg/kg).

The Meeting estimated a maximum residue level, a median and a highest residue for cauliflower of 6, 0.36 and 2.6 mg/kg respectively.

For Brassica vegetables, no data from studies on follow crops are available. In field studies on succeeding crops, the overall highest mean, median and highest total residues in lettuce were 0.12, < 0.06 and 0.41 mg/kg respectively.

The Meeting decided to add the mean residue for lettuce in field studies on succeeding crops of 0.12 mg/kg to the median residue obtained from supervised cauliflower residue trials of 0.36 mg/kg for an overall STMR for flupyradifurone in cauliflower of 0.48 mg/kg.

It was also decided to add 2.6 mg/kg (the highest residue found in supervised field trials for cauliflower) and the highest residue of 0.41 mg/kg for lettuce in the succeeding crop trials.

The Meeting estimated a maximum residue level, an STMR and an HR for cauliflower of 6, 0.48 and 3.01 mg/kg respectively for cauliflower.

Cabbages, Head

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in cabbage head from supervised trials (foliar use pattern) according to the GAP in the USA was 0.11, 0.12, 0.32, 0.33, 0.38, 0.45, 0.69, 0.82 and 0.83 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in cabbage head from supervised trials according to the GAP in the USA was 0.20, 0.24, 0.44, 0.60, 0.67, 0.79, 0.93, 1.0 and 1.1 mg/kg (HR 1.3 mg/kg).

The Meeting estimated a maximum residue level, a median and a highest residue for cabbage, head of 1.5 mg/kg, 0.67 and 1.3 mg/kg respectively.

It was decided to add the mean residue for lettuce in field studies on succeeding crops of 0.12 mg/kg to the median residue obtained from supervised cabbage residue trials of 0.67 mg/kg for an overall STMR for flupyradifurone in cabbage of 0.79 mg/kg.

It was also decided to add 1.3 mg/kg (the highest residue found in supervised field trials for cabbage) and the highest residue of 0.41 mg/kg for lettuce in the succeeding crop trials.

The Meeting estimated a maximum residue level, an STMR and an HR for cabbage of 1.5, 0.79 and 1.71 mg/kg respectively for cabbage.

Fruiting vegetables, Cucurbits

Residue trials were conducted in cucumbers (nine trials), summer squash (eight trials) and muskmelons (five trials) in the USA and Canada according to the foliar GAP in the USA for Crop Group 9 (two foliar applications at 205 g ai/ha, 7-day RTI, 1-day PHI) and also according to the soil application GAP in the USA (one application at 409 g ai/ha, 21-day PHI). The highest observations for estimation of maximum residue levels and for dietary intake purposes have been selected from each trial for both the foliar application and the soil application.

Cucumber

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in cucumber from supervised trials (foliar use pattern) according to the GAP in the USA was 0.039, 0.081, 0.083, 0.092, 0.10, 0.11, 0.13, 0.19 and 0.23 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in cucumber from supervised trials (foliar use pattern) according to the GAP in the USA was 0.16, 0.18, 0.28, 0.28, 0.34, 0.45, 0.62, 0.85 and 1.0 mg/kg (HR 1.1 mg/kg).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in cucumber from supervised trials (soil use pattern) according to the GAP in the USA was < 0.010, < 0.010, < 0.010, < 0.010, 0.011, 0.012, 0.015, 0.022 and 0.027 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in cucumber from supervised trials (soil use pattern) according to the GAP in the USA was < 0.060, 0.061, 0.066, 0.13, 0.18, 0.24, 0.42, 0.47 and 1.0 mg/kg (HR 1.5 mg/kg).

The Meeting estimated a maximum residue level for cucumbers of 0.4 mg/kg (based on the foliar use pattern).

The Meeting noted that in some decline trials conducted with flupyradifurone on cucumbers, there was no indication that the total residues (flupyradifurone + DFA + 6-CNA) had reached a maximum. Therefore, it was not possible to estimate an STMR and HR for cucumbers.

Summer squash

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in summer squash from supervised trials (foliar use pattern) according to the GAP in the USA was 0.032, 0.033, 0.048, 0.054, 0.055, 0.075, 0.081 and 0.10 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in summer squash from supervised trials (foliar use pattern) according to the GAP in the USA was 0.10, 0.14, 0.16, 0.21, 0.22, 0.61, 0.95 and 1.1 mg/kg (HR 1.4 mg/kg).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in summer squash from supervised trials (soil use pattern) according to the GAP in the USA was < 0.010, < 0.010, < 0.010, < 0.010, 0.020, 0.024, 0.031 and 0.057 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in summer squash from supervised trials (soil use pattern) according to the GAP in the USA was < 0.060 (4), 0.16, 1.1, 1.1 and 1.4 mg/kg (HR 1.5 mg/kg).

The Meeting estimated a maximum residue level, a median and a highest residue for summer squash of 0.2 mg/kg, 0.215 and 1.5 mg/kg respectively.

In field studies on succeeding crops, mean, median and highest total residues in cucumbers were 0.44, 0.51 and 0.69 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.44 mg/kg to the median residue obtained from supervised cucurbit fruiting vegetables residue trials of 0.215 mg/kg for an overall STMR for flupyradifurone in summer squash of 0.655 mg/kg.

It was also decided to add 1.5 mg/kg (the highest residue found in supervised field trials) and the highest residue of 0.69 mg/kg for cucumbers in the succeeding crop trials.

The Meeting estimated a maximum residue level, an STMR and an HR of 0.2, 0.655 and 2.19 mg/kg respectively for summer squash.

Melons

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in melon fruit from supervised trials (foliar use pattern) according to the GAP in the USA was 0.061, 0.088, 0.11, 0.15 and 0.19 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in melon fruit from supervised trials (foliar use pattern) according to the GAP in the USA was 0.20, 0.22, 0.38, 0.52 and 0.68 mg/kg (HR 0.71 mg/kg).

For dietary intake purposes the ranked order of total residues of flupyradifurone in melon pulp from supervised trials (foliar use pattern) according to the GAP in the USA was < 0.060 (2), 0.062, 0.075 and 0.095 mg/kg.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in melon fruit from supervised trials (soil use pattern) according to the GAP in the USA was < 0.010, 0.012, 0.012, 0.017 and 0.028 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in melons from supervised trials (soil use pattern) according to the GAP in the USA was 0.082, 0.088, 0.23, 0.43 and 0.87 mg/kg (HR 1.2 mg/kg).

For dietary intake purposes the ranked order of total residues of flupyradifurone in melon pulp from supervised trials (soil use pattern) according to the GAP in the USA was < 0.060 (2), 0.13, 0.22 and 0.38 mg/kg (HR 0.38 mg/kg).

The Meeting estimated a maximum residue level for melons of 0.4 mg/kg (based on the foliar use pattern). The Meeting estimated a median and highest residue for melon of 0.13 and 0.38 mg/kg respectively (based on the soil use pattern melon pulp data).

In field studies on succeeding crops, mean, median and highest total residues in cucumbers were 0.44, 0.51 and 0.69 mg/kg respectively.

The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.44 mg/kg to the median residue obtained from supervised melon residue trials of 0.13 mg/kg for an overall STMR for flupyradifurone in melons of 0.57 mg/kg.

It was also decided to add 0.38 mg/kg (the highest residue found in supervised field trials) and the highest residue of 0.69 mg/kg for cucumbers in the succeeding crop trials.

The Meeting estimated a maximum residue level, an STMR and an HR of 0.4, 0.57 and 1.07 mg/kg respectively for melons, except watermelons.

Fruiting vegetables, other than Cucurbits

Residue trials were conducted in tomatoes (19 trials), sweet peppers (10 trials) and chilli peppers (four trials) in the USA and Canada, according to the GAP in the USA for Crop Group 8-10 (two foliar applications at 205 g ai/ha, 7-day RTI, 1-day PHI) and also according to the soil application GAP for Crop Group 8-10 (1 application at 409 g ai/ha, 45-day PHI). The highest observations for estimation of maximum residue levels and for dietary intake purposes have been selected from each trial for both the foliar application and the soil application.

The Meeting noted that in some decline trials conducted with flupyradifurone on fruiting vegetables other than cucurbits, there was no indication that the total residues (flupyradifurone +

DFA + 6-CNA) had reached a maximum. The Meeting therefore decided that although the GAP was for the fruiting vegetables other than cucurbits group, no Crop Group MRL will be considered.

Tomato

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in tomatoes from supervised trials (foliar use pattern) according to the GAP in the USA was 0.055, 0.057, 0.059, 0.068, 0.086, 0.088, 0.11, 0.13, 0.14, 0.14, 0.14, 0.15, 0.23, 0.27, 0.28, 0.31, 0.45, 0.57 and 0.73 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in tomatoes from supervised trials (foliar use pattern) according to the GAP in the USA was 0.11, 0.11, 0.11, 0.15, 0.15, 0.18, 0.19, 0.19, 0.22, 0.27, 0.29, 0.30, 0.32, 0.33, 0.40, 0.46, 0.53, 0.62 and 0.91 mg/kg (HR 1.1 mg/kg).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in tomatoes from supervised trials (soil use pattern) according to the GAP in the USA was < 0.010 (7), 0.010, 0.011, 0.012, 0.013, 0.014, 0.015, 0.015, 0.029, 0.031, 0.034, 0.069 and 0.24 mg/kg

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in tomatoes from supervised trials (soil use pattern) according to the GAP in the USA was < 0.060, < 0.060, 0.064, 0.070, 0.079, 0.10, 0.13, 0.15, 0.15, 0.19, 0.20, 0.24, 0.34, 0.68, 0.81, 0.81, 0.90, 1.1 and 1.9 mg/kg (HR 2.1 mg/kg).

The Meeting estimated a maximum residue level of 1 mg/kg based on the foliar use pattern. The Meeting estimated a median and highest residue for tomato of 0.27 and 2.1 mg/kg.

For tomatoes, no data from studies on follow crops are available. In field studies on succeeding crops, mean, median and highest total residues in cucumbers (fruiting vegetables, cucurbits) were 0.44, 0.51 and 0.69 mg/kg respectively. The Meeting decided to add the mean residue found in cucumber field studies on succeeding crops of 0.44 mg/kg to the median residue obtained from supervised tomato residue trials of 0.27 mg/kg for an overall STMR for flupyradifurone in tomatoes of 0.71 mg/kg. It was also decided to add 2.1 mg/kg (the highest residue found in supervised tomato field trials) to the highest residue of 0.69 mg/kg for cucumbers in the succeeding crop trials.

The Meeting estimated a maximum residue level, an STMR and an HR for tomatoes of 1, 0.71 and 2.79 mg/kg respectively.

Peppers

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in peppers from supervised trials (foliar use pattern) according to the GAP in the USA was 0.030, 0.051, 0.070, 0.073, 0.083, 0.087, 0.12, 0.12, 0.12, 0.29, 0.30, 0.37, 0.47 and 0.53 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in peppers from supervised trials (foliar use pattern) according to the GAP in the USA was 0.11, 0.12, 0.14, 0.17, 0.17, 0.20, 0.22, 0.26, 0.35, 0.39, 0.42, 0.44, 0.52 and 0.68 mg/kg (HR 0.81 mg/kg).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in peppers from supervised trials (soil use pattern) according to the GAP in the USA was < 0.010, < 0.010, < 0.010, < 0.010, < 0.010, 0.011, 0.011, 0.011, 0.013, 0.024, 0.027, 0.035, 0.047 and 0.18 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in peppers from supervised trials (soil use pattern) according to the GAP in the USA was 0.071, 0.098, 0.10, 0.13, 0.13, 0.13, 0.14, 0.16, 0.17, 0.36, 0.52, 0.72, 0.92 and 1.6 mg/kg (HR 1.7 mg/kg).

The Meeting estimated a maximum residue level of 0.9 mg/kg for peppers based on the foliar use pattern. The Meeting estimated a median and highest residue of 0.24 and 1.7 mg/kg.

For peppers, no data from studies on follow crops are available. In field studies on succeeding crops, mean, median and highest total residues in cucumbers (fruiting vegetables, and cucurbits) were 0.44, 0.51 and 0.69 mg/kg respectively. The Meeting decided to add the mean residue found in cucumber field studies on succeeding crops of 0.44 mg/kg to the median residue obtained from supervised pepper residue trials of 0.24 mg/kg for an overall STMR for flupyradifurone in peppers of 0.68 mg/kg. It was also decided to add 1.7 mg/kg (the highest residue found in supervised field trials) to the highest residue of 0.69 mg/kg for cucumbers in the succeeding crop trials.

The Meeting estimated a maximum residue level, an STMR and an HR for peppers of 0.9, 0.68 and 2.39 mg/kg respectively.

The Meeting used the pepper data and a default processing factor of 10 to estimate a maximum residue level, STMR and HR for flupyradifurone in chilli pepper (dried) of 9, 6.8 and 23.9 mg/kg.

Sweet Corn

Residue trials were conducted in sweet corn (13 trials) in the USA and Canada, according to the GAP in the USA for Crop Group 15 (two foliar applications at 205 g ai/ha, 7-day RTI, 7-day PHI). Three trials also included plots to measure residues following the planting of seed treated with flupyradifurone.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in sweet corn kernels and cob husked from supervised trials (foliar use pattern) according to the GAP in the USA was < 0.01 (9), 0.016, 0.018, 0.026 and 0.038 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in sweet corn kernels and cob husked from supervised trials (foliar use pattern) according to the GAP in the USA was < 0.060 (3), 0.068, 0.099, 0.12, 0.13, 0.13, 0.15, 0.19, 0.21, 0.25 and 0.28 mg/kg (HR 0.29 mg/kg).

The Meeting estimated a maximum residue level, a median and a highest residue for sweet corn (corn-on-the-cob) of 0.05, 0.13 and 0.29 mg/kg respectively.

For sweet corn, no data on follow crops is available. In field studies on succeeding crops, the overall mean, median and highest total residues in barley grain were 0.43, 0.22 and 1.30 mg/kg respectively. In the absence of follow crop data for sweet corn the Meeting decided to add the mean residue found in barley grain in field studies on succeeding crops of 0.43 mg/kg to the median residue obtained from the sweet corn residue trials of 0.13 mg/kg for an overall STMR for flupyradifurone in sweet corn (corn-on-the-cob) of 0.56 mg/kg.

It was also decided to add 0.29 mg/kg (the highest residue found in supervised field trials) and the highest residue of 1.30 mg/kg for barley grain in the succeeding crop trials.

The Meeting estimated a maximum residue level, an STMR and an HR for sweet corn (corn-on-the-cob) of 0.05, 0.56 and 1.59 mg/kg respectively.

Brassica leafy vegetables

Residue trials were conducted in mustard greens (eight trials) in the USA according to the GAP in the USA for Crop Group 5 (two foliar applications at 205 g ai/ha, 7-day RTI, 1-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in mustard greens from supervised trials according to the GAP in the USA was 6.1, 7.3, 10, 11, 12, 15, 18 and 24 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in mustard greens from supervised trials according to the GAP in the USA was 6.2, 7.7, 11, 12, 12, 15, 18 and 25 mg/kg (HR 25 mg/kg).

The Meeting estimated a maximum residue level of 40 mg/kg for flupyradifurone in mustard greens, together with an STMR and an HR of 12 and 25 mg/kg respectively.

Short term dietary exposure assessment showed that residues in mustard greens exceed the acute reference dose (ARfD) of 0.2 mg/kg bw, at 250% of the ARfD for the general population and 610% for children. No alternative GAP for mustard greens was available.

Leafy vegetables

Residue trials were conducted in spinach (nine trials), leaf lettuce (nine trials) and head lettuce (eight trials) in the USA and Canada, according to the foliar GAP in the USA for Crop Group 4 (two foliar applications at 205 g ai/ha, 7-day RTI, 1-day PHI).

In field studies on succeeding crops, the highest mean, median and highest total residues in lettuce were 0.12, < 0.06 and 0.41 mg/kg, respectively. The Meeting concluded that residues in leafy vegetables due to an additional uptake via the roots are insignificant in comparison to residue levels following direct treatment.

Spinach

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in spinach from supervised trials according to the GAP in the USA was 2.0, 3.8, 6.4, 6.7, 7.9, 8.8, 9.8, 17 and 17 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in spinach from supervised trials according to the GAP in the USA was 2.1, 3.8, 6.5, 7.0, 8.5, 8.9, 9.9, 17 and 18 mg/kg (HR 19 mg/kg).

The Meeting estimated a maximum residue level of 30 mg/kg for flupyradifurone in spinach, together with an STMR and an HR of 8.5 and 19 mg/kg respectively.

Short term dietary exposure assessment showed that residues in spinach exceed the acute reference dose (ARfD) of 0.2 mg/kg bw, at 130% of the ARfD for the general population and 420% for children. No alternative GAP for spinach was available.

Leaf lettuce

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in leaf lettuce from supervised trials according to the GAP in the USA was 1.1, 1.8, 2.1, 2.3, 2.7, 3.8, 6.3 and 7.3 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in leaf lettuce from supervised trials according to the GAP in the USA was 1.2, 2.1, 2.2, 2.4, 2.8, 3.9, 6.5 and 7.5 mg/kg (HR 8.0 mg/kg).

The Meeting estimated a maximum residue level of 15 mg/kg for flupyradifurone in lettuce, leaf, together with an STMR and an HR of 2.6 and 8.0 mg/kg respectively.

Short term dietary exposure assessment showed that residues in leaf lettuce exceed the acute reference dose (ARfD) of 0.2 mg/kg bw, at 250% for children. No alternative GAP for leaf lettuce was available.

Head lettuce

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in head lettuce from supervised trials according to the GAP in the USA was 0.31, 0.69, 0.76, 1.2, 1.3, 1.6, 2.0 and 2.3 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in head lettuce from supervised trials according to the GAP in the USA was 0.38, 0.77, 0.83, 1.2, 1.4, 1.7, 2.1 and 2.4 mg/kg (HR 2.4 mg/kg).

The Meeting estimated a maximum residue level of 4 mg/kg for flupyradifurone in lettuce, head, together with an STMR and an HR of 1.3 and 2.4 mg/kg respectively.

Legume vegetables without pods

Residue trials were conducted in peas (six trials) and lima beans (nine trials) in the USA and Canada (beans only), according to the foliar GAP in the USA for Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI, 7-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in peas from supervised trials according to the GAP in the USA was 0.12, 0.25, 0.51, 0.62, 0.77 and 1.5 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in peas from supervised trials according to the GAP in the USA was 0.86, 1.0, 1.7, 1.9, 1.9 and 3.9 mg/kg (HR 3.9 mg/kg).

The Meeting estimated a maximum residue level of 3 mg/kg for flupyradifurone in peas, shelled (succulent seeds), together with a median and a highest residue of 1.8 and 3.9 mg/kg respectively.

In field studies on succeeding crops, the mean, median and highest total residues in French beans were 0.98, 0.80 and 1.80 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.98 mg/kg to the median residue obtained from garden peas residue trials of 1.8 mg/kg for an overall STMR for flupyradifurone in peas, shelled (succulent seeds) of 2.78 mg/kg.

The Meeting decided to add the highest residue of 1.80 mg/kg for French beans in the succeeding crop trials to 3.9 mg/kg (the highest residue found in supervised field trials) for an overall HR of 5.7 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for peas, shelled (succulent seeds) of 3, 2.78 and 5.7 mg/kg respectively.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in lima beans from supervised trials according to the GAP in the USA was < 0.010, < 0.010, 0.011, 0.012, 0.025, 0.027, 0.062, 0.10 and 0.11 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in lima beans from supervised trials according to the GAP in the USA was < 0.06, 0.10, 0.13, 0.14, 0.19, 0.20, 0.41, 0.56 and 0.95 mg/kg (HR 0.97 mg/kg).

The Meeting estimated a maximum residue level of 0.2 mg/kg for flupyradifurone in beans, shelled (succulent = immature seeds), together with a median and highest residue of 0.19 and 0.97 mg/kg respectively.

In field studies on succeeding crops, the mean, median and highest total residues in French beans were 0.98, 0.80 and 1.80 mg/kg respectively. It was decided to add the mean residue found in field studies on succeeding crops of 0.98 mg/kg to the median residue obtained from supervised lima

beans residue trials of 0.19 mg/kg for an overall STMR for flupyradifurone in beans, shelled (succulent = immature seeds) of 1.17 mg/kg.

The Meeting decided to add the highest residue of 1.80 mg/kg for French beans in the succeeding crop trials to 0.97 mg/kg (the highest residue found in supervised field trials) for an overall HR of 2.77 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for beans, shelled (succulent = immature seeds) of 0.2, 1.17 and 2.77 mg/kg respectively.

Legume vegetables with pods

Residue trials were conducted in common beans (eight trials), and snow peas (six trials) in the USA and Canada according to the foliar GAP in the USA for Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI, 7-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in common beans from supervised trials according to the GAP in the USA was 0.012, 0.063, 0.13, 0.16, 0.18, 0.21, 0.24 and 0.81 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in common beans from supervised trials according to the GAP in the USA was 1.3, 1.5, 1.5, 1.6, 1.7, 1.7, 2.4 and 3.0 mg/kg (HR 3.3 mg/kg).

The Meeting estimated a maximum residue level of 1.5 mg/kg for flupyradifurone in beans, except broad bean and soya bean (green pods and immature seeds) together with a median and highest residue of 1.65 and 3.3 mg/kg respectively.

In field studies on succeeding crops, the mean, median and highest total residues in French beans were 0.98, 0.80 and 1.80 mg/kg respectively. It was decided to add the mean residue found in field studies on succeeding crops of 0.98 mg/kg to the median residue obtained from supervised snow peas residue trials of 1.65 mg/kg for an overall STMR for flupyradifurone in peas (pods and succulent = immature seeds) of 2.63 mg/kg.

The Meeting decided to add the highest residue of 1.80 mg/kg for French beans in the succeeding crop trials to 3.3 mg/kg (the highest residue found in supervised field trials) for an overall HR of 5.1 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for beans, except broad bean and soya bean (green pods and immature seeds) of 1.5, 2.63 and 5.1 mg/kg respectively.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in snow peas from supervised trials according to the GAP in the USA was 0.57, 0.58, 0.95, 0.98, 1.2, and 1.2 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in snow peas from supervised trials according to the GAP in the USA was 1.5, 1.6, 1.6, 1.8, 2.2 and 3.3 mg/kg (HR 3.7 mg/kg).

The Meeting estimated a maximum residue level of 3 mg/kg for flupyradifurone in peas (pods and succulent = immature seeds), together with a median and highest residue of 1.7 and 3.7 mg/kg respectively.

In field studies on succeeding crops, the mean, median and highest total residues in French beans were 0.98, 0.80 and 1.80 mg/kg respectively. It was decided to add the mean residue found in field studies on succeeding crops of 0.98 mg/kg to the median residue obtained from supervised snow peas residue trials of 1.7 mg/kg for an overall STMR for flupyradifurone in peas (pods and succulent = immature seeds) of 2.68 mg/kg.

The Meeting decided to add the highest residue of 1.80 mg/kg for French beans in the succeeding crop trials to 3.7 mg/kg (the highest residue found in supervised field trials) for an overall HR of 5.5 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for peas (pods and succulent = immature seeds) of 3, 2.68 and 5.5 mg/kg respectively.

Pulses

Residue trials were conducted in beans (10 trials, one in which only forage was collected), and peas (10 trials) in the USA and Canada, according to the foliar GAP in the USA for Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI, 7-day PHI).

The Meeting noted that the GAP was for USA Crop Group 6 which includes the Codex pulses group and considered a group maximum residue level for the pulses group, however the median residues for peas (dry) and beans (dry) differed by > 5-fold.

Beans (dry)

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in shelled dried beans from supervised trials according to the GAP in the USA was < 0.010, 0.011, 0.019, 0.036, 0.036, 0.043, 0.070, 0.12 and 0.24 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in shelled dried beans from supervised trials according to the GAP in the USA was 0.12, 0.49, 0.64, 0.73, 0.73, 0.87, 1.2, 1.5 and 7.4 mg/kg (HR 7.4 mg/kg).

The Meeting estimated a maximum residue level of 0.4 mg/kg for beans (dry), together with a median residue of 0.73 mg/kg.

In field studies on succeeding crops, the mean, median and highest total residues in dry field peas were 2.49, 2.56 and 3.77 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 2.49 mg/kg to the median residue obtained from dried beans residue trials of 0.73 mg/kg for an overall STMR for flupyradifurone in beans (dry) of 3.22 mg/kg.

The Meeting estimated a maximum residue level and an STMR for beans (dry) of 0.4 and 3.22 mg/kg respectively.

Peas (dry)

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in shelled dried peas from supervised trials according to the GAP in the USA was 0.017, 0.13, 0.38, 0.45, 0.47, 0.67, 0.81, 1.0, 1.2 and 1.3 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in shelled dried peas from supervised trials according to the GAP in the USA was 0.067, 0.42, 0.69, 0.82, 0.83, 1.4, 1.7, 2.0, 2.1 and 6.2 mg/kg (HR 6.6 mg/kg).

The Meeting estimated a maximum residue level of 3 mg/kg for peas (dry), together with a median residue of 1.115 mg/kg.

The Meeting decided to add the mean residue found in field studies on succeeding crops of 2.49 mg/kg to the median residue obtained from dried peas residue trials of 1.115 mg/kg for an overall STMR for flupyradifurone in peas (dry) of 3.605 mg/kg.

The Meeting estimated a maximum residue level and an STMR for peas (dry) of 3 and 3.605 mg/kg respectively.

Noting that the use pattern is for the USA Subgroup 6C, the Meeting agreed that an STMR of 2.49 mg/kg (mean residue found in dried peas in field studies on succeeding crops) should apply to pulse crops on the USA label, which are not covered by the recommended Beans (dry) and Peas (dry) MRLs.

Soya bean (dry)

Residue trials were conducted in soya beans (20 trials) in the USA and Canada, according to the GAP in the USA for dry soya bean seed (two foliar applications at 205 g ai/ha, 10-day RTI, 21-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in soya beans from supervised trials according to the GAP in the USA was < 0.010 (4), 0.012, 0.015 (2), 0.019, 0.034, 0.053, 0.068, 0.069, 0.082, 0.15, 0.22, 0.25, 0.28, 0.36, 0.61 and 1.0 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in soya beans from supervised trials according to the GAP in the USA was < 0.060, 0.082, 0.085, 0.090, 0.11, 0.13, 0.25, 0.26, 0.66, 0.70, 1.2, 1.5, 1.7, 1.8, 1.8, 2.0, 3.7, 3.9, 4.1 and 11 (HR 11) mg/kg.

The Meeting estimated a maximum residue level and a median residue of 1.5 and 0.95 mg/kg respectively.

In field studies on succeeding crops, the mean, median and highest total residues in dry field peas were 2.49, 2.56 and 3.77 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 2.49 mg/kg to the median residue obtained from soya beans residue trials of 0.95 mg/kg for an overall STMR for flupyradifurone in soya beans of 3.44 mg/kg.

The Meeting estimated a maximum residue level and an STMR for soya beans (dry) of 1.5 and 3.44 mg/kg respectively.

Root and tuber vegetables

Carrots

Residue trials were conducted in carrots in the USA and Canada according to the critical foliar GAP in the USA for Crop Subgroup 1B (two foliar applications at 205 g ai/ha, 10-day RTI, 7-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in carrots from supervised trials according to the GAP in the USA was < 0.010 (2), 0.014, 0.017, 0.020, 0.021, 0.027, 0.037, 0.059 and 0.60 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in carrots from supervised trials according to the GAP in the USA was 0.076, 0.11, 0.11, 0.13, 0.21, 0.23, 0.24, 0.46, 0.60 and 0.68 mg/kg (HR 1.1 mg/kg).

Radish

Residue trials were conducted in radishes in the USA and Canada according to the critical foliar GAP in the USA for Crop Subgroup 1B (two foliar applications at 205 g ai/ha, 10-day RTI, 7-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in radishes from supervised trials according to the GAP in the USA was 0.024, 0.029, 0.031, 0.037, 0.040, 0.043 and 0.046 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in radishes from supervised trials according to the GAP in the USA was 0.10, 0.11, 0.11, 0.12, 0.19, 0.28 and 0.31 mg/kg (HR 0.32 mg/kg).

The Meeting noted that the GAP was for the subgroup (root and tuber vegetables except potatoes), and considered a group maximum residue level. The median values for the carrot and radish data sets differed by less than 5-fold, and the data sets were statistically similar (Mann-Whitney test), therefore the Meeting agreed to combine the data sets:

For maximum residue level estimation: < 0.010 (2), 0.014, 0.017, 0.020, 0.021, 0.024, 0.027, 0.029, 0.031, 0.037 (2), 0.040, 0.043, 0.046, 0.059 and 0.60 mg/kg.

For dietary intake assessment: 0.076, 0.10, 0.11, 0.11, 0.11, 0.11, 0.12, 0.13, 0.19, 0.21, 0.23, 0.24, 0.28, 0.31, 0.46, 0.60 and 0.68 mg/kg (HR 1.1 mg/kg).

The Meeting estimated a maximum residue level of 0.7 mg/kg for flupyradifurone in root and tuber vegetables (except potato), together with a median and highest residue of 0.19 and 1.1 mg/kg.

In field studies on succeeding crops, the overall mean, median and highest total residues in carrot and turnip roots were 0.10, 0.08 and 0.27 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.10 mg/kg to the median residue obtained from carrot and radish residue trials of 0.19 mg/kg for an overall STMR for flupyradifurone in root and tuber vegetables (except potato) of 0.29 mg/kg.

The Meeting decided to add the highest residue of 0.27 mg/kg for carrot and turnip roots in the succeeding crop trials to 1.1 mg/kg (the highest residue found in supervised field trials) for an overall HR of 1.37 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for root and tuber vegetables (except potato) of 0.7, 0.29 and 1.37 mg/kg respectively.

Potato

Residue trials were conducted in potatoes in the USA and Canada, according to the foliar GAP in the USA for Crop Subgroup 1C (two foliar applications at 205 g ai/ha, 7-day RTI, 7-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in potatoes from supervised trials according to the GAP in the USA was < 0.010 (12), 0.010 (2), 0.012, 0.020 (2), 0.022 and 0.037 (2) mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in potatoes from supervised trials according to the GAP in the USA was < 0.060 (9), 0.060, 0.062, 0.070, 0.070, 0.071, 0.072, 0.080, 0.088, 0.096, 0.12 and 0.12 mg/kg (HR 0.14 mg/kg).

The Meeting estimated a maximum residue level of 0.05 mg/kg for flupyradifurone in potatoes, together with a median and highest residue of 0.061 and 0.14 mg/kg respectively.

In field studies on succeeding crops, the mean, median and highest total residues in potatoes were 0.23, 0.20 and 0.43 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.23 mg/kg to the median residue obtained from potato residue trials of 0.061 mg/kg for an overall STMR for flupyradifurone in potatoes of 0.291 mg/kg.

The Meeting decided to add the highest residue of 0.43 mg/kg for potatoes in the succeeding crop trials to 0.14 mg/kg (the highest residue found in supervised field trials) for an overall HR of 0.57 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for potatoes of 0.05, 0.29 and 0.57 mg/kg respectively.

The Meeting noted that the GAP in the USA for Crop Subgroup 1C also includes sweet potato and agreed that the results of the USA and Canada potato trials matching this GAP could be used to estimate a maximum residue level for sweet potato. The Meeting estimated a maximum residue level, an STMR and an HR for sweet potatoes of 0.05, 0.29 and 0.57 mg/kg respectively.

Stalk and stem vegetables—Celery

Residue trials were conducted in celery (10 trials) in the USA and Canada, according to the GAP in the USA for Crop Group 4 (two foliar applications at 205 g ai/ha, 7-day RTI, 1-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in celery stalk from supervised trials according to the GAP in the USA was 0.22, 1.1, 2.0, 2.1, 2.2, 2.4, 3.2, 3.5 and 6.0 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in celery stalk from supervised trials according to the GAP in the USA was 0.27, 1.1, 2.0, 2.2, 2.2, 2.4, 3.2, 3.6 and 6.1 mg/kg (HR 6.8 mg/kg).

The Meeting estimated a maximum residue level of 9 mg/kg for flupyradifurone in celery, together with a median and highest residue and of 2.2 and 6.8 mg/kg (based on the total residue data for untrimmed stalks).

No data from studies on follow crops are available for celery and other stalk and stem vegetables.

In field studies on succeeding crops, the mean, median and highest total residues in leeks were 0.18, 0.13 and 0.39 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.18 mg/kg to the median residue obtained from celery residue trials of 2.2 mg/kg for an overall STMR for flupyradifurone in celery of 2.38 mg/kg.

The Meeting decided to add the highest residue of 0.39 mg/kg for leeks in the succeeding crop trials to 6.8 mg/kg (the highest residue found in supervised field trials) for an overall HR of 7.19 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for celery of 9, 2.38 and 7.19 mg/kg respectively.

Short term dietary exposure assessment showed that residues in celery exceed the acute reference dose (ARfD) of 0.2 mg/kg bw, at 120% for children. No alternative GAP for celery was available.

Cereal Grains

Barley

Twenty residue trials were conducted in barley in the USA and Canada according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, 21-day PHI). Three trials which showed residues after planting seed treated with flupyradifurone are not considered as there is no registered use pattern.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in barley grain from supervised trials according to the GAP in the USA was 0.038, 0.065, 0.096, 0.21, 0.24, 0.25, 0.27, 0.30, 0.31, 0.44, 0.46, 0.48, 0.68 (2), 0.71, 0.81, 0.84, 1.2, 1.7 and 2.3 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in barley grain from supervised trials according to the GAP in the USA was 0.53, 0.55, 0.67, 0.69, 0.74, 0.78, 0.79, 0.82, 0.83, 0.88, 0.89, 0.91, 1.1, 1.3, 1.3, 1.3, 1.4, 1.5, 1.8 and 2.4 mg/kg (HR 2.5 mg/kg).

Wheat

Twenty-nine residue trials were conducted in wheat in the USA and Canada, twenty-eight according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day

RTI, 21-day PHI). Three trials which showed residues after planting seed treated with flupyradifurone are not considered as there is no registered use pattern.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in wheat grain from supervised trials according to the GAP in the USA was 0.016, 0.024, 0.031, 0.033, 0.034, 0.040, 0.050, 0.059, 0.074, 0.090 (2), 0.10 (2), 0.15 (2), 0.16 (2), 0.17, 0.18, 0.21, 0.22, 0.23, 0.26, 0.34, 0.37, 0.58, 0.61 and 0.73 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in wheat grain from supervised trials according to the GAP in the USA was 0.083, 0.090, 0.10, 0.21, 0.24, 0.27, 0.30, 0.30, 0.38, 0.57, 0.60, 0.66, 0.67, 0.70, 0.74, 0.77, 0.78, 0.79, 0.80, 0.83, 0.90, 0.93, 1.1, 1.2, 1.6, 1.9, 2.6 and 2.7 mg/kg (HR 2.8 mg/kg).

Sorghum

Nine residue trials were conducted in sorghum in the USA, according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, 21-day PHI). Three trials which showed residues after planting seed treated with BYI 02960 480FS are not considered as there is no registered use pattern.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in sorghum grain from supervised trials according to the GAP in the USA was 0.34, 0.46 (2), 0.50, 0.51, 0.79, 0.86, 1.4 and 1.5 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in sorghum grain from supervised trials according to the GAP in the USA was 0.41, 0.54, 0.58, 0.67, 0.70, 0.89, 0.94, 1.5 and 1.6 mg/kg (HR 1.9 mg/kg).

Maize

Twenty residue trials were conducted in field corn in the USA, according to or approximating the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, 21-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in field corn grain from supervised trials according to the GAP in the USA was < 0.01 (15) and 0.011 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in field corn grain from supervised trials according to the GAP in the USA was < 0.060 (14), 0.061 and 0.13 mg/kg (HR 0.21 mg/kg).

The Meeting noted that the GAP was for the cereal grains group, other than rice and considered a group maximum residue level. The median residues for barley, wheat and sorghum differed by less than 5-fold, although the data sets were not statistically similar (Kruskal-Wallis test).

The Meeting estimated a maximum residue level of 3 mg/kg for flupyradifurone in cereal grains (except maize and rice) based on the data set for barley, together with a median residue of 0.885 mg/kg.

In field studies on succeeding crops, the overall mean, median and highest total residues in barley grain were 0.43, 0.22 and 1.3 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.43 mg/kg to the median residue obtained from the barley residue trials of 0.885 mg/kg for an overall STMR for flupyradifurone in cereal grains (except maize and rice) of 1.32 mg/kg.

The Meeting estimated a maximum residue level and an STMR for cereal grains (except maize and rice) of 3 and 1.32 mg/kg respectively.

The Meeting estimated a maximum residue level of 0.015 mg/kg for flupyradifurone in maize, together with a median residue of 0.06 mg/kg.

In field studies on succeeding crops, the overall mean, median and highest total residues in barley grain were 0.43, 0.22 and 1.3 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.43 mg/kg to the median residue obtained from the maize residue trials of 0.06 mg/kg for an overall STMR for flupyradifurone in maize of 0.49 mg/kg.

The Meeting estimated a maximum residue level and an STMR for maize of 0.015 and 0.49 mg/kg respectively.

Tree nuts

Pecans

Five residue trials were conducted in pecans in the USA according to the critical foliar GAP in the USA for Crop Group 14 except almonds (two foliar applications at 205 g ai/ha, 14-day RTI, 7-day PHI). Both concentrated and dilute applications were made. The highest observations for estimation of maximum residue levels and for dietary intake purposes have been selected from each trial.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in pecans nutmeat without shell from supervised trials according to the GAP in the USA was < 0.010 (4) and 0.012 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in pecans nutmeat without shell from supervised trials according to the GAP in the USA was < 0.060 (4) and 0.062 mg/kg (HR 0.063 mg/kg).

Based on the dataset, the Meeting estimated a maximum residue level, an STMR and an HR of 0.015, 0.060 and 0.063 mg/kg respectively, for flupyradifurone in pecans.

Oilseeds

Cotton

Twelve residue trials were conducted in cotton in the USA, eleven according to or approximating the GAP in the USA for cotton (two foliar applications at 205 g ai/ha, 10-day RTI, 14-day PHI). Three of these trials also included plots to measure residues following planting of seed treated with BYI 02960 480 FS. The latter method of application is not registered and is not discussed further.

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in cotton seed from supervised trials (foliar use pattern) according to the GAP in the USA was 0.014, 0.018, 0.074, 0.081, 0.12, 0.13, 0.18, 0.20, 0.40 and 0.49 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in cotton seed from supervised trials (foliar use pattern) according to the GAP in the USA was 0.072, 0.12, 0.13, 0.21, 0.23, 0.24, 0.27, 0.47, 0.63 and 0.74 mg/kg (HR 0.86 mg/kg).

Based on the dataset, the Meeting estimated a maximum residue level and a median residue of 0.8 and 0.235 mg/kg respectively.

In field studies on succeeding crops, the overall mean, median and highest total residues in an oilseed crop (rape seed) were 0.16, 0.15 and 0.26 mg/kg respectively. The Meeting decided to add the mean residue found in rape seed field studies on succeeding crops of 0.16 mg/kg to the median residue obtained from the cotton residue trials of 0.235 mg/kg for an overall STMR for flupyradifurone in cotton seed of 0.40 mg/kg.

The Meeting estimated a maximum residue level and an STMR for cotton seed of 0.8 and 0.40 mg/kg respectively.

Peanuts

Twelve residue trials were conducted in peanuts in the USA, eleven according to or approximating the GAP in the USA for peanuts (two foliar applications at 205 g ai/ha, 10-day RTI, 7-day PHI).

For the estimation of the maximum residue level the ranked order of residues of flupyradifurone in peanuts from supervised trials according to the GAP in the USA was < 0.01 (5), 0.011, 0.014, 0.017 and 0.027 mg/kg.

For the estimation of dietary intake, the ranked order of total residues of flupyradifurone in peanuts from supervised trials according to the GAP in the USA was < 0.060 (4), 0.065, 0.067, 0.069, 0.082 and 0.087 mg/kg (HR 0.090 mg/kg

Based on the dataset, the Meeting estimated a maximum residue level, a median and highest residue of 0.04, 0.065 and 0.090 mg/kg respectively.

In field studies on succeeding crops, the overall mean, median and highest total residues in rape seed were 0.16, 0.15 and 0.26 mg/kg respectively. The Meeting decided to add the mean residue found in field studies on succeeding crops of 0.16 mg/kg to the median residue obtained from the peanut residue trials of 0.065 mg/kg for an overall STMR for flupyradifurone in peanuts of 0.225 mg/kg.

The Meeting decided to add the highest residue of 0.26 mg/kg for rape seed in the succeeding crop trials to 0.090 mg/kg (the highest residue found in supervised field trials) for an overall HR of 0.35 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR for peanuts of 0.04, 0.225 and 0.35 mg/kg respectively.

Hops

Residue trials were conducted in hops in the USA according to the critical GAP in the USA for hops (one foliar application at 153 g ai/ha, 21-day PHI). Both concentrated and dilute applications were made. The highest observations for estimation of maximum residue levels and for dietary intake purposes have been selected from each trial.

The ranked order of residues of flupyradifurone in dried hops from supervised trials according to the GAP in the USA were in rank order 2.4, 2.7 and 4.7 mg/kg.

For the estimation of dietary exposure, the ranked order of total residues of flupyradifurone in dried hops from supervised trials according to the GAP in the USA were in rank order 3.4, 3.4 and 8.1 mg/kg.

No maximum residue level was recommended due to the insufficient number of trials (n = 3).

Animal feeds

The Meeting received supervised trials data for alfalfa forage and hay, clover forage and hay, pea, bean and soya bean forage and hay, peanut hay, barley hay and straw, maize and sweet corn forage and stover, sorghum forage and stover, wheat forage, hay and straw, almond hull and cotton gin by-products.

Where available, supplied moisture content values have been used to calculate residues on a dry weight basis. Where no moisture content for samples was provided, the default OECD values for moisture content were used.

Legume forages

No data from studies on legume forages as follow crops are available. In field studies on succeeding crops, the overall mean, median and highest total residues in barley forage were 0.19, 0.08 and 0.80 mg/kg respectively. Assuming a dry matter content of 30%, dry weight mean, median and highest residues in barley forage are 0.63, 0.27 and 2.7 mg/kg. The Meeting concluded that residues in legume forages due to an additional uptake *via* the roots, are insignificant in comparison to residue levels following direct treatment.

Bean forage (green)

Residue trials were conducted in beans (10 trials) in the USA and Canada according to the GAP in the USA for Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI and a 7-day PHI for bean forage).

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in bean forage from supervised trials according to the GAP in the USA was 0.27, 1.0, 1.2, 1.4, 1.7, 1.7, 1.8, 2.8, 3.2 and 4.1 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in bean forage samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 1.1, 7.9, 9.2, 9.5, 12, 13, 14, 17, 18 and 21 mg/kg (HR 21 mg/kg).

The Meeting estimated median and highest residues values for flupyradifurone in bean forage of 12.5 and 21 mg/kg respectively (dry weight).

Pea vines (green)

Residue trials were conducted in peas (10 trials) in the USA according to or approximating the US GAP for USA Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI, and a 7-day PHI for pea forage).

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in pea vines from supervised trials according to the GAP in the USA was 2.2, 3.3, 3.8, 3.9, 4.1, 4.4, 5.0, 5.1, 5.3 and 5.3 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in pea vines samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 14, 16, 17, 20, 22, 23, 25, 27, 28 and 43 mg/kg (HR 44 mg/kg).

The Meeting estimated median and highest residues values for flupyradifurone in pea forage of 22.5 and 44 mg/kg respectively (dry weight).

Soya bean forage (green)

Residue trials were conducted in soya beans (20 trials) in the USA and Canada according to the US GAP for USA Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI and a 7-day PHI for soya bean forage).

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in soya bean forage from supervised trials according to the GAP in the USA was 1.7, 2.1, 2.5, 3.3, 3.6, 3.8, 4.1, 4.4 (2), 4.5, 4.9, 5.0, 5.1, 5.3, 5.3, 5.4, 5.6, 5.6, 5.9 and 8.2 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in soya bean forage samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 8.8, 11, 14, 15, 16, 19, 21, 21, 22, 23, 23, 23, 24, 24, 24, 29, 31, 35, 36 and 41 mg/kg (HR 46 mg/kg).

The Meeting estimated median and highest residues values for flupyradifurone in soya bean forage of 23 and 46 mg/kg respectively (dry weight).

Alfalfa forage (green)

Residue trials were conducted in alfalfa (13 trials) in the USA according to the GAP in the USA for alfalfa (two foliar applications at 205 g ai/ha, 10-day RTI, and a 7-day PHI for alfalfa forage).

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in alfalfa forage from supervised trials according to the GAP in the USA was 1.4, 1.6, 2.9, 3.8, 4.0, 4.4, 4.4, 5.0, 5.0, 5.3, 5.6, 6.9 and 8.8 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in alfalfa forage samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 4.9, 7.9, 12, 16, 18, 19, 20, 22, 25, 26, 27, 34 and 46 mg/kg (HR 51 mg/kg).

The Meeting estimated median and highest residues values for flupyradifurone in alfalfa forage of 20 and 51 mg/kg respectively (dry weight).

Clover forage

Residue trials were conducted in clover (four trials) in the USA according to the GAP in the USA for clover (two foliar applications at 205 g ai/ha, 10-day RTI and a 7-day PHI for clover forage).

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in clover forage from supervised trials according to the GAP in the USA at three locations was 4.7, 5.9 and 6.2 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues (dry weight) of flupyradifurone in clover forage from supervised trials according to the GAP in the USA at three locations was 16, 20 and 21 mg/kg.

The Meeting considered that there were insufficient data on which to base estimates of the median and highest residues.

Legume fodders

No data from studies on legume fodders as follow crops are available. In field studies on succeeding crops, the overall mean, median and highest total residues in barley fodder (straw) were 0.22, < 0.12 and 0.78 mg/kg respectively. Assuming a dry matter content of 89%, dry weight mean, median and highest residues in barley straw are 0.25, 0.13 and 0.88 mg/kg. The Meeting concluded that residues in legume fodders due to an additional uptake *via* the roots, are insignificant in comparison to residue levels following direct treatment.

Bean hay

Residue trials were conducted in beans (nine trials) in the USA and Canada according to the US GAP for USA Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI and a 7-day PHI for bean hay).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in bean hay from supervised trials according to the GAP in the USA was < 0.040, 0.71, 2.2, 2.7, 3.0, 4.7, 7.6, 7.9 and 9.8 mg/kg.

For the calculation of the maximum residue level the ranked order of residues in bean hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was < 0.049, 0.80, 2.8, 3.2, 4.2, 5.9, 8.6, 12 and 15 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in bean hay from supervised trials according to the GAP in the USA was < 0.24, 2.0, 2.4, 3.7, 4.1, 5.9, 8.7, 10 and 11 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in bean hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was < 0.30, 2.3, 3.1, 4.4, 5.7, 7.4, 9.9, 15 and 16 mg/kg (HR 17 mg/kg).

The Meeting estimated maximum residue level, median and highest residues values for flupyradifurone in bean hay of 30, 5.7 and 17 mg/kg (dry weight) respectively.

Pea hay

Residue trials were conducted in peas (10 trials) in the USA and Canada according to the US GAP for USA Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI and a 7-day PHI for pea hay).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in pea hay from supervised trials according to the GAP in the USA was 4.7, 5.0, 6.4, 6.8, 8.0, 8.2, 9.1, 9.9, 10 and 15 mg/kg.

For the calculation of the maximum residue level, the ranked order of residues in pea hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 7.8, 8.9, 9.8, 11, 12, 16, 19, 24, 26 and 33 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in pea hay from supervised trials according to the GAP in the USA was 5.9, 6.8, 8.8, 9.8, 11, 11, 11, 12, 13 and 19 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in pea hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 11, 12, 14, 14, 17, 22, 22, 30, 33 and 36 mg/kg (HR 36 mg/kg).

The Meeting estimated maximum residue level, median and highest residues values for flupyradifurone in pea hay of 50, 19.5 and 36 mg/kg (dry weight) respectively.

Soya bean hay

Residue trials were conducted in soya beans (20 trials) in the USA and Canada according to the GAP in the USA for Crop Group 6 (two foliar applications at 205 g ai/ha, 10-day RTI and a 7-day PHI for soya bean hay).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in soya bean hay from supervised trials according to the GAP in the USA was 1.5, 2.6, 3.9, 4.2, 6.2, 6.4, 6.6, 6.6, 6.7, 6.9, 8.1, 8.3, 8.5, 8.5, 9.3, 11, 12, 13, 15 and 17 mg/kg.

For the calculation of the maximum residue level the ranked order of residues in soya bean hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 2.1, 4.4, 4.6, 6.2, 7.2, 8.2, 8.6, 8.8, 9.3, 10, 12, 15, 15, 15, 15, 16, 18, 19, 20 and 29 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in soya bean hay from supervised trials according to the GAP in the USA was 3.4, 6.7, 8.4, 9.4, 9.5, 9.8, 10, 10, 10, 11, 11, 11, 11, 13, 13, 15, 16, 18, 20 and 21 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in soya bean hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 4.8, 11, 13, 13, 13, 13, 13, 13, 14, 15, 16, 18, 21, 22, 22, 23, 23, 24, 26 and 36 mg/kg (HR 41 mg/kg).

The Meeting estimated maximum residue level, median and highest residues values for flupyradifurone in soya bean hay of 40, 15.5 and 41 mg/kg (dry weight) respectively.

Alfalfa hay

Residue trials were conducted in alfalfa (13 trials) in the USA according to the GAP in the USA for alfalfa (two foliar applications at 205 g ai/ha, 10-day RTI and a 7-day PHI for alfalfa hay).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in alfalfa hay from supervised trials according to the GAP in the USA was 2.5, 2.7, 4.2, 4.8, 5.5, 5.9, 6.1, 6.2, 7.4, 8.4, 9.3, 9.4 and 9.5 mg/kg.

For the calculation of the maximum residue level, the ranked order of residues in alfalfa hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 3.0, 3.2, 5.1, 7.3, 7.9, 9.0, 9.2, 9.3, 10, 11, 13, 13 and 15 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in alfalfa hay from supervised trials according to the GAP in the USA was 7.1, 7.4, 7.4, 7.7, 8.2, 8.3, 10, 10, 11, 13, 14, 15 and 25 mg/kg.

For the calculation of the livestock animal dietary burden the ranked order of total residues in alfalfa hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 7.6, 9.1, 9.4, 12, 13, 13, 14, 16, 18, 18, 19, 19 and 36 mg/kg (HR 42 mg/kg).

The Meeting estimated maximum residue level, median and highest residues values for flupyradifurone in alfalfa hay of 30, 14 and 42 mg/kg (dry weight) respectively.

Clover hay or fodder

Residue trials were conducted in clover (four trials) in the USA according to the GAP in the USA for clover (two foliar applications at 205 g ai/ha, 10-day RTI and a 14-day PHI for clover hay) and also at approximately 0.5 × the registered rate.

Sampling of four clover hay samples at the registered rate was conducted at 11, 12, 14 and 17-PHI. As the 12 and 14 day samples are from the same location, the Meeting considered that insufficient data was available at GAP to recommend an MRL or dietary parameters.

Peanut hay

Residue trials were conducted in peanuts (12 trials), in the USA according to the GAP in the USA for peanuts (two foliar applications at 205 g ai/ha, 10-day RTI, and a 7-day PHI for peanut hay).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in peanut hay from supervised trials according to the GAP in the USA was 1.7, 2.0, 2.7, 3.7, 4.5, 5.0, 9.1, 10, 11 and 11 mg/kg.

For the calculation of the maximum residue level, the ranked order of residues in peanut hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 2.0, 4.1, 5.4, 5.4, 5.7, 6.4, 10, 12, 13 and 16 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked total order of total residues (fresh weight) of flupyradifurone in peanut hay from supervised trials according to the GAP in the USA was 3.8, 5.4 (2), 5.5, 6.0 (2), 12 and 13 (3) mg/kg.

For the calculation of the livestock animal dietary burden the ranked order of total residues in peanut hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 6.0, 6.4, 7.2, 7.7, 10, 12, 14, 15 (2) and 19 mg/kg (HR 20 mg/kg).

The Meeting estimated maximum residue level, median and highest residues values for flupyradifurone in peanut hay of 30, 11 and 20 mg/kg (dry weight) respectively.

Wheat, sorghum, maize and sweet corn forages

In field studies on succeeding crops, the overall mean, median and highest total residues in barley forage were 0.19, 0.08 and 0.80 mg/kg respectively. Assuming a dry matter content of 30%, dry weight mean, median and highest residues in barley forage are 0.63, 0.27 and 2.7 mg/kg. The Meeting concluded that residues in cereal forages due to an additional uptake *via* the roots, are insignificant in comparison to residue levels following direct treatment.

Wheat forage

Residue trials were conducted in wheat (29 trials) in the USA and Canada according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, and a 7-day PHI for wheat forage).

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in wheat forage from supervised trials according to the GAP in the USA was 0.095, 0.11, 0.12, 0.12, 0.15, 0.15, 0.17, 0.22, 0.22, 0.27, 0.29, 0.41, 0.54, 0.55, 0.59, 0.62, 0.72, 1.1, 2.2, 2.3, 2.5, 2.8, 5.7, 5.9, 6.4, 9.5, 13 and 15 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in wheat forage samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 0.68, 0.69, 0.85, 0.85, 0.89, 1.0, 1.1, 1.3, 1.7, 1.8, 2.1, 2.4, 2.6, 2.9, 3.4, 3.8, 4.9, 5.4, 12, 13, 14, 15, 21, 24, 25, 41, 51 and 68 mg/kg (HR 77 mg/kg).

Sorghum forage (green)

Residue trials were conducted in sorghum (nine trials) in the USA according to the GAP in the USA for cereal grains (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, 7-day PHI for sorghum forage).

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in sorghum forage from supervised trials according to the GAP in the USA was 2.3 (2), 2.5, 2.8 (2), 3.2, 3.4, 4.2 and 4.3 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in sorghum forage samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 6.5 (2), 6.6, 6.8, 9.7, 10, 11 and 12 (2) mg/kg (HR 14 mg/kg).

Maize and sweet corn forage

Residue trials were conducted in maize (20 trials) and sweet corn (13 trials) in the USA according to the GAP in the USA for cereal grains (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, 7-day PHI for maize and sweet corn forage).

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in maize and sweet corn forage from supervised trials according to the GAP in the USA was 0.79, 0.87, 1.0, 1.4, 1.5, 1.5, 1.6, 1.7, 1.7, 1.8, 1.8, 1.9, 1.9, 1.9, 2.0, 2.0, 2.3, 2.5, 2.5, 2.6, 2.6, 2.8, 2.9, 2.9, 3.1, 3.3, 3.3, 3.8, 4.0 and 9.4 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues in maize and sweet corn forage samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 3.7, 4.4, 4.5, 4.8, 4.8, 5.0, 5.5, 5.6, 5.8, 5.9, 6.0, 6.9, 6.9, 7.0, 7.6, 7.8, 8.0, 8.4, 8.5, 9.2, 10, 10, 11, 11, 12, 12, 14, 15, 25 and 58 (HR 65 mg/kg).

The Meeting noted that the GAPs for wheat, sorghum and maize and sweet corn forage were the same (2 × 205 g ai/ha foliar applications, 7-day RTI and a 7-day PHI). The medians for the data sets differed by less than 5-fold and the data sets are statistically similar (Kruskal-Wallis). The

Meeting agreed to combine the data sets for wheat, sorghum and maize and sweet corn forage for the purpose of estimating median and highest residue values.

Combined total residues data set for cereal forages (dry weight): 0.68, 0.69, 0.85, 0.85, 0.89, 1.0, 1.1, 1.3, 1.7, 1.8, 2.1, 2.4, 2.6, 2.9, 3.4, 3.7, 3.8, 4.4, 4.5, 4.8, 4.8, 4.9, 5.0, 5.4, 5.5, 5.6, 5.8, 5.9, 6.0, 6.5, 6.5, 6.6, 6.8, 6.9, 6.9, 7.0, 7.6, 7.8, 8.0, 8.4, 8.5, 9.2, 9.7, 10, 10, 10, 11, 11, 11, 12, 12, 12, 12, 12, 13, 14, 14, 15, 15, 21, 24, 25, 25, 41, 51, 58 and 68 mg/kg (HR 77 mg/kg).

The Meeting estimated a median residue and a highest residue of 6.9 and 77 mg/kg (dry weight) respectively for flupyradifurone in wheat, sorghum and maize forage, and agreed that these values could be extrapolated to all forages of cereal grains except rice.

Barley and wheat hay and straw, and sorghum and maize and sweet corn stovers

In field studies on succeeding crops, the overall mean, median and highest total residues in barley fodder (straw) were 0.22, < 0.12 and 0.78 mg/kg respectively. Assuming a dry matter content of 89%, dry weight mean, median and highest residues in barley straw are 0.25, 0.13 and 0.88 mg/kg. The Meeting concluded that residues in cereal fodders due to an additional uptake *via* the roots, are insignificant in comparison to residue levels following direct treatment.

Barley hay

Residue trials were conducted in barley (20 trials) in the USA and Canada according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, and a 7-day PHI for barley hay).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in barley hay from supervised trials according to the GAP in the USA was 0.33, 0.42, 0.73, 1.5, 1.6, 1.8, 2.0, 2.7, 3.3, 3.8, 5.2, 5.4, 5.8, 7.2, 8.8, 12, 17 and 24 mg/kg.

For the calculation of the maximum residue level, the ranked order of residues in barley hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 0.51, 1.1, 1.6, 2.1, 2.4, 2.9, 3.2, 4.4, 4.6, 4.8, 5.6, 6.4, 9.9, 11, 12, 19, 22 and 28 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues (fresh weight) of flupyradifurone in barley hay from supervised trials according to the GAP in the USA was 0.66, 0.89, 1.0, 1.9, 2.0, 2.2, 2.3, 2.4, 3.7, 4.4, 5.5, 6.1, 6.4, 7.5, 9.6, 14, 18 and 25 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues in barley hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 1.0, 2.2, 2.4, 2.9, 3.0, 3.2, 3.7, 3.8, 5.2, 5.4, 5.9, 7.2, 11, 11, 13, 22, 23 and 29 mg/kg (HR 31 mg/kg).

Barley straw

Residue trials were conducted in barley (20 trials) in the USA and Canada according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, and a 21-day PHI for barley straw).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in barley straw from supervised trials according to the GAP in the USA was 0.31, 0.33, 0.42, 0.42, 0.52, 0.61, 0.77, 0.92, 1.0, 1.3, 1.3, 1.4, 2.2, 2.5, 3.1, 3.8, 3.8, 4.0, 5.1 and 5.6 mg/kg.

For the calculation of the maximum residue level, the ranked order of residues in barley straw samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 0.77, 0.82, 0.94, 1.0, 1.1, 1.1, 1.2, 1.5, 1.7, 1.7, 2.8, 2.9, 3.5, 4.9, 5.7, 5.7, 6.6, 6.9, 7.3 and 12 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues (fresh weight) of flupyradifurone in barley straw from supervised trials according to the GAP in the USA

was 0.41, 0.49, 0.58, 0.82, 0.83, 1.0, 1.1, 1.2, 1.3, 1.4, 1.4, 1.5, 2.5, 2.5, 3.5, 3.9, 4.1, 4.2, 5.2 and 5.6 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues in barley straw samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 1.2, 1.4, 1.4, 1.4, 1.5, 1.8, 1.8, 1.9, 1.9, 1.9, 3.2, 3.5, 4.0, 5.0, 5.9, 6.0, 6.7, 7.7, 7.8 and 12 mg/kg (HR 12 mg/kg).

Wheat hay

Residue trials were conducted in wheat (29 trials) in the USA and Canada according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, and a 7-day PHI for wheat hay).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in wheat hay from supervised trials according to the GAP in the USA was 2.5, 2.6, 3.5, 3.6, 4.3, 5.5, 5.7, 5.7, 5.9, 6.4, 6.6, 6.7, 7.2, 7.5, 7.8, 8.0, 8.1, 8.3, 8.4, 9.2, 9.9, 11, 11, 12, 13, 16, 16, 17 and 22 mg/kg.

For the calculation of the maximum residue level the ranked order of residues in wheat hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 3.2, 3.3, 4.2, 4.9, 5.3, 6.6, 6.6, 6.6, 6.7, 7.5, 8.0, 8.5, 8.7, 9.0, 9.0, 9.3, 9.3, 9.7, 10, 11, 11, 12, 13, 14, 16, 19, 19, 20 and 26 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues (fresh weight) of flupyradifurone in wheat hay from supervised trials according to the GAP in the USA was 3.5, 3.6, 3.9, 4.1, 5.6, 5.8, 5.9, 6.2, 6.4, 7.0, 7.3, 7.4, 7.7, 7.8, 8.2, 8.5, 8.9, 9.4, 9.9, 9.9, 10, 11, 12, 13, 13, 17, 18, 18 and 23 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues in wheat hay samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 4.4, 4.7, 4.7, 6.0, 6.4, 6.9, 7.0, 7.1, 7.2, 8.1, 8.3, 9.0, 9.1, 9.4, 9.6, 10, 10, 12, 12, 12, 12, 12, 15, 15, 17, 19, 20, 21 and 26 mg/kg (HR 28 mg/kg).

Wheat straw and fodder, dry

Residue trials were conducted in wheat (29 trials) in the USA and Canada according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, and a 21-day PHI for wheat straw).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in wheat straw from supervised trials according to the GAP in the USA was 0.24, 0.44, 0.58, 0.66, 0.93, 1.0, 1.1, 2.0, 2.0, 2.1, 2.5, 3.5, 3.7, 3.8, 4.0, 4.6, 4.6, 5.0, 5.7, 6.1, 6.9, 7.0, 7.0, 7.7, 8.1, 11, 13 and 19 mg/kg.

For the calculation of the maximum residue level, the ranked order of residues in wheat straw samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 0.66, 1.0, 1.3, 1.5, 1.6, 1.7, 2.4, 2.5, 2.9, 3.9, 4.2, 4.4, 4.4, 5.8, 5.8, 6.2, 6.5, 6.9, 7.9, 8.5, 8.5, 8.9, 9.2, 9.3, 11, 13, 15 and 23 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues (fresh weight) of flupyradifurone in wheat straw from supervised trials according to the GAP in the USA was 0.60, 0.95, 1.4, 1.5, 1.5, 1.6, 2.0, 2.3, 2.7, 3.0, 3.6, 3.8, 3.9, 4.1, 4.6, 4.7, 5.2, 5.3, 6.1, 6.7, 6.9, 7.0, 7.1, 7.9, 8.1, 11, 13 and 19 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues in wheat straw samples converted to a dry weight basis from supervised trials according to the GAP in

the USA was 1.7, 2.2, 2.5, 2.8, 2.9, 3.0, 3.6, 3.8, 3.9, 4.6, 4.6, 5.2, 6.0, 6.3, 6.3, 6.5, 7.8, 8.0, 8.2, 8.6, 8.9, 9.2, 9.4, 9.4, 12, 13, 15 and 23 mg/kg (HR 23 mg/kg).

Sorghum stover

Residue trials were conducted in sorghum (nine trials) in the USA according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, 21-day PHI for sorghum stover).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in sorghum stover from supervised trials according to the GAP in the USA was 0.97, 1.2, 1.3, 1.7, 2.3, 2.4 (2), 2.7 and 5.0 mg/kg.

For the calculation of the maximum residue level, the ranked order of residues in sorghum stover samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 1.1, 1.4, 1.5, 1.9, 2.6, 2.7 (2), 3.1 and 5.7 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues (fresh weight) of flupyradifurone in sorghum stover from supervised trials according to the GAP in the USA was 1.1, 1.3, 1.4, 1.8, 2.4, 2.6, 2.7, 2.9 and 5.3 mg/kg.

For the calculation of the livestock animal dietary burden the ranked order of total residues in sorghum stover samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 1.3, 1.5, 1.6, 2.0, 2.7, 3.0, 3.1, 3.3 and 6.0 mg/kg (HR 6.9 mg/kg).

Maize and sweet corn stover

Residue trials were conducted in maize (20 trials) and sweet corn (13 trials) in the USA according to the GAP in the USA for Crop Group 15 (except rice) (two foliar applications at 205 g ai/ha, 7-day RTI, 21-day PHI for maize and sweet corn stover).

For the calculation of the maximum residue level, the ranked order of residues (fresh weight) of flupyradifurone in maize and sweet corn stover from supervised trials according to the GAP in the USA was 0.53, 0.90, 1.1, 1.1, 1.2, 1.2, 1.4, 1.4, 1.4, 1.5, 1.5, 1.6, 1.7, 1.7, 1.8, 1.9, 2.1, 2.2, 3.0, 3.1, 3.2, 3.2, 3.4, 3.5, 3.6, 3.6, 4.6, 5.1, 5.9 and 8.2 mg/kg.

For the calculation of the maximum residue level, the ranked order of residues in maize and sweet corn stover samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 1.6, 1.8, 2.2, 2.3, 2.3, 2.6, 2.9, 3.0, 3.2, 3.2, 3.2, 3.9, 4.2, 4.7, 5.0, 5.2, 5.3, 5.7, 5.9, 6.1, 6.2, 6.2, 6.6, 9.3, 9.9, 10, 11, 12, 12 and 27 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues (fresh weight) of flupyradifurone in maize and sweet corn stover from supervised trials according to the GAP in the USA was 0.67, 0.95, 1.1, 1.2, 1.3, 1.3, 1.5, 1.5, 1.5, 1.5, 1.7, 1.7, 1.8, 1.8, 1.9, 2.1, 2.2, 2.2, 3.0, 3.3, 3.3, 3.4, 3.6, 3.6, 3.8, 3.8, 4.7, 5.2, 5.9 and 8.5 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of residues in maize and sweet corn stover samples converted to a dry weight basis from supervised trials according to the GAP in the USA was 1.8, 1.9, 2.1, 2.4, 2.8, 2.9, 3.0, 3.3, 3.3, 3.7, 4.1, 4.3, 4.7, 5.3, 5.5, 5.6, 6.0, 6.0, 6.3, 6.6, 6.6, 6.7, 6.8, 9.7, 11, 11, 11, 12, 12 and 28 mg/kg (HR 32 mg/kg).

The Meeting noted that the GAPs for wheat and barley hay were the same (2 × 205 g ai/ha foliar applications, with a 7-day RTI and a 7-day PHI) and the GAPs for wheat and barley straw and sorghum and maize stover were the same (2 × 205 g ai/ha foliar applications, with a 7-day RTI and a 21-day PHI). The Meeting considered a group maximum residue level for straw and fodder of cereal grains. The Meeting noted that the median residues (for estimation of maximum residue levels) for the cereal straws and stovers differed by less than 5-fold, however the data sets were not statistically

similar (Kruskal-Wallis). The Meeting similarly noted that the median residues for wheat and barley hay differed by less than 5-fold, although the data sets were not statistically similar (Mann-Whitney).

Based on the data for barley hay, the Meeting estimated a maximum residue level of 40 mg/kg for flupyradifurone in straw and fodder (dry) of cereal grains. The Meeting concluded that this maximum residue level was adequate to cover residues in hays and straws/stovers of cereals.

Based on the barley hay data, the Meeting estimated a highest residue value of 31 mg/kg (dry weight) for flupyradifurone in wheat and barley hay, and based on the wheat hay data, a median residue of 9.6 mg/kg (dry weight) was estimated. The Meeting agreed that these values could be extrapolated to oat, rye, millet and triticale hays.

Based on the wheat straw data, the Meeting estimated median and highest residues of 6.3 and 23 mg/kg (dry weight) for flupyradifurone in wheat and barley straw, and maize and sorghum stover. The Meeting agreed that these values could be extrapolated to oat, rye, millet and triticale straws.

Cotton gin by-products

Residue trials were conducted in cotton in the USA according to the critical foliar GAP in the USA for cotton (two foliar applications at 205 g ai/ha, 10-day RTI, 14-day PHI).

For the calculation of the livestock animal dietary burden, the ranked order of total residues of flupyradifurone in cotton gin by-products on a fresh weight basis from supervised trials according to GAP in the USA was 7.1, 8.3, 14, 19 and 21 mg/kg.

For the calculation of the livestock animal dietary burden, the ranked order of total residues of flupyradifurone in cotton gin by-products on a dry weight basis from supervised trials according to GAP in the USA was 9.6, 10, 15, 21 and 28 mg/kg (HR 29 mg/kg).

The Meeting estimated a median and highest residue of 15 and 29 mg/kg (dry weight) respectively for flupyradifurone in cotton gin by-products.

Fate of residues during processing

Data showed that flupyradifurone was not degraded during the simulation of pasteurisation (pH 4, 90 °C, 20 minutes), baking, boiling and brewing (pH 5, 100 °C, 60 minutes) and during sterilisation (pH 6, 120 °C, 20 minutes).

The Meeting also received processing studies for oranges, apples, grapes, cucumbers, tomatoes, soya beans, potatoes, barley, wheat, corn, cotton, peanuts, coffee and hops. The table below summarises STMR-P values calculated on the determined processing factors (total residues). In addition, the following maximum residue levels were estimated.

Apples

Based on the flupyradifurone (parent only) processing factor of 2.0 for dried apples and the pome fruit MRL of 0.9 mg/kg, the calculated expected highest residues in dried apples are 1.8 mg/kg. The Meeting estimated an MRL for flupyradifurone in apples, dried of 2 mg/kg.

Grapes

Based on the flupyradifurone (parent only) processing factor of 2.5 for raisin (mean of 2.1 and 2.9) and the grape MRL of 3 mg/kg, the calculated expected highest residues in raisins are 7.5 mg/kg. The Meeting estimated an MRL for flupyradifurone in dried grapes of 8 mg/kg.

Maize

Based on the flupyradifurone (parent only) processing factor of 2.8 for maize bran (mean of 1.8 and 3.8) and the maize MRL of 0.015 mg/kg, the calculated expected highest residues in maize bran are 0.042 mg/kg. The Meeting estimated an MRL for flupyradifurone in maize bran of 0.05 mg/kg.

Wheat

Based on the flupyradifurone (parent only) processing factor of 2.35 for wheat bran (mean of 2.3 and 2.4) and the cereal grain MRL of 3 mg/kg, the calculated expected highest residues in wheat bran are 7.05 mg/kg. The Meeting estimated an MRL for flupyradifurone in wheat bran of 8 mg/kg.

Based on the flupyradifurone (parent only) processing factor of 1.45 for wheat germ (median of 0.79, 1.3, 1.6 and 1.7) and the cereal grain MRL of 3 mg/kg, the calculated expected highest residues in wheat germ are 4.35 mg/kg. The Meeting estimated an MRL for flupyradifurone in wheat germ of 5 mg/kg.

Based on the flupyradifurone (parent only) processing factor of 1.4 for wheat whole meal (median of 1.1, 1.3, 1.5 and 1.6) and the cereal grain MRL of 3 mg/kg, the calculated expected highest residues in wheat whole meal are 4.2 mg/kg. The Meeting estimated an MRL for flupyradifurone in wheat whole meal of 5 mg/kg.

The processing (or transfer) factors derived from the processing studies and the resulting recommendations for STMR-Ps are summarised in the table below.

Processing factors from the processing of raw agricultural commodities (RACs) with field-incurred residues from foliar treatment with flupyradifurone

RAC	Processed commodity	Best estimate processing factor (total residues)	RAC STMR	Processed commodity STMR-P	RAC HR	Processed commodity HR-P
Oranges	Peel, ripe unwashed	1.85	0.505	0.93	2.2	4.1
	Juice	0.135		0.068		0.30
	Oil	0.135		0.068		0.30
	Pulp	0.21		0.11		0.46
	Pomace, wet	1.3		0.66		2.9
	Pomace, dried	4.5		2.3		9.9
	Marmalade	0.155		0.078		0.34
Apple	Whole fruit, washed	1.1	0.23	0.25	0.62	0.68
	Sauce	0.80		0.18		0.50
	Pomace, dried	3.95		0.91		2.4
	Juice	0.60		0.14		0.37
	Fruit, dried	1.9		0.44		1.2
Grape	Berry	0.865	0.63	0.54	2.3	2.0
	Pomace, grape	1.75		1.1		4.0
	Must	0.70		0.44		1.6
	Juice, pasteurised	0.69		0.43		1.6
	Wine at first taste test	0.415		0.26		0.95
	Jelly	0.295		0.19		0.68
	Raisin	2.5		1.6		5.8
Tomatoes	Juice	0.67	0.71	0.48	2.79	1.9
	Puree	1.5		1.1		4.2
	Paste	1.9		1.3		5.3
	Peel	2.1		1.5		5.9
	Preserve	0.71		0.50		2.0
	Fruit, dried	2.45		1.7		6.8
Soya bean	Aspirated grain fractions	7.1	3.44	24.4		

RAC	Processed commodity	Best estimate processing factor (total residues)	RAC STMR	Processed commodity STMR-P	RAC HR	Processed commodity HR-P
seed	Meal	1.35		4.6		
	Hull	0.76		2.6		
	Oil, refined	0.038		0.13		
	Milk	0.21		0.72		
	Defatted flour	1.55		5.3		
Potato	Crisps	1.25	0.291	0.36	0.57	0.71
	Flakes	1.55		0.45		0.88
	Peel, wet	0.596		0.17		0.34
	Starch	0.546		0.16		0.31
	Tuber with peel, cooked	1.05		0.31		0.60
	Tuber, steamed, cooked	0.546		0.16		0.31
Barley	Malt sprouts	0.79	1.315	1.04		
	Brewer’s malt	0.49		0.64		
	Brewer’s grain	0.069		0.091		
	Hops draff	0.44		0.58		
	Brewer’s yeast	0.13		0.17		
	Beer	0.075		0.099		
	Pearl barley	0.12		0.16		
	Pearl barley rub-off	2.93		3.85		
Wheat	White flour	0.445	1.315	0.59		
	White bread	0.32		0.42		
	Whole meal	1.25		1.64		
	Whole meal bread	0.795		1.05		
	Wheat germ	1.25		1.64		
	Aspirated grain fractions	10.5		13.8		
	Bran	1.55		2.0		
	Gluten	0.40		0.53		
	Pasta, cooked	0.135		0.18		
	Pasta, dried and cooked	0.175		0.23		
	Pasta, dry	0.645		0.85		
	Pasta, fresh	0.51		0.67		
	Shorts	0.945		1.2		
	Starch	0.026		0.034		
Corn	Aspirated grain fractions	6.6	0.49	3.2		
	Bran	1.55		0.76		
	Flour	0.89		0.44		1
	Germ, dry milling	1.035		0.51		
	Meal, dry milled	0.895		0.44		
	Oil, dry milled	0.89		0.44		
	Starch	0.89		0.44		
Cotton	Oil, refined	0.20	0.395	0.079		
	Meal	0.83		0.33		
	Hull	0.99		0.39		
Peanuts	Meal	1.2	0.225	0.27	0.35	0.42
	Oil, refined	0.56		0.13		0.20
	Peanut butter	0.75		0.17		0.26
	Peanut, roasted	0.75		0.17		0.26

Residues in animal commodities

Estimated maximum and mean dietary burdens of farm animals

Dietary burden calculations for beef cattle and dairy cattle and poultry are provided below. The dietary burdens were estimated using the OECD diets listed in Appendix IX of the 2016 edition of the FAO Manual.

Potential cattle feed items include: alfalfa forage and hay, clover forage and hay, apple pomace, grape pomace, citrus dried pulp, barley grain, forage, hay and straw, brewer's grain, barley grain, wheat grain, maize grain, millet grain, rye grain, sorghum grain, triticale grain, forage, hay and straw, wheat milled by-products, maize aspirated grain fractions, maize meal, maize grain fodder and forage, maize milled by-products, millet forage and hay, oat forage and hay, rye forage and straw, carrot culls, potato culls, potato process waste, barley bran, cabbage heads, cotton seed, cotton seed meal and hulls, cotton gin by-products, soya bean forage and fodder (hay), soya beans, soya bean meal and hulls, soya bean aspirated grain fractions, sorghum forage and stover, bean and pea seed, bean vines and pea vines and hay/ fodder, peanut hay and peanut meal.

Summary of livestock dietary burden for flupyradifurone (ppm of dry matter diet)

	US-Canada		EU		Australia		Japan	
	max	mean	max	mean	Max	Mean	max	mean
Beef cattle	22.7	7.63	71.8 [A]	16.6	71.8 [A]	23 [C]	8.18	5.38
Dairy cattle	46.0	9.36	66.6	12.1	71.8 [B]	18.0 [D]	50.25	8.2

[A] Highest maximum beef or dairy cattle dietary burden suitable for HR and MRL estimates for mammalian meat

[B] Highest maximum dairy cattle dietary burden suitable for HR and MRL estimates for mammalian milk

[C] Highest mean beef or dairy cattle dietary burden suitable for STMR estimates for mammalian meat

[D] Highest mean dairy cattle dietary burden suitable for STMR estimates for mammalian milk

Potential poultry feed items include: apple pomace, carrot culls, cabbage heads, barley grain, forage, hay and straw, brewer's grain, wheat grain, forage, hay and straw, wheat milled by-products, maize grain fodder and forage, maize meal, maize milled by-products, potato culls and dried pulp (potato process waste), barley bran, cotton seed, cotton seed meal and hulls, cotton gin by-products, soya bean forage and fodder (hay), soya beans, soya bean meal and hulls, soya bean aspirated grain fractions, bean and pea seed, bean vines and pea vines and hay/ fodder.

Summary of poultry dietary burden for flupyradifurone (ppm of dry matter diet)

	US-Canada		EU		Australia		Japan	
	max	Mean	max	mean	Max	Mean	max	mean
Poultry Broiler	2.89	2.89	3.43	3.41	3.905	3.905	5.21	3.67
Poultry Layer	2.89	2.89	15.4 [A]	6.03 [B]	3.905	3.905	2.42	2.42

[A] Highest maximum poultry dietary burden suitable for HR and MRL estimates for poultry meat and eggs

[B] Highest maximum poultry dietary burden suitable for STMR estimates for poultry meat and eggs

Farm animal dietary burden

The Meeting received a lactating dairy cow feeding study which provided information on residues of flupyradifurone arising in tissues and milk when dairy cows were dosed for 29 days, at feeding levels equivalent to 0, 4.8, 23, 50 and 135 ppm flupyradifurone in the diet. Residues of parent, DFA, fpd-OH and fpd-AMCP were determined.

Total (parent + DFA) flupyradifurone residues in milk from the 135 ppm feed group reached plateau levels within two or four days of consecutive dosing. The residue in milk was primarily (60–90%) parent compound. Residues of parent + DFA did not concentrate in cream.

Residues of parent were observed in tissues (fat, kidney, liver and muscle) at every feeding level and it was the dominant residue. Total (parent + DFA) flupyradifurone residues at the 135 ppm feeding level, for example, were 1.4 mg/kg in fat, 5.3 mg/kg in kidney, 3.8 mg/kg in liver and 1.9 mg/kg in muscle with 71, 89, 89 and 80% of these residues respectively being parent.

The Meeting also received information on residues arising in tissues and eggs when laying hens were dosed with flupyradifurone for 28 days, at feeding levels equivalent to 0, 1.5, 6.5, 19.4 and 65.1 ppm in the diet. Residues of parent, DFA, fpd-OH and fpd-AMCP were determined.

Residues of all four analytes were present at the highest feeding level in eggs. DFA was the dominant residue. No quantifiable residues of parent were observed at the lower feeding levels (1.5 and 6.5 ppm). At the next highest feeding level residues of parent ranged from 0.01–0.026 mg/kg, while residues of DFA were approximately 0.45–0.56 mg/kg.

DFA was also the dominant residue in tissues (fat, liver and muscle). Total (parent + DFA) flupyradifurone residues at the 65.1 ppm feeding level, for example, were 1.2 mg/kg in fat, 3.4 mg/kg in liver and 2.3 mg/kg in muscle with 84, 99 and 98% of these residues respectively being DFA.

Animal commodity maximum residue levels

Cattle-STMR, HR and MRLs

For highest residue level estimation, the high residues in the cattle tissues were calculated by interpolating the maximum dietary burden for beef cattle (71.8 ppm) between the relevant feeding levels (49.6 and 135 ppm) in the dairy cow feeding study and using the highest tissue concentrations from individual animals within those feeding groups. For highest residue level estimation, the high residues in the cattle milk were calculated by interpolating the maximum dietary burden for dairy cattle (71.8 ppm) between the relevant feeding levels (49.6 and 135 ppm) in the dairy cow feeding study and using the highest mean milk concentrations from those feeding groups.

The STMR values for the tissues were taken from the 23.1 ppm feeding level from the dairy cow feeding study and using the mean tissue concentrations from that feeding group as the mean dietary burden for beef cattle was almost the same (23 ppm). The STMR values for the milk were calculated by interpolating the mean dietary burden for dairy cattle (18.0 ppm) with the 4.8 and 23.1 ppm feeding levels from the dairy cow feeding study and using the mean milk concentrations from those feeding groups.

Flupyradifurone Feeding Study	Feed Level (ppm) for milk residues	Residues (mg/kg) in milk	Feed Level (ppm) for tissue residues	Residues (mg/kg)			
				Muscle	Liver	Kidney	Fat
HR Determination (beef or dairy cattle)							
Feeding Study	49.6	0.308	49.6	0.910	2.17	2.37	0.489
	135	0.974	135	2.28	4.40	6.35	1.93
Dietary burden and estimate of highest residue	71.8	0.481	71.8	1.27	2.75	3.40	0.864
STMR Determination (beef or dairy cattle)							
Feeding Study	4.81	0.043	23.1	0.304	0.812	0.867	0.147
	23.1	0.129					
Dietary burden and estimate of highest residue	18.0	0.105	23	0.304	0.812	0.867	0.147

The Meeting estimated the following STMR values: milk 0.11 mg/kg; muscle 0.30 mg/kg; edible offal (based on kidney) 0.87 mg/kg and fat 0.15 mg/kg.

The Meeting estimated the following HR values: milk 0.48 mg/kg; muscle 1.27 mg/kg; edible offal (based on kidney) 3.40 mg/kg and fat 0.86 mg/kg.

The Meeting estimated the following maximum residue levels: milk 0.7 mg/kg; meat (mammalian except marine mammals) 1.5 mg/kg, edible offal (based on kidney) 4 mg/kg and mammalian fats (except milk fats) 1 mg/kg.

Poultry-STMR, HR and MRLs

For highest residue level estimation, the high residues in the hen tissues and eggs were calculated by interpolating the maximum dietary burden (15.4 ppm) with the 6.5 and 19.4 ppm feeding levels in the laying hen feeding study and using the highest tissue concentrations from individual animals within that feeding group and using the highest mean egg concentration from those feeding groups.

The STMR values for the tissues and eggs were calculated by extrapolating the mean dietary burden (6.03 ppm) with the 1.5 and 6.5 ppm feeding levels from the poultry feeding study and using the mean tissue and egg concentrations from those feeding groups.

Flupyradifurone Feeding Study	Feed Level (ppm) for egg residues	Residues (mg/kg) in egg	Feed Level (ppm) for tissue residues	Residues (mg/kg)		
				Muscle	Liver	Fat
HR Determination (poultry broiler or layer)						
Feeding Study	6.5 19.4	0.169 0.532	6.5 19.4	0.307 0.783	0.427 1.08	0.127 0.290
Dietary burden and estimate of highest residue	15.4	0.42	15.4	0.64	0.88	0.24
STMR Determination (poultry broiler or layer)						
Feeding Study	1.5 6.5	0.053 0.164	1.5 6.5	0.0868 0.294	0.107 0.419	0.0319 0.120
Dietary burden and estimate of highest residue	6.03	0.15	6.03	0.27	0.39	0.11

The Meeting estimated the following STMR values: egg 0.15 mg/kg; muscle 0.27 mg/kg; edible offal (based on liver) 0.39 mg/kg and fat 0.11 mg/kg.

The Meeting estimated the following HR values: egg 0.42 mg/kg; muscle 0.64 mg/kg; edible offal (based on liver) 0.88 mg/kg and fat 0.24 mg/kg.

The Meeting estimated the following maximum residue levels: eggs 0.7 mg/kg; poultry meat 0.8 mg/kg, poultry edible offal (based on liver) 1 mg/kg and poultry fats 0.3 mg/kg.

RECOMMENDATIONS

On the basis of the data obtained from supervised residue trials the Meeting concluded that the residue levels listed in Annex 1 are suitable for establishing maximum residue limits and for IEDI and IESTI assessment.

Definition of the residue (for compliance with the MRL for plant commodities): *Flupyradifurone.*

Definition of the residue (for estimation of dietary intake for plant commodities): *Sum of flupyradifurone, difluoroacetic acid (DFA) and 6-chloropyridine-3-carboxylic acid (6-CNA), expressed as parent equivalents.*

Definition of the residue (for compliance with the MRL and for estimation of dietary intake for animal commodities): *Sum of flupyradifurone and difluoroacetic acid (DFA), expressed as parent equivalents.*

The residue is not fat soluble.

DIETARY RISK ASSESSMENT

Long-term dietary exposure

The International Estimated Daily Intakes (IEDIs) for flupyradifurone were calculated for the 17 GEMS/ Food cluster diets, based on STMRs and STMRPs estimated by the current Meeting. The results are shown in Annex 3 to the 2016 Report.

The ADI is 0–0.08 mg/kg bw and the estimated IEDIs were 6–20% of the maximum ADI of 0.08 mg/kg bw. The Meeting concluded that the long-term dietary exposure to residues of flupyradifurone, from the uses that have been considered by the JMPR, is unlikely to present a public health concern.

Short-term dietary exposure

The 2015 JMPR established an ARfD of 0.2 mg/kg bw. The International Estimated Short-Term Intakes (IESTIs) for flupyradifurone were calculated for the food commodities for which STMRs and HRs were estimated and for which consumption data were available. The results are shown in Annex 4 to the 2016 Report.

For celery the IESTI represented 120% of the ARfD for children. For leaf lettuce the IESTI represented 250% of the ARfD for children. For mustard greens the IESTI represented 250% of the ARfD for the general population and 610% for children. For spinach the IESTI represented 130% of the ARfD for the general population and 420% for children. No alternative GAP for celery, leaf lettuce, mustard greens and spinach was available. On the basis of the information provided to the JMPR, the Meeting concluded that the short-term dietary exposure to flupyradifurone from the consumption of celery, leaf lettuce, mustard greens and spinach may present a public health concern.

Estimates of intakes for the other commodities considered by the 2016 JMPR varied from 0–90% of the ARfD (0.2 mg/kg bw). The Meeting concluded that apart from celery, leaf lettuce, mustard greens and spinach, the short-term dietary exposure to residues of flupyradifurone, from uses considered by the current Meeting, is unlikely to present a public health concern.