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Australian Quarantine and Inspection Service

Pesticide risk profile for the feeding of oilseed (cotton, linseed, peanut, rape, safflower, sesame, sunflower) seeds and/or meal and processed oil to cattle and sheep

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Abbreviations

ai	active ingredient
APVMA	Australian Pesticide and Veterinary Medicines Authority
bw	body weight
DM	dry matter
ECRP	Existing Chemical Review Program
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
g	gram
GAP	good agricultural practice
ha	hectare
HAFT	Highest average field trial
JMPR	Joint Meeting on Pesticide Residues
kg	kilogram
LOD	Limit of detection for the analytical method, sometimes also used for limit of determination which is the same as LOQ
LOQ	limit of analytical quantitation
mg	milligram = 0.001 grams
MRL	maximum residue limit
PAFC	primary animal feed commodity
PHI	pre-harvest interval
P_{ow}	octanol water partition coefficient
ppm	parts per million = mg/kg
PSD	Pesticide Safety Directorate
TF	transfer factor = concentration in animal tissue or milk divided by concentration in feed
TRR	total radioactive residue
US EPA	United States of America Environmental Protection Agency
WHP	withholding period
*	before MRL indicates that the residue is at or about the LOQ, *i.e.* should be less than the LOQ.

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Potential for violative residues in cattle and sheep fed oilseed (cotton, linseed, peanut, rape, safflower, sesame, sunflower) products

Chemical residues in animal feeds may be transferred to the tissues of livestock on feeding. While it is unlikely that the chemical residues present in meat and offal arising from feeding represent a concern regarding food safety they can result in disruption to trade where the relevant Australian and overseas market standards differ.

The observation of chemical product withholding periods does not guarantee that the chemical residues in the feed are such that when fed to livestock, the residues in meat and offal will meet export market requirements.

The aim of the current report is to profile the risk of violative residues in export meat and edible offal posed by the presence of pesticide residues in oilseeds (cotton, linseed, rape, peanut, safflower, sesame, sunflower) animal feed commodities fed to cattle and sheep.

Assessment of currently registered chemicals that may be used on oilseed crops

Estimates of residues in livestock tissues and milk are usually made on the basis of the propensity of a chemical to transfer to tissues and milk combined with anticipated animal dietary exposure.

Most experiments in the area of transfer of pesticide residues to animal tissues and milk following ingestion have been designed based on the requirements of regulators. The relevant studies required are livestock metabolism studies (lactating goat or dairy cow) and animal transfer (feeding) studies.

The feeding studies are used to determine transfer factors (TF) that are defined as the ratio of the pesticide residue in the tissue or commodity of interest (fat, muscle, liver, kidney or milk) to the residue in the diet (expressed on a dry matter intake basis).

In utilizing transfer factors derived from feeding or metabolism studies for risk assessment management purposes, the user needs to be aware of the limitations and assumptions used. The TF derived is dependent on the duration of the feeding or dosing, the concentration in the feed or dose level, the nature of the feed (if added to the feed), lactational status, bodyweight, age, sex and breed of the animal studied. For chemicals administered as a mixture, the presence of other chemicals may alter the metabolism and/or rate of excretion by induction of the various routes of decontamination. The duration of a feeding study required for the steady state concentration to be reached in tissue or milk is a function of the elimination half-life. Residue definitions set by different regulators are not always the same and residue definition is a factor that should also be taken into account when utilizing TF for managing residue risks and trade. Care must be taken in extrapolating TFs from goat metabolism studies to all ruminants as is demonstrated by endosulfan, for which the residue definition is the sum of α-endosulfan, β-endosulfan and endosulfan sulphate, where only low levels of residues are found in goats but significant transfer to tissues occurs for cattle[1,2].

The transfer factors utilised here were calculated from residues reported in the scientific literature using the highest individual animal tissue divided by the nominal feed level. If the highest residue

[1] Indraningsih, McSweeney, C.S. & Ladds, P.W. (1993) Residues of endosulfan in the tissues of lactating goats. *Aust. Vet. J.,* **70**, 59-62.

[2] Reregistration Eligibility Decision for Endosulfan Case No. 0014 EPA 738-R-02-013 November 2002 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division. http://cfpub.epa.gov/oppref/rereg/status.cfm?show=rereg)

was not reported the average residue divided by the nominal feed level were used instead. In the case of milk the average residue was divided by the nominal feed level.

For the purposes of profiling risk conservative estimates of animal dietary burden (intake) are required. The APVMA "*Stockfeed Guideline Document 1 Primary Feed Commodities As A Proportion of Livestock Diets"* (Version 1.1 March 2002)[3] lists the maximum proportion of oil seeds included in animal feed as 30% and this value was used in the current evaluation. Estimates of residues in oil seeds were obtained from scaling of literature studies, MRLs or based on conservative assumptions. The dietary burden is then the residue in crop × maximum proportion in the diet. To overcome errors that may result from differences in moisture contents of feed items it is accepted practice to calculate dietary burdens for a ration on a dry matter basis. Oil seeds typically comprise 90% dry matter and it was not considered necessary to adjust residue values as any correction would be minor.

The estimated residue in animal commodities is:
Residue = TF × dietary burden [ppm DM basis]

Unless stated otherwise, the following assumptions have been used in the risk assessment:

- The oilseeds are harvested at maturity and that the by-products obtained at processing.
- The crop has been treated at the maximum rate and with the shortest interval between application and harvest permitted by the product label[4].
- The maximum rate of incorporation in the ration/diet is 30%.
- That residue transfer for cattle is greater than for sheep and therefore that the estimated transfer factors for cattle can be applied to sheep.

The potential for violative residues in animals is assessed against the Australian, Codex and US tolerances as listed in February 2010[5]. Other markets may have different standards, however, for the bulk of Australian meat exports it is assumed that if the lower of these tolerances (or the LOQ of the analytical method if no Codex or US tolerance exists) can be met, the feeding of oilseed and processed commodities will not pose an unacceptable risk.

Appendix 1 provides the details of a risk assessment for each of the compounds registered in Australia for use on oilseeds. Most of the compounds registered for use on oilseeds also have registrations in other crops that are major animal feed commodities. Indeed, for most compounds listed in appendix 1 the major route of exposure for animals to the chemical is expected to be through feeding of other crops such as cereal and pulse grains.

The conclusion of the analysis is the risk of residue violations in meat and edible offal posed by the feeding of oilseed products derived from oilseed crops treated with currently registered products is low. Based on the available information, no chemicals were identified as requiring further investigation and/or the development of additional risk management strategies, *i.e.* and chemicals identified as posing a risk of transfer of residues above relevant MRLs were only of marginal concern and given the conservative assumptions used are not considered to warrant further attention (e.g. diclofop-methyl).

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[3] http://www.apvma.gov.au/residues/Stockfeed_Guideline_1.pdf

[4] In general, only one or two product labels were selected per pesticide. There is a possibility that the maximum permitted rate may be higher than identified.

[5] MRLs and approved use patterns change with time. The assessments include the most recent decisions of the Codex Alimentarius Commission (32nd Session, July 2009) with regard to Codex MRLs, US tolerances as listed in the Code of Federal Regulations at February 2010 and MRLs as they appear in Table 1 of the APVMA *MRL Standard* as at February 2010.

Appendix 1

2,2-DPA (2,2-dichlorpropionic acid also known as dalapon)
- is a systemic herbicide used for the control of annual and perennial grasses and rushes. It is registered on a variety of crops including potential animal feeds sunflower, maize, soybean and pastures. The application for *sunflowers* is up to 3.7 kg ai/ha. The application rate for *cotton* is up to 7.4 kg ai/ha with application early season with spray applied between rows.
No harvest WHP is required.
All crops have the following grazing restraint:
DO NOT graze or cut for stock food for 6 weeks after application

There are no Codex or USA MRLs for 2,2-DPA in animal tissues. The critical Australian MRL is 0.2 mg/kg for meat (mammalian) and *0.1 mg/kg for milks. Residues are not expected in cotton or sunflower seed at harvest as reflected in the MRL of *0.1 mg/kg for both. Therefore no residues are expected to result from the feeding of cotton or sunflower seed/meal to animals. Dalapon and all of its known breakdown products dissolve easily in water. They are readily washed from cells and tissues. Because dalapon is insoluble in organic solvents and lipids, it does not build up in animal tissues[6,7].

It is anticipated that animal product residues will be below typical method LOQs.

2,4-D
- is a selective herbicide used widely for the control of weeds. It is registered on a variety of crops including potential animal feeds pasture and cereals. Application to canola, linseed, safflower and sunflower is as a preparatory spray for *fallow crops* and *seed beds* at rates up to 0.81 kg ai/ha. Application to *peanuts* prior to crop emergence at rates up to 2.25 kg ai/ha.
No harvest WHP is required.
All crops have the following grazing restraint:
DO NOT graze or cut for stock food for 7 days after application

There are Australian, Codex and USA MRLs for 2,4-D in animal tissues however, the residue definitions that apply differ. The residue definition for Codex and Australia is parent compound. For the USA the residue definition is the sum of 2,4-D and 2,4-DCP. This added complication potentially makes comparison of the respective MRLs more difficult. The Australian MRLs are 0.2 mg/kg for meat (mammalian), 2 mg/kg for edible offal (mammalian) and *0.05 mg/kg for milks. The critical USA tolerance is 4 mg/kg for cattle kidney while the MRL for milk is 0.05 mg/kg. The critical Codex tolerances are 5 mg/kg for edible offal, 0.2 mg/kg for meat (mammalian) while the MRL for milk is 0.01 mg/kg. The Australian MRL for oilseed is *0.05 mg/kg.

In an animal transfer study cows were dosed at the equivalent of 1446, 2890, 5779 and 8585 ppm in the diet for 28 days[8]. Residues in liver, kidney, muscle and fat for the 1446 ppm group were 0.2, 6.5, 0.24 and 0.51 mg/kg respectively. Residues are not expected in oilseeds at harvest therefore no residues are expected to result in animal commodities from the feeding of oilseed/meal to livestock.

[6] Kuhnert M, Freytag B, Freytag HH, Fuchs V. (1992) [The tolerance and residue accumulation of sodium-2,2-dichloropropionate (Dalapon) administered over 90 days to dairy cows] *Dtsch Tierarztl Wochenschr*. 99 (4), 148-51. German.
[7] Fertig, S. N.; Schreiber, M. M. (1961). Effects Of Herbicide Ingestion. Effect of dalapon ingestion on performance of dairy cattle and levels of residue in the milk. *J. Ag. Food Chem*. 9:369
[8] 1998 JMPR - Pesticide Residues in Food - 1998 Evaluations, Part I Residues FAO Plant Production and Protection Paper 152/1. FAO and WHO 1999

It is anticipated that animal product residues will be below typical method LOQs.

2,4-DB
- is a selective herbicide used widely for the control of weeds. It is registered on a variety of crops including potential animal feeds pasture, lucerne, medics and clover. Application to *peanuts* is at rates up to 0.88 kg ai/ha with applications made 1-12 weeks after emergence.
No harvest WHP is required.

There are Australian but no Codex or USA MRLs for 2,4-DB in animal tissues. The Australian MRLs are 0.2 mg/kg for meat (mammalian) and edible offal (mammalian) and *0.05 mg/kg for milks. There is no Australian MRL for peanuts as no residues are expected.

The US residue definition for plant commodities is the sum of 2,4-DB and its metabolite 2,4-D.

Residues are not expected in peanuts at harvest therefore no residues are expected to result in animal commodities from the feeding of peanuts/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Abamectin
- is a macrocyclic lactone insecticide used for the control of various insects and mites. It is registered on *cotton* for the control of pest mites and heliothis. The application rate is up to 10.8 g ai/ha.
The harvest WHP is 20 days.

There are Australian, Codex and USA MRLs for abamectin (avermectin in the USA) in animal tissues. The MRLs for cattle fat are 0.1 mg/kg in Australia and 0.03 mg/kg in the USA. The Australian cattle milk MRL is 0.02 mg/kg while the US MRL is 0.005 mg/kg. The Codex MRLs are 0.1 mg/kg for cattle fat, 0.05 mg/kg for cattle kidney, *0.01 mg/kg for cattle meat and 0.005 mg/kg for cattle milk. The Australian MRL for cottonseed is 0.01 mg/kg.

A transfer factor of 0.02 for liver when fed at 0.1 ppm in the diet was reported[9]. Applying this TF to the maximum residue in cottonseed fed at 30% of the diet gives a liver residue of 0.00006 mg/kg (0.30×0.01×0.02), less than the relevant Australian, EU and USA MRLs.
The TF for milk is 0.04 giving an anticipated milk residue of 0.00012 mg/kg (0.3×0.01×0.04).

It is anticipated that animal product residues will be below typical method LOQs.

Acetamiprid
- is an insecticide used for the control of cotton aphid and green mirids. It is applied to *cotton* at rates up to 22.5 g ai/ha.
DO NOT harvest for 10 days after application.
Do not graze or cut for stock food

There are no Codex animal tissue MRLs for acetamiprid. The US MRLs for animal tissues are 0.2 mg/kg for edible offal and 0.1 mg/kg for fat, meat and milk. The Australian MRLs are *0.05 mg/kg for edible offal and *0.01 mg/kg for meat and milk. The MRL for cotton seed is *0.05 mg/kg.

[9] Pesticide Residues in Food – 1992 evaluations. Part II. Toxicology. WHO, WHO/PCS/93.34, Geneva, 1993

The US EPA reported: Acetamiprid was administered orally to nine Holstein dairy cows for 28 days. The dosages were equivalent to 6 ppm (1.3×), 18 ppm (4.0×) and 60 ppm (13×) in the diet. Using a diet consisting of cotton gin byproducts and cottonseed meal, the maximum theoretical dietary burden of acetamiprid to dairy cattle is 4.545 ppm. The expected residues of acetamiprid in milk, meat, and meat byproducts resulting from the feeding of crops treated with acetamiprid under the conditions proposed in this petition are <0.01–0.018 ppm in milk, <0.01 ppm in fat and muscle, and <0.05 ppm in kidney and liver. The metabolism studies indicated that the residues of concern in ruminant commodities are the combined residues of acetamiprid and IM-2-1.

It is anticipated that animal product residues will be below typical method LOQs.

Acibenzolar-S-methyl
- is a fungicide used for the suppression of Fusarium wilt and black root rot in cotton. The application rate is 6 g ai/100 kg seed (60 ppm), that is as a seed dressing.
The harvest WHP is not required.

There are Australian but no Codex or USA MRLs for acibenzolar-S-methyl in animal tissues. The MRLs are *0.02 mg/kg for tissues and *0.005 mg/kg for milk. The Australian MRL for cottonseed is *0.02 mg/kg.

As there are no residues in cottonseed, none are expected in animal commodities.

It is anticipated that animal product residues will be below typical method LOQs.

Acifluorfen
-is a diphenyl ether herbicide used for the control of various weeds in peanut crops at 0.448 kg ai/ha. When used pre-emergent application may be at rates of up to 0.896 kg ai/ha.
A grazing WHP is not required.
When used for crop salvage at rates of up to 0.896 kg ai/ha. Do not harvest for 50 days after application.

There are Australian but no Codex or US MRLs for animal commodities. The Australian and US residue definitions differ, parent for Australia and sum of acifluorfen and its metabolites (the corresponding acid, methyl ester, and amino analogues) for the US. The Australian MRLs are 0.1 mg/kg for edible offal and *0.01 mg/kg for meat and milk. The Australian MRL for peanuts is 0.05 mg/kg.

The US EPA determined that there is no reasonable expectation of acifluorfen being detected in animal tissues on feeding at levels of up to 0.1 ppm in the diet (tissue LOQs of 0.01-0.02 mg/kg).

In peanuts treated with [^{14}C]sodium acifluorfen, labeled in the chlorophenyl ring, at 1.1× the maximum seasonal use rate, TRR were 0.18 ppm in nutmeats, 1.9 ppm in fodder, and 0.72 ppm in hulls. Acifluorfen was the major identified metabolite, accounting for 4.9% TRR in nutmeats, 11% TRR in hulls, and 13% TRR in peanut fodder. In peanut hulls two additional conjugate metabolites, 3-carboxy-4-nitrophenyl thio-beta-D-glucopyranoside and S-(3-carboxy-4-nitrophenyl)-cysteine, accounted for 26% TRR and 6.4% TRR, respectively. Numerous remaining residues in peanut matrices were characterized as being polar and present at <10% TRR.

In peanuts treated at or above the maximum registered rate of 0.56 kg ai/ha (applications were made at 0.56-1.68 kg ai/ha), residues of sodium acifluorfen and its regulated metabolites were below the LOQ (<0.10 ppm) at *ca.* 75 to 140 days after application.

In a goat metabolism study where goats were dosed at the equivalent of 10 ppm in the feed, total radioactive residues in tissues and milk ranged from 0.008 mg equiv./kg in milk to 0.40 mg equiv./kg in kidney[10]. The US EPA determined that there is no reasonable expectation of acifluorfen being detected in animal tissues on feeding at levels of up to 0.1 ppm in the diet (tissue LOQs of 0.01-0.02 mg/kg).

It is anticipated that animal product residues will be below typical method LOQs.

Aldicarb
- is a carbamate insecticide used for the control of various insects and nematodes. It is registered on *cotton* as a single application to the seed furrow at seeding. The application rate is up to 1.05 kg ai/ha.
No harvest WHP is required.

There are Australian and Codex but no USA MRLs for aldicarb in animal tissues. The MRLs for meat (mammalian) and milk are at 0.01 and *0.01 mg/kg for Australia and Codex respectively. The Australian use-pattern is pre-emergent application and as such negligible residues are expected in cotton at harvest. The cottonseed MRL is 0.1 mg/kg.

Residues of aldicarb in the tissues of goats fed at 2.5 ppm in the diet for 10 days were reported by JMPR and were 1.5 μg/kg in liver, 0.46 μg/kg in kidney, 0.11 μg/kg in fat and 0.1 μg/kg in muscle[11]. Feeding at up to 2.5 ppm in the diet is not expected to result in significant residues in animal tissues. The TF for milk is <0.002, residues from feeding cotton seed at 30% of the diet are expected to be 0.3×0.05×<0.002 = <0.00003 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

alpha-Cypermethrin (cypermethrin and zeta-cypermethrin)
- is a synthetic pyrethroid insecticide used for the control of various insects in crops.

The application rates for oilseeds are reported in the table below together with the harvest WHPs and any label feeding restraints.

Crop	**Rate (g ai/ha)**	**Harvest WHP (days)**	**Grazing WHP (days)**
Canola	40	21 days	-
Cotton	50	14 days	-
Linola	20	12 weeks	-
Linseed	30	14 days	-
Sunflowers	40	21 days	-

There are Australian, Codex and USA MRLs for cypermethrin in animal tissues. The relevant MRLs for cattle fat are 0.5, 1 and 2 mg/kg for Australia, Codex and the USA respectively. The milk MRLs for the same are 0.1 , 0.04 F mg/kg and 5 mg/kg respectively. The US also has separate MRLs for zeta cypermethrin of 1 mg/kg for cattle fat and 2.5 mg/kg in milk fat (reflecting a residue of 0.1 mg/kg in whole milk). There are Australian MRLs of cottonseed 0.2 mg/kg, linola T0.1

[10] US EPA HED Metabolism Committee Memorandum: Sodium Acifluorfen (PC Code: 114402): HED Metabolism Assessment, Review Committee Decision Document (DP Barcode: D265602 http://www.epa.gov/pesticides/reregistration/acifluorfen/metabolism_committee_report.pdf
[11] 1994 JMPR - Pesticide Residues in Food - 1994 Evaluations, Part I Residues FAO Plant Production and Protection Paper 78. FAO and WHO 1995

mg/kg, linseed 0.5 mg/kg, rapeseed 0.2 mg/kg, sunflower seed 0.1 mg/kg. The TF for fat is 0.1[12,13]. Feeding of oilseeds at 30% of the diet could result in cypermethrin residues in fat of 0.3×0.2 ppm × 0.1 = 0.006 mg/kg. Anticipated residues in whole milk (TF 0.003-0.1) are the same as for fat.

It is anticipated that animal product residues will be below typical method LOQs.

Amitraz

- is an acaricide used for the control of heliothis in *cotton*. The application rate is up to 0.4 kg ai/ha. The harvest WHP is 21 days.

There are Australian, Codex and US MRLs for amitraz in animal tissues however, the residue definitions that apply differ. The Australian and Codex definition is the sum of amitraz plus metabolite BTS-27271, calculated as BTS-27271. The U.S. expression is the sum of amitraz and its metabolites BTS-27271 and BTS-27919, calculated as the parent compound. The Australian MRLs are 0.5 mg/kg for edible offal (mammalian) while the relevant Codex and US MRLs are set at 0.2 mg/kg. The critical tolerance is the Codex MRL for edible offal of 0.2 mg/kg. The relevant MRLs for milk are 0.1, *0.01 and 0.03 mg/kg respectively for Australia, Codex and the USA. The Australian cottonseed MRL is *0.1 mg/kg.

The Australian use-pattern is such that significant residues are not expected in cottonseed at harvest. Therefore no residues are expected to result from the feeding of cottonseed to animals.

It is anticipated that animal product residues will be below typical method LOQs.

Asulam

-is a herbicide used on *oilseed poppies* at up to 1 kg ai/ha.
No grazing or harvest restraints; spray any time after the 4-6 leaf stage.

There are Australian but no Codex or US MRLs for asulam in animal commodities. The Australian MRLs have all been set at *0.1 mg/kg.

In a ruminant feeding study lactating dairy cows were dosed with asulam *per se* at 50, 200, or 800 ppm in the diet for 28 days[14]. Half the test animals were sacrificed within 24 hours of the final dose and the remaining animals were sacrificed after a 14- or 21-day withdrawal period. Residues of asulam and its metabolites containing the sulfanilamide moiety were determined using an adequate HPLC method (Method No. 154) in fat, kidney, liver, muscle, and milk. At the 50 ppm dose level, residues ranged from 0.04 - 0.11 mg/kg in milk and from <0.05 - 0.34 mg/kg in the tissues; at the 200 ppm dose level residues ranged from 0.10 - 0.32 mg/kg in milk and from <0.05 - 1.03 mg/kg in tissues; and at the 800 ppm dose level residues ranged from 0.48 - 1.16 mg/kg in milk and from <0.05 - 3.56 mg/kg in tissues. Kidney tissue had the highest residue levels (>4×) as compared to the other tissues.

In a second ruminant feeding study, lactating dairy cows were dosed with asulam *per se* at 0.5, 5, 50, 200, or 800 ppm in the diet for 28 days. Residues of asulam were determined using an adequate

[12] Chen-AW; Fink-JM; Letinski-DJ; Barrett-GP; Pearsall-JC (1997) Residue of cypermethrin and its major acid metabolites in milk and tissues from dairy bovines treated with cypermethrin. *J. Ag. Food Chem.* 45: 12, 4850-4855.
[13] 1981 JMPR Pesticide Residues in Food - 1981 Evaluations, FAO Plant Production and Protection Paper 42. FAO and WHO 1982 http://www.fao.org/ag/AGP/AGPP/Pesticid/Default.htm
[14] Reregistration Eligibility Decision, Asulam List A Case 0265 EPA 738-R-95-024 September 1995 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division. http://cfpub.epa.gov/oppref/rereg/status.cfm?show=rereg

spectrophotometric method. Residues were nondetectable (<0.025 mg/kg) in milk from cows dosed at 0.5- 50 ppm. Residues were nondetectable (<0.05 mg/kg) in all tissues of cows dosed at 0.5 ppm and in the fat of cows from all feeding levels. In cows fed at 5 ppm, residues were nondetectable (<0.05 mg/kg) in all tissues except kidney (0.06-0.12 mg/kg). In cows fed at 50 ppm, residues were nondetectable in all tissues except kidney (0.11-0.13 mg/kg) and heart (0.06 mg/kg). In cows fed at 200 ppm, residues were nondetectable in all tissues except kidney (0.32-0.34 mg/kg) and heart (0.07 mg/kg). In cows fed at 800 ppm, residues were 1.19-1.39 mg/kg in kidney, 0.10-0.11 mg/kg in liver, 0.08-0.10 mg/kg in muscle, 0.13-0.17 mg/kg in heart, and 0.07 mg/kg in brain.

Residues are not expected in poppy seed at harvest therefore no residues are expected to result in animal commodities from the feeding of poppyseed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Atrazine

- is a triazine herbicide used for the control of grass and weeds in crops such as sugarcane, maize, lupins, canola and sorghum. It is applied to *canola* (including triazine resistant canola) at rates up to 2 kg ai/ha.

No harvest WHP is required.

There are no Codex animal tissue MRLs for atrazine. The US MRLs for animal tissues are lower (0.02 mg/kg for cattle fat, mbyp, meat and milk) than the Australian MRL of T*0.01 mg/kg for edible offal mammalian and T*0.01 mg/kg for milk. The MRL for rape seed is *0.02 mg/kg.

Feeding at 37.5 ppm in the diet for 28 days gave residues that were <0.01 mg/kg in milk and tissues at slaughter[15]. Therefore detectable residues are not expected to result from the feeding of canola seed/meal to cattle and sheep.

It is anticipated that animal product residues will be below typical method LOQs.

Azoxystrobin

-is registered for the control of stem rot/white mould and rhizoctonia peg and pod rot in *peanuts* with application at up to 447 g ai/ha (APVMA permit 4583).

The harvest WHP is 14 days.

There are Australian and US but no Codex MRLs for animal commodities. The Australian MRLs for animal tissues have been set at *0.01 mg/kg while the milk MRL is 0.005 mg/kg. The US MRLs for animal commodities are set at 0.03, 0.01 and 0.07 mg/kg for cattle fat, meat and meat by-products respectively and 0.006 mg/kg for milk. There are Australian MRLs of 1 ppm for peanut hulls and 0.05 mg/kg for peanuts.

Residues in tissues of lactating cows were ≤0.01 mg/kg after feeding at levels up to 25 ppm in the diet for 28 days[16].

It is anticipated that animal product residues will be below typical method LOQs.

Bentazone

[15] Atrazine Reregistration Eligibility Decision Residue Chemistry Considerations PC Code 080803; Case 0062 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division

[16] APVMA Animal Residue Data Sheet – Azoxystrobin (October 2002) http://www.apvma.gov.au/residues/stockfeed.shtml

- is a post-emergent herbicide and may be applied to *peanuts* at rates of up to 960 g ai/ha.
The harvest WHP is 21 days.

The Australian MRLs for tissues and milk are *0.05 mg/kg. The Codex MRL for milk is *0.05 mg/kg. The Australian MRL for peanuts is 0.1 mg/kg. The EU MRL for milk and cream is *0.02 mg/kg.

Animal metabolism studies (5 to 8 day goat study, up to 1420 ppm) and a goat feeding study (35 days) at 75 and 150 ppm suggest that no detectable residues are expected with exposure of 10 to 15 ppm[17]. (TF for kidney was 0.04 and fat 0.002)

Note: the US EPA indicate that a lactating cow animal transfer study exists with feeding levels of 1, 5 and 20 ppm with ^{14}C bentazone and its 6 and 8-hydroxy metabolites[18].

It is anticipated that animal product residues will be below typical method LOQs.

Beta-cyfluthrin
- is a synthetic pyrethroid insecticide used for the control of various insects in crops. It is registered on *canola* for the control of heliothis. It is registered on cotton for the control of heliothis, mirids, jassids and flea beetles. The application rate is up to 20 g ai/ha for cotton and up to 10 g ai/ha for canola.
Canola: Do not harvest for 14 days after application.
Cotton: Do not harvest for 4 weeks after application.

There are Australian, USA and Codex MRLs for cyfluthrin. The relevant MRLs for cattle fat are 0.5, 1 and 2 mg/kg for Australia, Codex and the USA respectively. The relevant MRLs for cattle milk are 0.1, 0.04 and 5 mg/kg for milkfat (1 mg/kg in whole milk) for Australia, Codex and the USA respectively. There is an Australian MRL for cottonseed at 0.01 mg/kg and for rape seed at *0.05 mg/kg.

TF fat = 0.05[19]. Estimated residues in fat are $0.3\times0.05\times0.05 = 0.00075$ mg/kg. The low levels of residue anticipated in fat lead to the conclusion that feeding of cotton and canola seed/meal/oil derived from crops treated with beta-cyfluthrin should not present a problem. The TF for milk is 0.005 giving anticipated residues of $0.3\times0.05\times0.005 = 0.000075$ mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Bifenthrin
- is a synthetic pyrethroid insecticide used for the control of various insects in crops. It is registered on *canola* for control of mites (bare earth application). The application rate is up to 20 g ai/ha. It is registered on *cotton* for control of heliothis, mirids (foliar application) and wireworm (application made in-furrow application at the time of planting). The application rate is up to 80 g ai/ha (foliar).
Cotton: Do not harvest for 2 weeks after application

[17] 1995 JMPR - Pesticide Residues in Food - 1995 Evaluations, Part I Residues FAO Plant Production and Protection Paper 137. FAO and WHO 1996
[18] Reregistration Eligibility Decision Bentazon List A Case 0182EPA 738-R-94-029 September 1994 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division
[19] 1998 JECFA Residues of some veterinary drugs in animals and foods. Forty-eighth meeting of the Joint FAO/WHO Expert Committee on Food Additives, 1998, FAO Food and Nutrition Paper 41/10

There are Australian, Codex and USA MRLs for bifenthrin in animal tissues. The relevant MRLs for cattle fat are 2, 0.5 and 1 mg/kg for Australia, Codex and the USA respectively. The MRLs for milk are 0.5 mg/kg, *0.05 mg/kg (cattle milk) and 1 mg/kg (milk fat, 0.1 mg/kg for whole milk). The Australian MRL for cottonseed is 0.1 mg/kg and for rape seed *0.02 mg/kg. Assuming similar levels in cottonseed as the MRL and a maximum TF of 0.3[20] would give residues in fat of $0.3 \times 0.1 \times 0.3 = 0.009$ mg/kg. The TF for milk is 0.02 giving anticipated residues in milk of $0.3 \times 0.1 \times 0.02 = 0.0006$ mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Bromoxynil

- is a selective herbicide used for the control of broad-leafed weeds in *linseed*. The application rate is up to 0.4 kg ai/ha with applications made when the crop is 50-150 mm high.
No harvest WHP is required.

There are no Codex animal tissue MRLs for bromoxynil. The Australian residue definition for bromoxynil is parent compound while the US definition includes a metabolite. The US MRLs for animal tissues are 0.5 mg/kg for meat, 3.5 mg/kg for mbyp and 0.1 mg/kg for milk. The Australian MRL of T1 mg/kg for meat (mammalian) and T0.1 mg/kg for milk. The Australian MRL for linseed is *0.02 mg/kg. No detectable residues are expected in the tissues of animals from the feeding of linseed/meal.

In a study where bromoxynil was fed to lactating dairy cows for 4 days at 5 ppm, bromoxynil (parent compound) was not detected in milk (LOD 0.1 ppm) [21].

It is anticipated that animal product residues will be below typical method LOQs.

Butroxydim (p)

-is a cyclohexanedione herbicide used for the control of grass weeds in various crops. The application rate for *cotton, peanuts* and *sunflowers* is up to 45 g ai/ha.
Do not graze or cut for stock food for 14 days after application.

There are no Codex or USA MRLs for butroxydim. The Australian residue definition for butroxydim is parent compound. The Australian MRLs are *0.01 mg/kg for meat (mammalian), edible offal (mammalian) and milk. There is an oilseed MRL of *0.01 ppm.

Residues are not expected in oilseeds at harvest therefore no residues are expected to result in animal commodities from the feeding of oilseed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Captan

-is applied as a seed treatment at 120 g ai/100 kg seed for control of pre-emergence rot and seedling blight.
A harvest WHP is not required.

[20] 1992 JMPR - Pesticide Residues in Food – 1992 evaluations. Part II. Toxicology. WHO, WHO/PCS/93.34, Geneva, 1993

[21] Reregistration Eligibility Decision Bromoxynil List B Case 2070EPA738-R-98-013 December 1998 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division

There are Australian and USA but no Codex MRLs for captan in animal tissues. The relevant MRLs for edible offal and meat in Australia are set at 0.05 mg/kg and milk at *0.01 mg/kg. The US MRL for cattle meat is 0.2 and milk is 0.1 mg/kg. No MRL has been set for peanuts as no residues are expected.

Residues are not expected in oilseeds at harvest therefore no residues are expected to result in animal commodities from the feeding of oilseed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Carbaryl

- is a carbamate insecticide used for the control of various insects in crops. It is registered on *linseed* for control of various pests at rates of up to 1.1 kg ai/ha. It is registered on cotton for control of rough bollworm. The application rate is also up to 1.1 kg ai/ha.
The harvest WHP is 3 days for linseed.

There are Australian, Codex and USA MRLs for carbaryl in animal tissues. The Australian and Codex residue definition is carbaryl for both plant and animal commodities. The Australian MRLs for edible offal and meat are T0.2 mg/kg while that for milk is T*0.05 mg/kg. The Codex MRL for kidney is 3 mg/kg and liver 1 mg/kg while the MRL for meat is 0.05 mg/kg. The Codex milk MRL is 0.05 mg/kg.

The USA residue definition is the sum of carbaryl and 1-napthol expressed as carbaryl for plant commodities, the sum of carbaryl, 1-napthol, 5,6-dihydrodihydroxycarbaryl and 5,6-dihydrodihydroxynapthol expressed as carbaryl for animal tissues. The US tolerance for cattle meat and milk is 1 while fat is 0.5 mg/kg.

The Australian MRLs are 1 mg/kg for cotton and sunflower seed.

The TF for kidney is 0.007 for the Australian/Codex residue definition and 0.012 for the US residue definition[22] giving rise to anticipated maximum residues in kidney from feeding oilseeds of $0.3\times0.007\times1 = 0.0021$ mg/kg and $0.3\times0.012\times1 = 0.0036$ mg/kg respectively for the Australian/Codex and USA residue definitions.
The TF for milk is 0.0002 for the Australian/Codex residue definition and 0.002 for the US residue definition giving rise to anticipated maximum residues in milk from feeding oilseeds at 30% of the diet of $0.3\times0.0002\times1 = 0.00006$ mg/kg and $0.3\times0.002\times1 = 0.0006$ mg/kg respectively for the Australian/Codex and USA residue definitions.

It is anticipated that animal product residues will be below typical method LOQs.

Carbosulfan

- is a systemic insecticide used for the control of various insects and nematodes in crops. It is registered on *cotton* for incorporation in furrow at seeding. The application rate is up to 1 kg ai/ha. Not required when used as directed.

There are Australian and Codex but no USA MRLs for carbosulfan in animal tissues. The relevant Australian and Codex MRLs for meat and milk are* 0.05 mg/kg (Codex *0.03 mg/kg for milk). The Australian use-pattern is such residues are not expected in cotton at harvest. This is reflected in the Australian MRL for cottonseed of 1 mg/kg. Therefore no residues are expected to result from the

[22] 2002 JMPR. Pesticide Residues in Food - 2002 Evaluations – Part I: Residues Volume 1, FAO Plant Production and Protection Paper 175/1. FAO and WHO 2003 http://www.fao.org/ag/AGP/AGPP/Pesticid/Default.htm

feeding of cotton seed/meal to animals. Note there is also an Australian primary animal feed commodity MRL of 2 ppm which suggests feeding at this rate should not result in residues above *0.05 mg/kg in animal tissues.

In a feeding study with cows carbosulfan (not carbofuran) was fed to lactating dairy cattle for 28 consecutive days at rates equivalent to 1, 3, 10 and 50 ppm in the diet[23]. Carbofuran was not found in any milk, skim milk, cream or tissue samples at any of the 4 feeding concentrations, where the limit of detection was estimated as 0.005 mg/kg for milk and 0.01 mg/kg for tissues and cream. The metabolite 3-keto-carbofuran was detected only in one liver sample at 0.023 mg/kg from the 50 ppm group, and 3-hydroxy-carbofuran was detected in most milk samples from the 50 ppm group, at 0.007-0.030 mg/kg, and in one from the 10 ppm group (day 4, 0.007 mg/kg). Total carbamate residues reached a plateau at about 0.03 mg/kg from days 1 to 21. At the 50 ppm feeding level 3-hydroxy-carbofuran was detected in the kidneys (0.090, 0.13 mg/kg), liver (0.047, 0.060 mg/kg) and muscle (0.020, 0.030 mg/kg), but not in fat. In the 10 ppm group the 7-phenol (0.057 mg/kg) and 3-hydroxy-7-phenol (0.012 mg/kg) were found in the kidneys.

It is anticipated that animal product residues will be below typical method LOQs.

Carfentrazone-ethyl
- is a herbicide used on cotton for the dessication of regrowth follwing defoliation. It is registered at rates of up to 24 g ai/ha.
The harvest WHP is 1 day.
DO NOT graze treated areas or feed cotton trash to livestock

There are Australian and US but no Codex MRLs for carfentrazone-ethyl in animal tissues. The Australian MRLs for edible offal and meat are *0.05 mg/kg while that for milk is *0.025 mg/kg. The US MRLs have been set at 0.1 mg/kg for fat, meat and offal and 0.05 mg/kg for milk. The Australian MRL for cotton seed is *0.05 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Chlorantraniliprole
- is an insecticide. It is used on cotton for the control of bollworms. The application rate is 52.5 g ai/ha.
The harvest WHP is 28 days.
Do not allow livestock to graze crops, cotton stubble or gin trash treated with Altacor Insecticide.

There are Australian, Codex and US MRLs for chlorantraniliprole. The relevant Australian MRLs for meat (fat), edible offal and milk are all *0.01 mg/kg. The US MRLs are 0.3 mg/kg for fat and liver, 0.2 for cattle mbyp (=offal) except liver, 0.05 mg/kg for meat and milk. The Codex MRLs are all *0.01 mg/kg (meat (fat), offal and milk).

The Australian MRL for cotton seed is 0.3 mg/kg and for cotton seed meals and hulls 0.7 ppm.

The 2008 JMPR reported a feeding study where dairy cows were dosed with chlorantraniliprole for 28 days at the equivalent of 1, 3, 10 and 50 ppm in the diet. Average residues of chlorantraniliprole in milk for the 3 ppm dose group were < 0.01 (3) mg/kg. Chlorantraniliprole residues in liver and fat were higher than in other tissues. Average residues for tissues for the 3 ppm dosing level (3 animals per dose group) were all < 0.01 mg/kg for liver, fat, kidney and muscle. A transfer factor of

[23] 1999 JMPR - Pesticide Residues in Food - 1999 Evaluations, Part I Residues FAO Plant Production and Protection Paper 157. FAO and WHO 2000

<0.01/3 = <0.003 for fat when fed at 3 ppm in the diet was reported[24]. Applying this TF to the Australian MRL for meals and hulls at 30% of the diet gives a fat residue of 0.006 mg/kg (0.7×3×0.003).
A transfer factor of 0.003 for milk when fed at 3 ppm in the diet was reported. Applying this TF to the Australian MRL for meal and hulls at 30% of the diet gives a milk residue of 0.006 mg/kg (0.7×3×0.003).

It is anticipated that animal product residues will be below typical method LOQs.

Chlorfenapyr
- is a pyrrole insecticide/miticide. It is used on *cotton* for the control of heliothis and two-spotted mites. The application rate is 0.396 kg ai/ha.
The harvest WHP is 28 days.

There are Australian but no Codex or US MRLs (revoked 31/1/2001) for chlorfenapyr. The relevant Australian MRLs for meat (fat), edible offal and milk are 0.05, *0.05 and *0.01 mg/kg respectively.

The Australian MRL for cottonseed is 0.5 mg/kg.

A transfer factor of 0.09 for fat when fed at 7 ppm in the diet was reported[25]. Applying this TF to the cottonseed MRL fed at 30% of the diet gives a fat residue of 0.3×0.09×0.5 = 0.0135 mg/kg.
A transfer factor of 0.006 for milk when fed at 7 ppm in the diet was reported. Applying this TF to the cottonseed MRL fed at 30% of the diet gives a milk residue of 0.0009 mg/kg (0.3×0.006×0.5).

It is anticipated that animal product residues will be below typical method LOQs.

Chlorothalonil
Is registered for use on *peanuts* for control of leaf spot and rusts at rates of up to 1.3 kg ai/ha.
Do not graze treated crops.

There are Australian and US but no Codex MRLs for chlorothalonil. The Australian residue definition is the sum of chlorothalonil and 4-hydroxy-2,5,6-trichloroisophthalonitrile metabolite expressed as chlorothalonil. The Australian MRLs are 7 mg/kg for edible offal, 2 mg/kg for meat in the fat and 0.05 mg/kg for milk. The US residue definition for animal commodities is 4-hydroxy-2,5,6-trichloroisophthalonitrile. The relevant MRLs for cattle commodities are 0.1, 0.5, 0.05 and 0.03 mg/kg for fat, kidney, meat by-products (except kidney) and meat respectively and 0.1 mg/kg for milk. The Australian MRL for peanuts is T0.2 mg/kg

The TF for kidney (target tissue, US residue definition) is 0.09[26]. Assuming residues of chlorothalonil in peanuts/meal are 0.2 ppm, anticipated residues in kidney would be 0.3×0.2×0.09 = 0.0054 mg/kg. Other countries would be expected to utilise parent compound in any monitoring and no residues of parent compound are expected in animal tissues from feeding peanut seed/meal.

[24] US EPA memorandum dated 12 February 1998, Chlorfenapyr - 129093: Health Effects Division Risk Characterization for Use of the Chemical Chlorfenapyr (Alert, EPA File Symbol 5905-GAI) in/on Citrus (6F04623). Case: 287132. Barcode: D221320 from George Kramer, Marion Copley, Susie Chun, Julianna Cruz to Ann Sibold/Marion Johnson, http://www.epa.gov/opprd001/chlorfenapyr/memohed2.pdf
[25] memorandum dated 12 February 1998, Chlorfenapyr - 129093: Health Effects Division Risk Characterization for Use of the Chemical Chlorfenapyr (Alert, EPA File Symbol 5905-GAI) in/on Citrus (6F04623). Case: 287132. Barcode: D221320 from George Kramer, Marion Copley, Susie Chun, Julianna Cruz to Ann Sibold/Marion Johnson http://www.epa.gov/opprd001/chlorfenapyr/memohed2.pdf
[26] Pesticide Residues in Food - 1997 evaluations, FAO Plant Production and Protection Paper 146. FAO and WHO 1998

The TF for milk (US def) is 0.03. Assuming residues of chlorothalonil in peanuts/meal are 0.2 ppm, anticipated residues in milk would be 0.3×0.2×0.03 = 0.0018 mg/kg if fed at 30% of the diet, below the US MRL.

Chlorothalonil can contain up to 100 mg/kg hexachlorobenzene (HCB), an application rate of 1.3 kg ai/ha corresponds to a potential application of HCB at 0.13 g/ha. Noting the half-life for HCB in soil is 3-6 years. Uptake of HCB by various crops was such that the ratio of soil to crop residues ranges from 0.03 – 2.4 for aerial parts and slightly higher for roots and tubers. The contribution from previous years applications (assumed 12 years of additions 1 spray per year at the maximum rate = 0.13 g HCB/ha = 1.56 g HCB/ha), distributed in the top 20 cm soil with density 1 g/mL would be 1560 mg/2000000 kg = 0.00078 ppm. Residues in plant parts would account for no more than 0.000078 mg/kg for a crop to soil ratio of 0.1. Feeding peanut meat with residues of 0.000078 ppm at 30% of the diet would give rise to residues of 0.3×0.000078×8 = 0.00019 mg/kg in fat and 0.00020 in milk fat.

It is anticipated that animal product residues will be below typical method LOQs.

Chlorpyrifos

- is an organophosphate insecticide used for the control of various insects in crops. It is registered on *oilseeds* as a foliar spray at rates up to 0.75 kg ai/ha for *rape seed* and up to 450 g ai/ha for other oilseeds. It is also registered on cotton for the control of armyworm and locusts and so involves application late in the crop growth. The application rate is up to 1.5 kg ai/ha.

The harvest WHP is 28 days for cotton.

There are Australian, Codex and USA MRLs for chlorpyrifos in animal tissues. The Australian and Codex residue definition is chlorpyrifos while the USA definition includes the metabolite TCP. The MRLs for cattle fat are T0.5, 1 and 0.3 mg/kg for Australia, Codex and the USA respectively. The MRLs for milk are T0.2 [milk in the fat] mg/kg, *0.01 mg/kg and 0.01 mg/kg (0.25 mg/kg for milk fat). The MRL for cotton seed is 0.05 mg/kg and for other oilseeds T0.01 mg/kg.

The maximum transfer factor for feeding cattle at 10 ppm in the diet was 0.016 for cattle fat[27]. Residues from feeding oilseeds, with residues of 0.05 ppm, at 30 % of the diet are 0.3×0.05×0.016 = 0.00024 mg/kg.

Anticipated residues for milk would be 0.3×0.05×0.0007 = 0.00001 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Chlorpyrifos-methyl

- is an organophosphate insecticide used for the control of various insects in crops. It is registered on *cotton* for the control of heliothis, mirids, aphids and dimpling bug and so involves application late in the crop growth. The application rate is up to 1 kg ai/ha.

The harvest WHP is 28 days.

There are Australian, Codex and USA MRLs for chlorpyrifos-methyl in animal tissues. The MRLs for cattle fat are *0.05, 0.05 and 0.5 mg/kg for Australia, Codex and the USA respectively. The MRLs for milk are *0.05 [in the fat], *0.01 and 0.25 (fat) mg/kg for Australia, Codex and the USA respectively. There are Australian MRLs of 0.05 mg/kg for cottonseed and 30 ppm for cotton fodder (dry). Assuming cottonseed has residues at the same level the MRL, the residues in animal tissues on feeding at *0.01 ppm in the diet are anticipated to be 0.3×0.01×0.003 = 0.00009 mg/kg

[27] 2000 JMPR. Pesticide Residues in Food - 2000 Evaluations – Part I, FAO Plant Production and Protection Paper 165. FAO and WHO 2001 http://www.fao.org/ag/AGP/AGPP/Pesticid/Default.htm

for fat (Australian and US residue definitions). The maximum transfer factor for milk was 0.003[28]. Anticipated residues in milk are 0.3×0.01×0.0003 = 0.000009 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Chlorthal-dimethyl (DCPA)
- is a pre-emergent herbicide. It is registered on *cotton* for the control of various weeds at application rates of up to 9.75 kg ai/ha pre-emergent. Lay-by application at up to 8.25 kg ai/ha can be made after bolls open.
WHP is not required when used as directed.

There are Australian but not Codex or US MRLs for chlorthal-dimethyl.
The Australian MRLs for animal tissues have all been set at *0.05 mg/kg. There is no MRL for cottonseed though there is an MRL at 5 mg/kg for vegetables. In a goat metabolism study the TF for fat was 0.0003[29]. Although more information on likely residues in animals is desirable for chlorthal-dimethyl it is considered unlikely that this pesticide would give rise to detectable residues.

Chlorthal-dimethyl can contain up to 100 mg/kg hexachlorobenzene (HCB) [30], an application rate of 9.75 kg ai/ha corresponds to a potential application of HCB at 0.975 g/ha. In addition, applications of chlorthal-dimethyl can be made after bolls open at up to 8.25 kg ai/ha or 0.825 g HCB/ha.
Note the half-life for HCB in soil is 3-6 years. Uptake of HCB by various crops was such that the ratio of soil to crop residues ranges from 0.03 – 2.4 for aerial parts. The contribution from previous years applications (assumed 12 years of additions 1 spray per year at the maximum rate = 0.975 g HCB/ha = 11.7 g HCB/ha), distributed in the top 20 cm soil with density 1 g/mL would be 11700 mg/2000000 kg = 0.0059 ppm. Residues in aerial plant parts including seed would account for no more than 0.00059 mg/kg (assuming a crop to soil ratio of 0.1) giving rise to anticipated residues of 0.3×0.00059×8 = 0.0014 mg/kg in fat and 0.3×0.00059×8.4 = 0.0015 mg/kg in milk fat.

It is anticipated that animal product residues will be below typical method LOQs.

Clethodim (see Sethoxydim)
- is a cyclohexanedione herbicide used for the control of certain grass weeds in crops. It is registered for use on *canola* at rates of up to 120 g ai/ha. It is registered on *cotton* and *peanuts* with a maximum application rate of 90 g ai/ha.
Canola: Do not apply later than 8 weeks before harvest.
Cotton: Do not apply later than 12 weeks before harvest
Peanuts: Do not apply later than 7 weeks before harvest.

There are Australian, Codex and US MRLs for clethodim. The Australian and Codex residue definition is clethodim and its metabolites containing 5-(2-ethylthiopropyl)cyclohexane-3-one and 5-(2-ethylthiopropyl)-5-hydroxycyclohexe-3-one moieties and their sulphoxides and sulphones, expressed as clethodim. The US residue definition is clethodim and its metabolites containing the 2-cyclohexen-1-one moiety. The Australian MRLs for animal commodities have been set at *0.05

[28] 1979 JMPR - Pesticide Residues in Food - 1979 Evaluations, Part I Residues FAO Plant Production and Protection Paper 20 Suppl. FAO and WHO 1980
[29] Reregistration Eligibility Decision (RED) DCPA List A Case 0270 Environmental Protection Agency Office of Pesticide Programs, Special Review and Reregistration Division, EPA 738-R-98-005, November 1998
[30] Australian Pesticides And Veterinary Medicines Authority, Minimum Compositional Standards (MCS) for Active Constituents as of 30 January 2004, http://www.apvma.gov.au/tgac/mincompstandards.pdf

mg/kg. The Codex MRLs are *0.2 mg/kg for edible offal and meat and *0.05 mg/kg for milk. The US MRLs for cattle tissues are all 0.2 mg/kg while the MRL for milk is 0.05 mg/kg.

The MRL for cottonseed is 0.2 mg/kg, peanuts is 3 mg/kg and for rapeseed is 0.5 mg/kg.

The TF for the US residue definition is 0.006[31] for offal giving an anticipated residue of 0.3×2×0.006 = 0.0036 mg/kg for liver and kidney, below the US MRL.
Anticipated residues in milk (TF 0.0011) are 0.3×2×0.0011 = 0.0066 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Clomazone
- is an isoxazolidinone herbicide used to control broad-leafed annual weeds in crops. The application rate for *poppies* is 0.48 kg ai/ha.
Do not graze or cut for stock food until after harvest.

There are no Australian, Codex or US MRLs for clomazone in animal commodities. The Australian MRL for poppy seed has been set at *0.05 mg/kg. No detectable residues are expected to be found in crops at harvest, following application of clomazone.

It is anticipated that animal product residues will be below typical method LOQs.

Clopyralid
-is a selective pyridine herbicide used for the control of certain weeds in *canola*. Application is made up to the 8 leaf stage of crop growth at rates of up to 90 g ai/ha.
Do not apply later than 12 weeks before harvest.

There are Australian and US but no Codex MRLs for clopyralid in animal commodities. The Australian MRLs are 0.1 mg/kg for meat (mammalian), 5 mg/kg for kidney of cattle goats, pigs and sheep, 0.5 mg/kg for edible offal (mammalian) except kidney and 0.05 mg/kg for milk. The US MRLs are 36 mg/kg for meat by-products except liver, 3 mg/kg for liver, 1 mg/kg for fat and meat and 0.2 mg/kg for milk. The Australian MRL for rapeseed is 0.5 mg/kg.

Average clopyralid residues in tissues at the end of an experiment where calves were dosed at the equivalent of 1000 ppm in the diet for 28 days were 0.3 mg/kg in muscle, 0.2 mg/kg in fat, 1.3 mg/kg in liver and 15 mg/kg in kidney[32]. Anticipated residues in kidney on feeding rapeseed with residues at the MRL are 0.5×0.015 = 0.0075 mg/kg.

Two goats were fed radiolabelled clopyralid at rates equivalent to 230 and 69 ppm in feed for 7 days. The residues in liver (approx. 0.04 ppm) and kidney (approx. 0.6 ppm) tissues were shown to be unchanged clopyralid[33]. Residues in muscle and fat were too low (less than 0.02 ppm) to characterize. The milk residue averaged approximately 0.03 ppm and was shown to consist of approximately equal amounts of clopyralid and its glycine conjugate.

It is anticipated that animal product residues will be below typical method LOQs.

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[31] 1994 JMPR - Pesticide Residues in Food - 1994 Evaluations, Part I Residues FAO Plant Production and Protection Paper 78. FAO and WHO 1995
[32] Draft Assessment Report (DAR) – public version- Initial risk assessment provided by the rapporteur Member State Finland for the existing active substance Clopyralid of the second stage of the review programme referred to in Article 8(2) of Council Directive 91/414/EEC, Volume 3, Annex B, B.7, February 2005.
[33] Dow Agrosciences Technical profile: Clopyralid, July 1998

Clothianidin
- is an insecticide. It is used on cotton for the control of cotton aphid, green mired, Jassids and Green vegetable bug. The application rate is 50 g ai/ha.
The harvest WHP is 5 days.

There are Australian and US but no Codex MRLs for clothianidin. The relevant Australian MRLs for meat (fat) and edible offal are *0.02 mg/kg and milk *0.01 mg/kg. The US MRLs are not set for for fat, mbyp (=offal) and meat and 0.01 mg/kg for milk. NOTE:, clothianidin is a major metabolite of thiamethoxam, and tolerances for the combined residues of thiamethoxam and its metabolite clothianidin have been established under 40 CFR part 180.565 for both plant and livestock commodities. US thiamethoxam tolerances in meat, offal and milk are 0.02, 0.04 and 0.02 mg/kg respectively.

The Australian MRL for cotton seed is *0.02 mg/kg and for cotton seed by-products *0.01 mg/kg.

At the highest dose level, 2.6 ppm feed, residues of clothianidin could be quantified in milk, ranging from < 0.01 ppm to 0.012 ppm. No quantifiable residues above the LOQ (0.01–0.02 ppm) of any analyte (TI-435, TZG, TZU and ATMG-pyruvate) were found in tissues.

It is anticipated that animal product residues will be below typical method LOQs.

Cyclanilide
- is a plant growth regulator used to defoliate cotton plants prior to harvest. The application rate is up to 0.225 kg ai/ha.
The harvest WHP is 7 days.

There are Australian and USA but no Codex MRLs for animal commodities. The Australian MRLs for animal commodities have been set at 2 mg/kg for edible offal and 0.05 mg/kg for meat and milk. The USA MRL for cattle kidney is 2 mg/kg, cattle fat 0.1 mg/kg, cattle meat 0.02 mg/kg and 0.04 mg/kg for milk. Australian and US MRL for cottonseed have been set at 0.2 and 0.6 mg/kg respectively.

The following information was obtained from the US Federal Register[34]. The cow feeding study determined the magnitude of cyclanilide residues in the meat and milk of lactating dairy cattle following a 28-day oral exposure to cyclanilide. When cyclanilide residues plateaued, average concentrations in the milk were 0.013, 0.044, and 0.19 mg/kg for the 1× (5.6 ppm), 3×, and 10× groups, respectively. The maximum cyclanilide residues found in milk, kidney, liver, fat and muscle from the 5.6 ppm group were 0.040, 1.4, 0.14, 0.021, and 0.019 mg/kg respectively. The TF for kidney is 0.25 and for fat 0.004. Considering the MRL for cottonseed of 0.2 ppm it is considered unlikely that detectable residues will occur in cattle and sheep tissues when feeding seed/meal from treated cotton (kidney = 0.3×0.25×0.2 = 0.015 mg/kg).

It is anticipated that animal product residues will be below typical method LOQs.

Cyfluthrin
- is a synthetic pyrethroid insecticide used for the control of various insects in crops. It is registered on *cotton* for the control of heliothis. The application rate is up to 40 g ai/ha.

[34] [Federal Register: December 23, 1996 (Volume 61, Number 247)] [Notices] [Page 67544-67549] ENVIRONMENTAL PROTECTION AGENCY [PF-683; FRL-5577-1] Rhone-Poulenc Ag Company; Pesticide Tolerance Petition Filing

Do not harvest for 4 weeks after application.

There are Australian, USA and Codex MRLs for cyfluthrin. The relevant MRLs for cattle fat are 0.5, 1 and 2 mg/kg for Australia, Codex and the USA respectively. The relevant MRLs for cattle milk are 0.1, 0.04 and 5 mg/kg for milkfat (1 mg/kg in whole milk) for Australia, Codex and the USA respectively. There is an Australian MRL for cotton seed at 0.01 mg/kg as well as cereal grain and various forage MRLs (grass pasture, legume pasture, chickpea, field pea, canola, faba bean, navy bean, sorghum) of 2-5 mg/kg. The USA has MRLs of 1 mg/kg for cottonseed and 2 mg/kg for hulls and oil.

TF fat = 0.05[35]. Estimated residues in fat are 0.3×0.01×0.05 = 0.00015 mg/kg. The low levels of residue anticipated in fat lead to the conclusion that feeding of cottonseed/meal from cotton treated with cyfluthrin should not present a problem.
The TF for milk is 0.005 giving anticipated residues of 0.3×0.01×0.005 = 0.000015 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Cypermethrin
see alpha-cypermethrin

- is a synthetic pyrethroid insecticide used for the control of various insects in crops.

The application rates for oilseeds are reported in the table below together with the harvest WHPs and any label feeding restraints.

Crop	**Rate (g ai/ha)**	**Harvest WHP (days)**	**Grazing WHP (days)**
Canola	50	21 days	21 days
Cotton	125	14 days	-
Sunflowers	100	21 days	-

There are Australian, Codex and USA MRLs for cypermethrin in animal tissues. The relevant MRLs for cattle fat are 0.5, 0.2 and 1 mg/kg for Australia, Codex and the USA respectively. The respective milk MRLs are 1 [in the fat = 0.04 mg/kg whole milk], 0.05 F mg/kg and 2.5 mg/kg for Australia, Codex and the USA. There are Australian MRLs of cottonseed 0.2 mg/kg, linola 0.1 mg/kg, linseed 0.5 mg/kg, rapeseed 0.2 mg/kg, sunflower seed 0.1 mg/kg.

The TF for fat is 0.1[36,37]. Feeding of oilseeds at 30% of the diet could result in cypermethrin residues in fat of 0.3×0.5×0.1 = 0.015 mg/kg. Anticipated residues in whole milk (TF 0.003-0.1) are also 0.015 mg/kg.

Livestock residues are not anticipated to exceed international and/or domestic market standards.

Cyproconazole
-is a conazole fungicide registered for the control of leaf spot and rusts in *peanuts*. The application rate is up to 60 g ai/ha.
The harvest WHP is 14 days.

[35] Residues of some veterinary drugs in animals and foods. Forty-eighth meeting of the Joint FAO/WHO Expert Committee on Food Additives, 1998, FAO Food and Nutrition Paper 41/10
[36] Chen-AW; Fink-JM; Letinski-DJ; Barrett-GP; Pearsall-JC (1997) Residue of cypermethrin and its major acid metabolites in milk and tissues from dairy bovines treated with cypermethrin. *J. Ag. Food Chem.* 45: 12, 4850-4855.
[37] 1981 JMPR Pesticide Residues in Food - 1981 Evaluations, FAO Plant Production and Protection Paper 42. FAO and WHO 1982 http://www.fao.org/ag/AGP/AGPP/Pesticid/Default.htm

There are Australian but no Codex or US MRLs for cyproconazole in animal commodities. The Australian MRLs have been set at 0.03 mg/kg for meat [mammalian], 1 mg/kg for edible offal (mammalian) and *0.01 mg/kg for milk. The MRL for peanut fodder is 20 ppm and for peanuts 0.02 mg/kg.

(The log P_{ow} for cyproconazole is reported to be 2.9 indicating little propensity for transfer to fat.). The relevant TFs for liver and fat are 0.04 and 0.002 (20 ppm feeding level) [38,39]. No detectable residues are expected in tissues and milk (<0.01 mg/kg).

It is anticipated that animal product residues will be below typical method LOQs.

Deltamethrin

- is a synthetic pyrethroid insecticide used for the control of various insects in crops. It is registered on *canola, linseed, safflower* and *sunflowers* at 13.75 g ai/ha. It is registered on cotton for control of heliothis and the pink spotted bollworm. The application rate is up to 19.25 g ai/ha.
The harvest WHP is 7 days

There are Australian, Codex and USA MRLs for deltamethrin in animal tissues. The relevant MRLs for cattle fat are 0.5, 0.5 and 0.05 mg/kg for Australia, Codex and the USA respectively. The Australian MRL for milks is 0.05 mg/kg. The Codex MRL for milks is 0.02 F mg/kg. The US MRL is for milk fat 0.1 mg/kg reflecting 0.02 mg/kg in whole milk. The MRL for oilseed is 0.1 mg/kg. There are Australian animal feed MRLs of 5 ppm for fodder and forage or cereal grains, oilseeds, pulses and sweet corn and 7 ppm for rice hulls.

The TF for deltamethrin in fat is roughly 0.03[40]. Feeding of oilseeds with residues of 0.1 mg/kg at 30% of the diet could result in deltamethrin residues in fat of 0.3×0.1×0.03 = 0.0009 mg/kg, this is less than the Australian, Codex and USA tolerances. Anticipated residues in milk (TF 0.009) are 0.3×0.1×0.009 = 0.00027 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Diafenthiuron

- is a thiourea insecticide/miticide used for the control of cotton aphid and two-spotted mites in *cotton*. The application rate is up to 0.4 kg ai/ha.
The harvest WHP is 35 days.

There are Australian but no Codex or US MRLs for diafenthiuron. The Australian MRLs for animal commodities are set at *0.02 mg/kg. There are Australian MRLs for cottonseed at 0.2 mg/kg.

In a sheep feeding study at 20 ppm for 56 days; maximum residues in omental fat were 0.11 mg/kg and in renal fat were 0.12 mg/kg (TF = 0.006) [41]. After 14 days withdrawal, residues were <0.02 mg/kg in omental and subcutaneous but were 0.05 mg/kg in renal fat.

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[38] Evaluation of fully approved or provisionally approved products. Issue 45: Evaluation on SAN 619F (cyproconazole), August 1991, Department of Environment Food and Rural Affairs, Pesticide Safety Directorate. UK

[39] Trade Advice Note on azoxystrobin and cyproconazole in the product Amistar Xtra Fungicide (APVMA Product Number 57949), Australian Pesticides and Veterinary Medicines Authority

[40] 2002 JMPR. Pesticide Residues in Food - 2002 Evaluations – Part I: Residues Volume 1, FAO Plant Production and Protection Paper 175/1. FAO and WHO 2003

[41] George B. and Adams, S., *The Accumulation and depletion of diafenthiuron in Shee*p, Ciba-Geigy Crop Protection Technical Report No. 96/6/1527, 1996.

Anticipated residues in fat are 0.25×0.2×0.006 = 0.0003 mg/kg. Anticipated residues in milk (TF 0.006, goat metabolism study) are 0.25×0.2×0.006 = 0.0003 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Diazinon

- is an organophosphate insecticide used for the control of various insects in crops. It is registered on *oilseed crops* for the control of various pests including grasshoppers and locusts. The application rate is up to 0.68 kg ai/ha.
Do not harvest, graze or cut for stock food for 14 days after application.

There are Australian, Codex and USA MRLs for diazinon in animal tissues. The MRLs for cattle fat are 0.7 mg/kg for Australia, 2 for Codex and 0.5 mg/kg for the US. For milk the MRLs are 0.5 [in the fat], 0.02 F mg/kg and not specified. The Australian MRL for vegetables is 0.7 mg/kg.

The TF for fat from a dairy cow feeding study (400 ppm feed level) was 0.002[42]. Feeding oilseeds at 30% of the diet could result in fat residues of 0.3×0.7×0.002 = 0.00042 mg/kg. No residues were detected in milk of cows dosed at the equivalent of 120 ppm in the diet.

It is anticipated that animal product residues will be below typical method LOQs.

Diclofop-methyl

-is an aryloxphenoxypropinate herbicide used for control of annual grasses in *linseed, safflower, canola* and *poppies*. The application rate is up to 0.750 kg ai/ha for linseed, safflower and canola and 1.125 kg ai/ha for poppies.

There are Australian but no Codex or US tolerances for diclofop-methyl in animal commodities. The Australian MRLs have all been set at *0.05 mg/kg. The MRLs for oilseeds have been set at 0.1 mg/kg.

The US EPA reported an animal feeding study for diclofop methyl and noted that animal MRLs would be required to be established. Four groups of lactating dairy cows were dosed orally *via* capsules for 28 consecutive days with diclofop-methyl at levels equivalent to 0.11, 0.33, 1.1, and 25.0 ppm in the diet[43]. In tissues, residues were highest in kidney and lowest in muscle. For the 25 ppm feed level, the combined residues were 12-23 mg/kg in kidney, 3.9-6.1 mg/kg in liver, 0.75-0.85 mg/kg in fat, and 0.32-0.57 mg/kg in muscle. The TF for kidney and fat were 0.9 and 0.03 respectively. Feeding oilseeds at 30% of the diet could result in kidney and fat residues of 0.3×0.9×0.1 = 0.027 mg/kg and 0.3×0.03×0.1 = 0.0009 mg/kg.

Residues in whole milk plateaued by Day 4 at all dose levels. The maximum combined residues in whole milk were 0.023, 0.114, 0.212, and 2.759 mg/kg for the 0.11, 0.33, 1.1, and 25 ppm groups, respectively. Diclofop-methyl residues concentrated in milk fat, with residues in cream being 2.4-3.4× higher than in whole milk.

It is anticipated that animal product residues will be below typical method LOQs.

Dicofol

[42] 1996 JMPR - Pesticide Residues in Food - 1996 Evaluations, Part I: Residues FAO Plant Production and Protection Paper 142. FAO and WHO 1997

[43] Diclofop-Methyl Reregistration Eligibility Decision Residue Chemistry Considerations PC Code 110902; Case 2160 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division

- is an organochlorine miticide used for the control of various pests in a variety of crops. In *cotton* it is used for the control of spider mites. The application rate is up to 0.96 kg ai/ha.
The harvest WHP is 7 days.

There are no Australian or USA MRLs for animal commodities. The Australian and Codex residue definitions differ. The Australian residue definition is the sum of dicofol + 2,2,2-trichloro-1-(4-chlorophenyl)-1-(2-chlorophenyl)ethanol calculated as dicofol while the Codex residue definition for animal commodities is the sum of dicofol + 2,2-dichloro-1,1-bis(4-chlorophenyl)ethanol (p,p'-FW152) calculated as dicofol. There is a Codex MRL of 3 for cattle fat, 0.1 mg/kg for milk (F) and 1 mg/kg for cattle edible offal. The EU MRLs are 0.5 mg/kg for cattle and sheep meat, *0.05 mg/kg for cattle and sheep edible offal and 0.02 mg/kg for milk. There is an Australian MRL for cottonseed set at 0.1 mg/kg.

The TF for fat for the Australian and Codex residue definitions are 0.05-0.1 for Australia and 0.3-0.5 for the Codex residue definition[44].

If assume residues in oilseeds at 0.1 mg/kg and use a TF for fat of 0.3, estimated residues in fat are $0.3\times0.1\times0.3 = 0.009$ mg/kg. Anticipated residues in milk (TFs 0.003-0.006 and 0.02-0.04 respectively.) are $0.3\times0.1\times0.04 = 0.0012$ mg/kg for the Codex and $0.3\times0.1\times0.006 = 0.00018$ for the Australian residue definition.

Dicofol can contain up to 1000 mg/kg DDT and related compounds[45], an application rate of 1 kg ai/ha corresponds to a potential application of DDT at 1 g/ha. The TF for fat and milk fat are estimated to be 1.8 and 2.1 respectively. If residues DDT are present at the same ratio to dicofol as in the technical active ingredient the anticipated residues are $0.3\times(0.1/1000)\times1.8 = 0.000054$ mg/kg in subcutaneous fat and $0.3\times(0.1/1000)\times2.1 = 0.000063$ mg/kg in milk fat.

It is anticipated that animal product residues will be below typical method LOQs.

Diflufenican
-is a nicotinanalide herbicide used to control various weeds in *oilseed poppies*. Application is at rates of up to 100 g ai/ha when at the 6-10 leaf crop growth stage.

There are Australian but no Codex or US MRLs for diflufenican in animal commodities. The Australian MRLs (parent compound) are 0.1 mg/kg for edible offal mammalian and 0.01 mg/kg for meat (mammalian) and milk. The MRL for peas and pulses is 0.05 mg/kg and for legume animal feeds is 5 mg/kg.

EFSA DAR - In a metabolism study lactating cows were dosed at 1 and 20 ppm feed with [difluorophenyl-^{14}C]-diflufenican and 5 and 50 ppm feed with [pyridine-^{14}C]-diflufenican for 7 days (2 doses/day). Cows were sacrificed 18-23 h after the last dose. TRR in milk reached a plateau after 3 days at 0.01 and 0.02 mg/kg in the 20 and 50 ppm feeding studies respectively. Parent compound represented 48-52% of TRR in milk. TRR in tissues were <0.01 mg/kg for muscle, 0.07-0.08 mg/kg for fat, 0.03-0.04 mg/kg for kidney and 0.26-0.40 mg/kg for liver in the 20 and 50 ppm studies. At the 1 and 5 ppm dose levels residues in tissues were <0.01 mg/kg with the exception of

[44] Pesticide Residues in Food - 1994 Evaluations, Part I Residues FAO Plant Production and Protection Paper 78. FAO and WHO 1995
[45] Australian Pesticides And Veterinary Medicines Authority, Minimum Compositional Standards (MCS) for Active Constituents as of 30 January 2004, http://www.apvma.gov.au/tgac/mincompstandards.pdf

liver (0.02-0.05 mg/kg) and fat (<0.01-0.03 mg/kg). Parent compound represented 82-91% of the TRR in fat. Parent residues in the highest residue liver sample were 0.02 mg/kg (about 6% TRR)

It is anticipated that animal product residues will be below typical method LOQs.

Dimethenamid-P
- is a pre-emergent herbicide used for the control of weeds in *poppies*. It is registered on poppies at application rates of up to 1.0 kg ai/ha.
DO NOT harvest for 100 days after application.

There are Australian and Codex but no USA MRLs (negligible residue) for dimethenamid in animal tissues. The Australian and Codex MRLs for animal commodities have been set at *0.01 mg/kg. There is an Australian MRL of *0.01 mg/kg for poppy seed.

It is anticipated that animal product residues will be below typical method LOQs.

Dimethipin
- is a plant growth regulator used to defoliate *cotton* plants prior to harvest. The application rate is up to 0.3 kg ai/ha.
The harvest WHP is 7 days.

There are Australian, Codex and USA (expire on 31/5/2010) MRLs for animal commodities. The Australian MRLs for animal commodities have been set at *0.01 mg/kg. The USA MRLs for animal commodities have been set at 0.01 mg/kg. There is an Australian and US MRL for cottonseed set at 0.5 mg/kg.

In a study reported by JMPR[46], no residues of dimethipin were observed in the tissues and milk of cattle fed at 50 ppm in the diet, the highest feeding level studied (LOQ 0.01 mg/kg). There is no expectation of residues of dimethipin in animal tissues.

It is anticipated that animal product residues will be below typical method LOQs.

Dimethoate
- is an organophosphate insecticide used for the control of various insects in crops. It is registered on *oilseeds* at application rates of up to 300 g ai/ha.
The harvest WHP is 14 days

There are Australian, Codex and and USA MRLs for dimethoate in animal tissues. The Australian and Codex MRLs for animal commodities have been set at *0.05 mg/kg while the US ones are set at 0.02 mg/kg. There is an Australian MRL of 0.1 mg/kg for oilseeds (except peanuts).

A metabolism study with lactating goats dosed orally with dimethoate at a rate equivalent to feeding at 30 ppm in the diet suggests that residues are not expected in animal tissues[47].

It is anticipated that animal product residues will be below typical method LOQs.

Dimethomorph

[46] 2001 JMPR Pesticide Residues in Food - 2001 Evaluations – Part I, FAO Plant Production and Protection Paper 171. FAO and WHO 2002
[47] 1998 JMPR - Pesticide Residues in Food - 1998 Evaluations, Part I Residues FAO Plant Production and Protection Paper 152/1. FAO and WHO 1999

-is a fungicide. It is used on *oilseed poppies* at application rates of 180 g ai/ha.
The harvest WHP is are 6 weeks.

There are Australian but no Codex or US MRLs for dimethomorph in animal commodities. The Australian MRLs have all been set at *0.01 mg/kg. The Australian MRL for poppy seed is *0.02 mg/kg.

The UK PSD reported a feeding study[48]. Three groups of lactating dairy cows were administered dimethomorph (48/52 E/Z) orally, twice daily at feeding levels equivalent to 50, 150 or 500 mg/cow/day for 4-5 weeks. Residues of dimethomorph, VII (Z67), VIII (Z69) and XIII (CUR 7117) were all below 0.01, 0.02, 0.02 and 0.01 mg/kg respectively except for cow 14 from the highest dose group on day 45 of the study when residue levels were determined to be 0.03, 0.03 and 0.02 respectively for metabolites VII, VIII and XI.

It is anticipated that animal product residues will be below typical method LOQs.

Diquat
- is a herbicide used for the control of weeds in various crops. It is applied to *linseed, rape* and *sunflower* at 600 g ai/ha, *oilseed poppies* at 300 g ai/ha, *cotton* at 400-600 g ai/ha and *peanuts* at 276 g ai/ha.

The Australian and Codex MRLs for diquat in meat (mammalian) are the same at *0.05 mg/kg. The US MRL for meat is 0.02 mg/kg. The MRLs for milk are *0.01 mg/kg, *0.01 mg/kg and 0.02 mg/kg respectively.
No residues were detected in tissues of cows fed diquat for 28 days at 100 ppm in the diet and slaughtered on the last day of dosing (LOD 0.01 mg/kg)[49]. MRLs for oilseeds except linseed are 5 mg/kg and linseed *0.01 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Disulfoton
- is an organophosphate insecticide used for the control of various insects in crops. It is registered on *cotton* for the control of cotton aphid, thrips and two-spotted mites. The application rate is up to 0.7 kg ai/ha applied as a band near seed at planting (in-furrow).
Do not apply to edible crops later than 70 days before harvest

There are Australian but no USA or Codex MRLs for disulfoton in animal tissues. The Australian MRLs for animal commodities have been set at 0.02 mg/kg for meat and edible offal and at 0.01 mg/kg for milk. The Codex MRL for milk is 0.01 mg/kg. There is an Australian MRLs of 0.5 mg/kg for cottonseed.

Studies reported in JMPR for residues of disulfoton in gin-trash following application at 1.1-6.7 kg ai/ha 28-192 days before harvest. Residues in trash were <0.04-<0.34 ppm. Residue in foliage were <0.03-1.2 ppm. The maximum residue in tissues of dairy cattle fed at 7.2 ppm in the diet was 0.03

[48] Evaluation of fully approved or provisionally approved products. Issue 99: Evaluation on dimethopmorph, April 1994, Department of Environment Food and Rural Affairs, Pesticide Safety Directorate. UK
[49] Reregistration Eligibility Decision, Diquat Dibromide, List A, Case 0288, EPA 738-R-95-016 July 1995 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division. http://cfpub.epa.gov/oppref/rereg/status.cfm?show=rereg

mg/kg[50]. Scaling the maximum tissue residues for the foliage residue would give an anticipated residue in tissues of (1.2÷7.2)×0.03 mg/kg = 0.005 mg/kg which is below the limit of quantitation for the analytical technique. Feeding of cottonseed/meal should not result in detectable residues of disulfoton in animal tissues.

It is anticipated that animal product residues will be below typical method LOQs.

Diuron
- is a herbicide used for the control of weeds in crop. It is applied pre-plant, pre-emergent or post-emergent as a directed spray when *cotton* is at least 30 cm high. The application rate is up to 1.75 kg ai/ha.
No harvest or grazing WHP is required.

There are no Codex MRLs for diuron. The US and Australian residue definitions differ with the Australian definition including a metabolite in addition to the parent compound. The relevant US MRL for animal tissues is 1 mg/kg for cattle mbyp while the Australian MRL for edible offal of cattle is 3 mg/kg (the higher value probably reflecting the inclusion of the metabolite in the residue definition). The Australian MRL for milk is 0.1 mg/kg. Australia has a primary animal feed commodity MRL of 50 mg/kg while the MRL for cottonseed (oilseed) is 0.5 mg/kg. The USA MRL for cottonseed is 1 mg/kg (USA: Do no feed foliage from treated cotton plants or gin trash to livestock). It is considered unlikely that feeding cottonseed/meal would lead to residues in animals.

NOTE: US MRLs have been established for animal feed items (including alfalfa forage and hay at 2 ppm and citrus pulp dry at 4 ppm) as well as for animal commodities. If the US MRLs are used to estimate the dietary burden using the US EPA Guideline, a dietary burden of ca. 4.8 ppm is estimated. An anticipated TF is the 1 ppm (animal commodity tolerances) ÷ 4.8 ppm (dietary burden) = 0.2 (crude estimate).

It is anticipated that animal product residues will be below typical method LOQs.

Emamectin benzoate
- is a macrocyclic lactone insecticide used for the control of pest mites and heliothis on cotton. The application rate is up to 12 g ai/ha.
The harvest WHP is 28 days.

There are Australian and USA but no Codex MRLs for emamectin benzoate in animal tissues. The Australian MRLs are 0.01 mg/kg for edible offal, *0.002 mg/kg for meat and *0.0005 mg/kg for milk. The US residue definition is the sum of emamectin (MAB1a + MAB1b isomers) and the associated 8,9-Z isomers (8,9-ZB1a + 8,9-ZB1b). The USA MRL for fat is 0.01 mg/kg, meat 0.003 mg/kg, meat by-products (except liver) 0.02 mg/kg, liver 0.05 mg/kg and milk 0.003 mg/kg.

A transfer factor of 0.3 for liver when fed at 0.1 ppm in the diet has been estimated[51]. Applying this TF to the MRL for cottonseed at 30% of the diet gives a liver residue of 0.00045 mg/kg (0.3×0.005×0.3). Anticipated residues in milk are (TF = 0.003) 0.3×0.005×0.003 = 0.0000006 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

[50] 1994 JMPR - Pesticide Residues in Food - 1994 Evaluations, Part I Residues FAO Plant Production and Protection Paper 78. FAO and WHO 1995
[51] APVMA Animal Residue Data Sheet – Emamectin, October 2002

Endosulfan
- is an organochlorine insecticide used for the control of various pests in a variety of crops. The application rate is up to 0.35 kg ai/ha applied pre-emergence for mite control in *canola*, *linseed, safflower* and *sunflower* and 0.735 kg ai/ha for *cotton*.
Canola (rapeseed), linseed, safflower or sunflower:
DO NOT graze or cut for stockfood for 8 weeks after application.
Cotton:
DO NOT harvest for 8 weeks after application
Do not feed cotton stubble, fodder or trash to livestock

There are Australian, Codex and USA MRLs for animal commodities. The Australian and Codex MRL for cattle fat is 0.2 mg/kg while the US MRL is 13 mg/kg. The Australian MRL for milk [in the fat] is 0.2 mg/kg, USA 2 mg/kg for milk fat and Codex 0.1 F mg/kg. There is an Australian MRL for oilseeds set at 1 mg/kg and forage of oilseed crops MRL of 0.3 ppm.

The TF for fat is 0.3-0.4[52]. Residues in fat would be 0.3×1×0.4 = 0.12 mg/kg.
The TF for milk is 0.02. Residues in milk would be 0.3×1×0.02 = 0.006 mg/kg. The TF for cream is 0.12. Residues in cream would be 0.3×1×0.12 = 0.036 mg/kg.

Livestock residues are not anticipated to exceed international and/or domestic market standards.

Endothal
- is a dicarboxylic acid herbicide/algicide/plant growth regulator. It is used on cotton as a defoliant/desiccant that is applied at an application rate of up to 0.128 kg ai/ha prior to harvest.
Do not apply to cotton crop later than 1 day before harvest

There are US but no Australian or Codex MRLs for endothal in animal tissues. The US MRLs for fat, kidney, liver and meat are 0.01, 0.2, 0.1 and 0.03 mg/kg respectively, and milk MRL 0.03 mg/kg. The Australian and US MRLs for cottonseed are both 0.1 mg/kg. Endothal is a dicarboxylic acid and rapidly excreted from animals. It is unlikely to result in detectable residues.

It is anticipated that animal product residues will be below typical method LOQs.

EPTC (eptam)
-is a thiocarbamate herbicide used for the pre-emergent control of certain grasses and broad-leafed weeds and is used as a pre-plant application in dryland safflower and oilseed rape crops and furrow irrigated sunflowers. It is used on safflower and oilseed rape at 2.0 kg ai/ha and sunflowers at 2.88 kg ai/ha.
No harvest WHP required.

There are Australian but no Codex or US tolerances for EPTC in animal commodities. The Australian MRLs are all set at *0.1 mg/kg. The MRL for oilseeds is 0.1 mg/kg. As no residues are present in the crops at harvest there is no reasonable expectation of residues in animal commodities.

Note: The US EPA in its RED[53] reported that the only residue of toxicological concern in goats was EPTA cysteine conjugate and this was only found at low concentrations on dosing at highly

[52] Reregistration Eligibility Decision for Endosulfan Case No. 0014 EPA 738-R-02-013 November 2002 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division. http://cfpub.epa.gov/oppref/rereg/status.cfm?show=rereg

exaggerated rates. The agency concluded that there is no reasonable expectation of the occurrence of finite residues in animal tissues.

It is anticipated that animal product residues will be below typical method LOQs.

Esfenvalerate
- is a synthetic pyrethroid insecticide used for the control of various insects in crops.

The application rates for oilseeds are reported in the table below together with the harvest WHPs and any label feeding restraints.

Crop	Rate (g ai/ha)	Harvest WHP (days)	Grazing WHP (days)
Canola	25	14	7
Cotton	35	7	-
Linseed	25	14	7
Safflower	16.5	14	7
Sunflower	25	14	7

There are Australian, Codex and USA MRLs for fenvalerate/esfenvalerate in animal tissues. The relevant MRLs for cattle fat are 1 (meat mammalian [in the fat]), 1 and 1.5 mg/kg for Australia, Codex and the USA respectively. The relevant MRLs for milk are 0.2 mg/kg, 0.1 F mg/kg and 0.3 mg/kg (7 mg/kg for milk fat) for Australia, Codex and the USA respectively. There are MRLs of 0.5 mg/kg for oilseeds and a PAFC MRL of 10 ppm.

Residues in oilseed and meal are not expected to exceed 10 ppm[54], the maximum level that fenvalerate should be fed at in the diet for animals to still comply with the Australian MRL. Residues of esfenvalerate from feeding these products are unlikely to present a trade risk.

Livestock residues are not anticipated to exceed international and/or domestic market standards.

Ethephon
- is a plant growth regulator. It is applied close to harvest. The application rate is up to 2.16 kg ai/ha.
A harvest WHP of 7 days applies.

The Codex and Australian MRLs for ethephon in edible offal are *0.2 and 0.2 mg/kg respectively. The Codex and Australian milk MRLs are *0.05 and 0.1 mg/kg. The US tolerance for kidney is 1, meat & fat 0.02 and milk is 0.01 mg/kg. The MRL for cottonseed is 2 mg/kg.

In a study where dairy cows were fed at up to 150 ppm in the diet for 28 days, residues in tissues were <0.1 mg/kg for muscle, <0.2 mg/kg for fat, liver and kidney and <0.12 mg/kg for milk[55]. It is considered unlikely that feeding of oilseeds would lead to residues in animal tissues that are above likely LOQs of regulatory methods.

It is anticipated that animal product residues will be below typical method LOQs.

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[53] Reregistration Eligibility Decision EPTC (S-Ethyl dipropylthiocarbamate) CASE # 0064EPA 738-R-99-006 December 1999 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division

[54] APVMA Fenvalerate & Esfenvalerate ARDS http://www.apvma.gov.au/residues/stockfeed.shtml.

[55] 1994 JMPR - Pesticide Residues in Food - 1994 Evaluations, Part I Residues FAO Plant Production and Protection Paper 78. FAO and WHO 1995

Ethion
- is an organophosphate insecticide used for the control of heliothis in cotton when formulated with zeta-cypermethrin. The application rate is up to 0.9 kg ai/ha.
The harvest WHP is 28 days

There are Australian and USA (expired on 1/10/2008) but no Codex MRLs for ethion in animal tissues. The USA residue definition includes the oxon analogue that is not included in the Australian definition. The Australian and US MRLs that apply to cattle fat have been set at 2.5 and 0 (previous 0.2 mg/kg) mg/kg respectively. The Australian and US milk MRLs are 0.5 [in the fat] mg/kg and 0 (previous 0.5) mg/kg for milk fat (representing negligible residues in whole milk) respectively. There is an Australian MRL of 0.1 mg/kg for cottonseed.

At the 20 ppm feeding level, residues in cattle fat (USA residue definition) were up to 0.22 mg/kg[56]. Feeding cottonseed with residues of 0.1 ppm would be expected to result in residues in fat of $0.3\times0.1\times0.01 = 0.0003$ mg/kg. Anticipated residues in milk (TF 0.0017) are $0.3\times0.1\times0.0017 = 0.000051$ mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Ethofumesate
- is a herbicide used for the control of various grass and weeds in *oilseed poppies*. The application rate is up to 1 kg ai/ha.

There are Australian and US but no Codex MRLs for ethofumesate in animal commodities. The Australian MRLs are 0.5 mg/kg for edible offal and meat (mammalian) (fat) with parent compound as the residue definition. The US MRLs are all 0.05 mg/kg (the sum of ethofumesate and its metabolites 2-hydroxy-2,3-dihydro-3,3-dimethyl-5-benzofuranyl methanesulfonate and 2,3-dihydro-3,3-dimethyl-2-oxo-5-benzofuranyl methanesulfonate, both calculated as the parent compound). The US also has MRLs of 5 ppm for beet tops, 1 ppm for the grass straw and 0.5 ppm for sugar beet molasses. The Australian MRL for poppy seed is *0.02 mg/kg.

Residues are not expected in poppy seeds at harvest therefore no residues are expected to result in animal commodities from the feeding of seed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Etoxazole
-is an oxazoline miticide used for control of two spotted mite and Bean spider mite in *cotton*. The application rate is 38.5 g ai/ha.
The harvest WHP is 21 days.
Do not graze treated area or feed cotton trash to livestock.

There are Australian and US but no Codex MRLs for etoxazole in animal commodities. The Australian MRLs are *0.01 mg/kg for edible offal and milks and *0.02 mg/kg for mammalian fat. The US MRLs are 0.02 mg/kg for cattle fat, 0.01 mg/kg for liver and milk fat. The MRL for cotton seed is 0.2 mg/kg.

[56] 1994 JMPR - Pesticide Residues in Food - 1994 Evaluations, Part I Residues FAO Plant Production and Protection Paper 78. FAO and WHO 1995

The APVMA reported a study where dairy cattle were fed etoxazole for 28 consecutive days at rates equivalent to 1.2, 3.6 and 11.4 ppm in the diet[57]. Residues of etoxazole in milk were <LOQ/<LOD in all samples from the two lowest dose groups. The highest residue in milk from the high dose group was observed after 6 days dosing, indicating residues plateau quickly. Etoxazole showed a low potential for transfer to tissues with transfer factors in the range <0.004 to 0.013. Residues in the 1.2 ppm dose group were <0.005 mg/kg in muscle, milk, kidney and liver with a maximum residue in fat of 0.015 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Fipronil

- is a phenylpyrazole insecticide used for control of red legged earth mite in *canola* (250 g ai/100 kg seed) and false wireworm in *sunflower* (75 g ai/100 kg seed). Application to cotton is for control of cotton thrips and mirids and is at an application rate of 25 g ai/ha.
The harvest WHP is 14 days for canola and sunflowers and 28 days for cotton.

The relevant Australian, Codex and US tolerances for fipronil in animal fat are 0.1, 0.5 (cattle meat in the fat) and 0.4 mg/kg respectively while the milk MRLs are 0.01, 0.02 mg/kg while the US MRL is 1.5 mg/kg for milk fat (representing 0.05 mg/kg in whole milk). The Australian MRL for cottonseed, rapeseed and sunflower seed is *0.01 mg/kg.

Residues are not expected in oilseeds at harvest therefore no residues are expected to result in animal commodities from the feeding of oilseed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Fluazifop-p

-is an aryloxyphenoxypropionate (fop) herbicide used for the control of certain grasses in various crops. It is used in *canola* and *linseed* at rates up to 53 g ai/ha, in *cotton* at up to 159 g ai/ha and *peanuts* at up to 212 g ai/ha.
The harvest WHP is 17 weeks for canola and linseed, 14 weeks for cotton and 6 weeks for peanuts.

There are Australian and USA but no Codex animal tissue MRLs for fluazifop. The relevant Australian MRLs are *0.05 for edible offal and meat and 0.1 for milk. The US tolerances for animal commodities have all been set at 0.05 mg/kg (fluazifop-butyl). The relevant Australian MRL is 0.5 mg/kg for oilseeds.

The TFs for kidney, fat and milk are 0.01, 0.05 and 0.012 respectively (12 ppm feeding level)[58]. Aniticipated residues are 0.3×0.05×0.5 = 0.0075 mg/kg for fat and 0.3×0.012×0.5 = 0.0018 mg/kg for milk.

It is anticipated that animal product residues will be below typical method LOQs.

Fludioxonil

-is a fungicide used for the control of damping off disease and seedling blackleg in canola. It is applied as a seed treatment at an application rate of 10 g ai/100 kg seed.

[57] Public Release Summary on Evaluation of the new active ETOXAZOLE in the product Paramite Selective Miticide, APVMA May 2004, Canberra, Australia.
[58] UK PSD Evaluation of fully approved or provisionally approved products. Issue No. 10 Evaluation on: Fluazifop-P-butyl, October 1988

A harvest WHP is not required.
DO NOT graze or cut for stock food for 6 weeks after application (probably should read planting treated seed)

There are Australian but no Codex or US MRLs for animal tissues. The Australian MRLs have been set at *0.05 for edible offal and *0.01 mg/kg for meat and milk. The Australian MRL for rape seed (canola) is *0.01 mg/kg. The animal feed MRLs are *0.02 ppm for canola straw and fodder and *0.01 mg/kg for canola forage.

No residues were observed above the analytical LOQ of 0.01 mg/kg (meat) and 0.05 mg/kg (liver and kidney) in an animal transfer study conducted in dairy cattle[59]. Lactating cows were treated with fludioxonil in gelatine capsules equivalent to 0.55, 1.6 and 5.5 ppm in feed for 28-30 consecutive days. There is no expectation of residues in tissues above regulatory method LOQs.

It is anticipated that animal product residues will be below typical method LOQs

Flumetsulam
is a triazolopyrimidine sulfoanilide herbicide used *on peanuts* with an application rate of up to 40 g ai/ha.
A harvest WHP is not required.

There are Australian but no Codex or US MRLs for flumetsulam in animal commodities. The Australian MRLs are 0.3 for edible offal and *0.1 for meat and milk. There is an animal feed MRL of 15 ppm for legume pasture. The MRL for peanuts is *0.05 mg/kg and for peanut forage (green) and fodder is *0.05 ppm.

Residues are not expected in peanuts at harvest therefore no residues are expected to result in animal commodities from the feeding of seed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Flumiclorac-pentyl
is a cotton defoliant used at an application rate of up to 90 g ai/ha.
DO NOT harvest for 7 dats after application.
DO NOT graze cotton crops or cut for stockfeed. DO NOT feed cotton trash to livestock.

There are Australian but no Codex or US MRLs for flumiclorac-pentyl in animal commodities. The Australian MRLs are all *0.01 mg/kg. The MRL for cotton seed is 0.1 mg/kg.

The US has an MRL for cotton gin by-products of 3 ppm and dtetermined that feeding of the by-products would not lead to detectable residues.

It is anticipated that animal product residues will be below typical method LOQs.

Flumioxazin
-is a diphenyl ether herbicide use to control weeds prior to sowing of canola (rape) and cotton. The application rate is 15 g ai/ha.

[59] Public Release Summary on Evaluation of the new active Fludioxinil in the product Maxim 100 FS Fungicide Seed Treatment National Registration Authority for Agricultural and Veterinary Chemicals April 2000 Canberra Australia

A harvest WHP is not required.
DO NOT crop or graze treated vegetation for 6 weeks after application.

There are Australia MRLs set at *0.01 mg/kg for animal commodities including milk. The cotton seed is *0.1 mg/kg and for rape seed *0.1 mg/kg. The MRLs for animal feed commodities are *0.05 mg/kg for forage of oilseed (fresh) and *0.1 mg/kg for oilseed straw and fodder (dry).

Goats were orally dosed with 0.5 mg/kg bw ^{14}C-flumioxazin for 5 days (equivalent to a nominal dose rate of 12 ppm) [60]. The majority of the radioactivity from oral dosing was eliminated in the urine and faeces as metabolites. Negligible residues were transferred into the milk (<0.03 mg/kg equivalents) and into tissues of the animals (<0.19 mg/kg equivalents)

There is no likelihood of residues in animal commodities.

It is anticipated that animal product residues will be below typical method LOQs.

Fluometuron
- is a selective post-emergent herbicide used for the control of certain grasses in crops such as canola, cotton, sunflower, legumes and pastures. The application rate is up to 3.6 kg ai/ha with application up to early emergence.
The harvest WHP is 7 weeks.

There are no Australian, Codex or US animal tissue MRLs for fluometuron. It is considered unlikely that residues of fluometuron would be detected in animal tissues. The USA and Australian MRLs for cottonseed have been set at 1 and 0.1 mg/kg respectively.

The US EPA reported[61] an initial ruminant feeding study conducted at 2 ppm, 10 ppm and 20 ppm feeding levels in which fluometuron and metabolites were determined as TFMA. A second ruminant feeding study was conducted at rates of 11 ppm, 33 ppm, and 110 ppm feeding levels for determination of the hydroxylated metabolites. Based on the ruminant feeding studies and feeding at 3.1 ppm in the diet, the maximum expected residues for fluometuron would be 0.0050 ppm in whole milk and 0.06 ppm in meat by-products (=offal). Fluometuron residues were not detected in muscle or fat in either of the feeding studies.

It is anticipated that animal product residues will be below typical method LOQs.

Fluroxypyr
- is a selective herbicide used for the control of broadleaf weeds in crops such as maize, sorghum and winter cereals as well as pastures. It is applied post-emergent to *poppies* at up to the 8-10 leaf growth stage at rates of up to 0.3 kg ai/ha.
The harvest WHP is 10 weeks.

There are no Codex animal tissue MRLs for fluroxypyr. The US (parent + metabolite) residue definition differs to that used in Australia (parent). The relevant US MRL for animal tissue is 1.5

[60] Public Release Summary on Evaluation of the new active FLUMIOXAZIN in the product Pledge 500 WG Herbicide Australian Pesticides and Veterinary Medicines Authority December 2003 Canberra Australia
[61] MEMORANDUM Date: November 30, 2004 Subject: Fluometuron. Summary of Analytical Chemistry and Residue Data for the Reregistration Eligibility Decision (RED) Document. DP Barcode: D300553 PC Code: 035503 Case Number: 0040 Chemical Class: Phenylurea 40 CFR §: 180.229 From: Samuel Ary, To: Elissa Reaves and Kylie Rothwell

mg/kg for cattle kidney. The relevant Australian MRL is 0.1 mg/kg for edible offal (mammalian except kidney), mammalian kidney *0.01 mg/kg. The MRL for milk in Australia is 0.1 and the US is 0.3 mg/kg. There is no MRL for poppies. The Australian MRL for cereal grains is 0.2 mg/kg. Fluroxypyr residues decline rapidly upon cessation of dosing at 1000 ppm for 28 days such that after 6 days residues in all tissues are less than the limit of analytical quantitation.

It is anticipated that animal product residues will be below typical method LOQs.

Fluquinconazole
-is a triazole fungicide used as a seed treatment for canola for the control of blackleg. It is applied at an application rate of 3.34 kg ai/tonne of seed.
No harvest WHP required.
Do not graze plants grown from treated seed or cut for stock food within 8 weeks of sowing.

There are Australian but no Codex or US MRLs for fluquinconazole in animal commodities. The Australian MRLs are 0.2 mg/kg for edible offal and 0.5 mg/kg for meat (mammalian)(in the fat) and *0.02 mg/kg for milk. The Australian MRL for rapeseed is *0.01 mg/kg. The animal feed MRLs are 0.5 ppm for canola forage and *0.01 ppm for straw and fodder (dry).

The TF for fat is 0.6[62]. Anticipated residues are 0.3×<0.01 ppm × 0.6 = <0.0018 mg/kg. Residues in fat declined with a half-life of *ca.* 7 days (< 7 days) when on clean-feed.
The TF for milk is 0.04. Anticipated residues are 0.3×<0.01 ppm × 0.04 = <0.00012 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Flutriafol
-is a DMI fungicide used for the control of blackleg in *canola*. Application is made in-furrow at 100 g ai/ha.
Do not graze or cut for stock food for 4 weeks after application.

There are Australian but no Codex or US MRLs for flutriafol in animal commodities. The Australian MRLs are 0.5 mg/kg for edible offal and *0.05 mg/kg for meat mammalian and milk. The MRL for rapeseed is *0.02 mg/kg.

Residues are not expected in canola at harvest therefore no residues are expected to result in animal commodities from the feeding of seed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Glufosinate ammonium
-is a non-selective foliar herbicide used for control of certain broadleaf and grass weeds in InVigor hybrid canola varieties. The application rate is up to 0.4 kg ai/ha with two applications at 7-14 day intervals at the two leaf to bolting stages of crop growth.
The harvest WHP is not required.
Do not graze or cut treated areas for stock food for 8 weeks after application

The Australian MRLs are 5 mg/kg for offal, 0.1 mg/kg for meat and *0.05 mg/kg for milk. The Codex MRLs are *0.1 mg/kg for edible offal, *0.05 mg/kg for meat and *0.02 mg/kg for milks. The

[62] Evaluation of fully approved or provisionally approved products. Issue 184: Evaluation on Fluquinconazole, May 1999, Department of Environment Food and Rural Affairs, Pesticide Safety Directorate. UK

relevant USA MRL is 6 mg/kg for cattle mbyp while the MRLs for meat and fat are 0.15 and 0.4 mg/kg respectively. The US MRL for milk is 0.15 mg/kg. There is an MRL for rapeseed at *0.05 mg/kg, for canola forage at 5 ppm, canola meal at 0.2 ppm and canola straw and fodder (dry) of 3 ppm.

The JMPR have reported that residues were <0.01 mg/kg in edible offal and meat of cattle fed at the equivalent of 27 ppm in the diet.

It is anticipated that animal product residues will be below typical method LOQs.

Glyphosate

-is a non-selective foliar herbicide used for the control of broadleaf weeds and grasses in crops such as sugarcane, maize, sorghum and winter cereals as well as *oilseeds*. It is applied prior to sowing of crops at application rates up to 2.16 kg ai/ha. It is applied post-emergent to cotton. The application rate is up to 0.36 kg ai/ha for late season application to weeds (cotton not treated, shielded spray). No harvest or grazing WHPs are required.

The relevant Australian and Codex MRLs are the same at 2 mg/kg for cattle offal. MRL for milk is *0.1 and *0.05 mg/kg respectively. The relevant USA MRL is 4 mg/kg for cattle meat byproducts. The primary animal feed commodity MRL for glyphosate is 150 mg/kg. The MRLs for oilseed are T*0.1 mg/kg except cotton seed, rapeseed and linseed. MRL for linseed is T5, cotton seed is 15 and rapeseed at 2 mg/kg.

Residues in cattle, pig and poultry meat, eggs and milk were negligible after the animals were fed with a diet containing 100 mg/kg glyphosate and aminoglyphosate acid[63]. The highest residues were in pig liver and kidney (up to 0.16 and 0.91 mg/kg, respectively) and cattle kidney (up to 1.4 mg/kg). TF cattle kidney = 0.014. Anticipated residues on feeding rapeseed with residues at the MRL are 0.3×2×0.014 = 0.0084 mg/kg, well below the Codex, US and Australian MRLs.

It is anticipated that animal product residues will be below typical method LOQs.

Halosulfuron-methyl

-is a selective post-emergent herbicide used for the control of nutgrass on *cotton,* corn/maize and sorghum. It is applied post-emergent to cotton at an application rate of up to 0.0975 kg ai/ha as a spot spray or shielded spray.
No harvest or grazing WHPs are required.

There are no Codex MRLs for halosulfuron. The US (parent + metabolite) and Australian (parent) residue definitions differ. The relevant US MRLs for animal tissues are 0.1 mg/kg for offal while the Australian MRL for edible offal (mammalian) is 0.2 mg/kg. The Australian use-pattern is such that significant residues in forage and fodder at harvest are not expected. The cottonseed MRL in Australia has been set at *0.05 mg/kg. Feeding at this level is not expected to result in significant residues in animals (<LOQ or 0.05 mg/kg).

It is anticipated that animal product residues will be below typical method LOQs.

Haloxyfop

[63] FAO/WHO (1986a) Pesticide residues in food - Evaluations 1986. Part I - Residues. Joint Meeting of the FAO Panel of Experts Residues in Food and the Environment and the WHO Expert Group on Pesticide Residues, Rome, 29 September-8 October 1986. Rome, Food and Agriculture Organization of the United Nations (FAO Plant Production and Protection Paper 78/1).

-is an aryloxyphenoxypropionate (fop) herbicide used for the control of certain grasses in various crops. It is registered for weed control in *canola, linseed* and *linola* at an application rate of up to 52 g ai/ha and *cotton, peanuts* and *sunflowers* (2^{nd} leaf to head initiation) at an application rate of up to 78 g ai/ha.
A harvest WHP is not required.

There are Australian but no USA or Codex animal tissue MRLs for haloxyfop. The relevant Australian MRLs are 0.5 mg/kg for edible offal, 0.02 mg/kg for meat (fat) and 0.02 mg/kg for milk. The MRL for cottonseed, linseed, linola seed and rapeseed is 0.1 mg/kg and peanut and sunflower seed 0.05 mg/kg.

The TF for cattle fat is 0.05 and cattle kidney 0.19[64]. If it is assumed residues are present at the same level as the MRL residues in cattle tissues would be 0.3×0.1×0.05 = 0.0015 mg/kg in fat and 0.3×0.1×0.19 = 0.0057 mg/kg in kidney if oilseeds are included at 30% of the diet.
The TFs for milk and cream are 0.016 and 0.15. If it is assumed residues are present at the same level as the MRL, residues in milk and cream would be 0.3×0.016 = 0.0048 mg/kg in milk and 0.3×0.15 = 0.045 mg/kg in cream.
It is considered unlikely that feeding of oilseed derived from haloxyfop treated crops would generate tissue residues above regulatory LOQs.

It is anticipated that animal product residues will be below typical method LOQs.

Imazamox
-is a imidazolinone herbicide used for the control of broad leaf and grass weeds in *peanuts*. It is applied at an application rate of up to 35 g ai/ha.

There are Australian but no Codex or US MRLs for imazamox in animal commodities. In the US imazamox is exempt from the requirement of a tolerance on all food commodities when applied as a herbicide in accordance with good agricultural practices. The Australian MRLs have all been set at *0.05 mg/kg. The MRLs for peanuts and peanut forage (green) [fresh weight] are *0.05 ppm.

Residues are not expected in peanuts at harvest therefore no residues are expected to result in animal commodities from the feeding of seed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Imazapic
-is a imidazolinone herbicide used for the control of broad leaf and grass weeds in *canola* and *peanuts*. It is applied at an application rate of up to 28 g ai/ha for canola and 96 g ai/ha for peanuts.

There are no Codex MRLs for imazapic. The relevant US MRLs for animal tissues are 1 mg/kg for kidney and 0.1 mg/kg for meat, fat and meat bypr except kidney while the Australian MRL for edible offal (mammalian) is *0.05 mg/kg, for meat (mammalian (in the fat) *0.05 mg/kg and for milk *0.01 mg/kg. The MRLs for rapeseed is *0.05 mg/kg while for peanuts it is *0.1 mg/kg. Feeding at this level is not expected to result in significant residues in animals (<LOQ or 0.05 mg/kg).

[64] Pesticide Residues in Food - 1995 Evaluations, Part I Residues FAO Plant Production and Protection Paper 137. FAO and WHO 1996

In the goat metabolism study 3 goats were exposed to ^{14}C-imazapic at doses of 0, 3.76 and 15.1 mg in gelatin capsules for seven consecutive days[65]. These levels were considered to be 0, 33×, and 197× of maximum residue that foraging animals would likely receive in the diet in the US. The limits of detection for imazapic were 0.02 mg/kg in fat and 0.01 mg/kg for milk and tissues. Daily milk residues were below the limits of detection as were all tissue concentrations with the exception of the kidney: 0.01 mg/kg at the low dose and 0.05 mg/kg at the high dose. Residues from the kidney consisted of 30% parent compound.

It is anticipated that animal product residues will be below typical method LOQs.

Imazapyr
-is a imidazolinone herbicide used for the control of weeds in *canola* with Clearfield® technology. It is applied at an application rate of up to 9.6 g ai/ha.
No harvest WHP is required.
Do not graze or cut for stock food for 6 weeks after application.

There are Australian and US but no Codex MRLs for imazapyr in animal tissues. The relevant Australian MRLs are *0.05 mg/kg for edible offal (mammalian), meat (mammalian)(in the fat) and *0.01 mg/kg for milk. The US MRLs are 0.05 mg/kg for meat, fat and meat bypds except kidney for which the MRL is 0.2 mg/kg and milk for which the MRL is 0.01 mg/kg. The rape seed MRL is *0.05 mg/kg. MRLs for canola forage (green) and fodder (dry) are *0.05 ppm. Feeding at this level is not expected to result in significant residues in animals (<LOQ or 0.05 mg/kg).

It is anticipated that animal product residues will be below typical method LOQs.

Imazethapyr
-is a imidazolinone herbicide used for the control of weeds in *peanuts* at an application rate of up to 96 g ai/ha.

There are no Codex MRLs for imazethapyr in animal tissues. The relevant Australian MRLs are *0.1 mg/kg for edible offal (mammalian), meat (mammalian) and milk while US MRL for meat byproducts is 0.1 mg/kg. There is a PAFC MRL of *0.1 ppm and peanuts at *0.1 mg/kg. Feeding at this level is not expected to result in significant residues in animals (<LOQ or 0.05 mg/kg).

In the goat metabolism study, parent ^{14}C-imazethapyr was dosed to lactating goats at 0.25 ppm and 1.25 ppm[66]. Results showed ^{14}C-residues of <0.01 ppm in milk, and <0.05 ppm in leg muscle, loin muscle, blood, fat, liver, and kidney. Laying hens dosed at 0.5 ppm and 2.5 ppm with ^{14}C-imazethapyr showed ^{14}C-residues of <0.05 ppm in eggs and all tissues (blood, muscle, skin/fat, liver, and kidney). Additional animal metabolism studies have been conducted with CL 288511 (main metabolite in treated crops fed to livestock) in both laying hens and lactating goats. These studies have been repeated to support subsequent use extensions on crops used as livestock feed items which would theoretically result in a higher dosing of imazethapyr- derived residues to livestock (i.e., corn, alfalfa). In these studies, lactating goats dosed at 42 ppm of ^{14}C-CL 288511 showed ^{14}C-residues of <0.01 ppm in milk, leg muscle, loin muscle, and omental fat. ^{14}C-residues

[65] ERA TR 00-21-28-01e IMAZAPIC [Plateau and Plateau DG]-Human Health and Ecological Risk Assessment Final Report Prepared for: USDA, Forest Service Task No. 28 USDA/FS Contract No. 53-3187-5-12 USDA/FS Order No. 43-3187-0-0153 Submitted to: Leslie Rubin, COTR Animal and Plant Health Inspection Service (APHIS) Biotechnology, Biologics and Environmental Protection Environmental Analysis and Documentation United States Department of Agriculture Submitted by: Syracuse Environmental Research Associates, Inc. January 28, 2001
[66] Imazethapyr; Notice of Filing a Pesticide Petition to Establish a Tolerance for a Certain Pesticide Chemical in or on Food [Federal Register: January 3, 2003 (Volume 68, Number 2)] Page 370-374

in blood were mostly <0.01 ppm but reached 0.01 ppm on 2 of the treatment days. ^{14}C-residue levels in the liver, and kidney were 0.02 and 0.09 ppm, respectively. These studies indicate that parent imazethapyr and CL 288511-related residues do not accumulate in milk or edible tissues of the ruminant.

It is anticipated that animal product residues will be below typical method LOQs.

Imidacloprid

- is a chloronicotinyl (pyridylmethylamine) insecticide. Application to *canola* for the control of red-legged earth mite and blue oat mite and *sunflowers* for the control of wireworm and is as a seed treatment. The application rate is up to 240 g ai/100 kg seed for canola and 258 g ai/100 kg seed for sunflower. Application to cotton is for control of aphids and is at an application rate of 50 g ai/ha.

There are Australian, Codex and US MRLs for imidacloprid in animal tissues. The relevant Australian and US tolerances for imidacloprid in edible offal are 0.2 and 0.3 mg/kg respectively and for milk 0.05 and 0.1 mg/kg. The Codex MRL for edible offal is 0.05 mg/kg and for milk *0.02 mg/kg. There is an animal feed MRL of 1 ppm for mixed pastures. The MRL for cottonseed is *0.02 mg/kg, rapeseed *0.05 mg/kg and for sunflower *0.02 mg/kg.

The TF for liver is 0.01[67]. Assuming residues in oilseed at 0.05 ppm and feeding at 30% of the diet, residues in liver would be 0.3×0.05×0.01 = 0.00015 mg/kg.
The TF for milk is 0.003. Anticipated maximum residues in milk are 0.3×0.05×0.000045 = 0.003 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Indoxacarb

- is a oxadiazine insecticide. Application to *cotton* is for control of heliothis and is at an application rate of 170 g ai/ha.
The harvest WHP is 28 days.

There are Australian and US MRLs but no Codex MRL for indoxacarb in animal tissues. The relevant Australian and US tolerances for indoxacarb in fat are 1 and 1.5 mg/kg respectively and for milk 0.1 and 0.15 (4 mg/kg for milkfat) mg/kg. The Australian MRL for cottonseed is 1 mg/kg while the USA MRL for cottonseed (undelinted) is 2 mg/kg. The TF for fat is 0.03[68]. Assuming that the residues in cottonseed in Australia do not exceed the MRL of 1 ppm, residues in fat would be expected to be 0.3×1×0.03 = 0.009 mg/kg, less than the Australian and USA MRLs.
The TF for milk is 0.002. Anticipated residues in milk of animals fed cottonseed at 30% of the diet are 0.3×1×0.002 = 0.0006 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Iprodione

It is used on *peanuts* and *canola* for the control of sclerotinia rot with application at rates of up to 500 g ai/ha.
The harvest WHP is 12 days for peanuts and 6 weeks for harvest and grazing of canola.

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[67] 2002 JMPR. Pesticide Residues in Food - 2002 Evaluations – Part I: Residues Volume 1, FAO Plant Production and Protection Paper 175/1. FAO and WHO 2003

[68] Indoxacarb; Notice of Filing a Pesticide Petition to Establish a Tolerance for a Certain Pesticide Chemical in or on Food, Federal Register: March 17, 2004 (Volume 69, Number 52) Page 12664-12670

There are Australian and US MRLs but no Codex MRLs for iprodione in animal tissues. The Australian MRLs have all been set at *0.1 mg/kg. The US MRLs are 3 mg/kg for cattle liver and kidney and 0.5 mg/kg for cattle fat, meat and meat by-products (except liver and kidney) and milk. The US residue definition is the sum of iprodione + isomer (RP-30228) + metabolite (RP-32490) + metabolite (RP-36114). There is an MRL of 20 ppm for peanut forage (green) and 0.05 mg/kg for peanuts. The MRL for rapeseed is 0.5 mg/kg and for canola forage, fodder and straw 1 ppm.

The TF for fat (US residue definition) is 0.03 (at 15 ppm feeding level)[69]. Assuming residues in peanuts are at the MRL and feeding peanuts at 30% of the diet the anticipated residues in fat are 0.3×0.05×0.03 = 0.00045 mg/kg. Anticipated residues in milk are 0.3×0.05×0.007 = 0.0001 mg/kg. Assuming residues in rapeseed are at the MRL and feeding rapeseed at 30% of the diet the anticipated residues in fat are 0.3×0.5×0.03 = 0.0045 mg/kg. Anticipated residues in milk are 0.3×0.5×0.007 = 0.001 mg/kg.
If parent compound is monitored in tissues in other countries, as in Australia, residues in tissues are expected to be below the method LOQ.

It is anticipated that animal product residues will be below typical method LOQs.

Lambda-cyhalothrin
- is a synthetic pyrethroid insecticide used for the control of various insects in crops. It is registered on *cotton* at 21 g ai/ha, *sunflowers* at 17.5 g ai/ha and *canola* at 9 g ai/ha.
Sunflowers: 28 days for harvest.
Canola: 7days for harvest
Cotton: 21 days for harvest

There are Australian, Codex and USA MRLs for cyhalothrin in animal commodities. The relevant MRLs for cattle fat are 0.5 and 3 mg/kg for Australia and the USA respectively. The Australian MRL for milk is 0.5 [in the fat] mg/kg while the US one is 10 mg/kg for milk fat (reflecting 0.4 mg/kg in whole milk). The Codex MRLs are 3 mg/kg for fat and 0.2 mg/kg for milk. The MRL for rape seed is 0.02 mg/kg, cotton seed is *0.02 and sunflower seed is *0.01 mg/kg.

If residues in oilseed/meal are fed to animals are assumed to be at the same level as the MRL, residues in fat (TF 0.3-0.5)[70] would be 0.3×0.02×0.5 = 0.003 mg/kg. The TF for milk is 0.02 giving anticipated maximum residues of 0.3×0.02×0.02 = 0.00012 mg/kg for whole milk.

It is anticipated that animal product residues will be below typical method LOQs.

Maldison (malathion)
- is an organophosphate insecticide used for the control of Rutherglen bug in *canola* and *sunflowers*. The application rate is up to 0.575 kg ai/ha.
No harvest WHP is required.

There are Australian and US but no Codex MRLs malathion in animal tissues. The relevant Australian and USA MRLs for malathion in animal tissues are 1 mg/kg in Australia and 4 mg/kg in the US. The Australian MRL for milk is 1 [in the fat] mg/kg while the US MRL is 0.5 mg/kg for milk fat (from application to dairy cows). The MRL for peanuts is 8 mg/kg.

[69] 1994 JMPR - Pesticide Residues in Food - 1994 Evaluations, Part I Residues FAO Plant Production and Protection Paper 78. FAO and WHO 1995
[70] Cyhalothrin. (Environmental health criteria ; 99) 1.Pyrethrins - adverse effects 2.Pyrethrins - toxicity I. Series ISBN 92 4 154299 3 (NLM Classification: WA 240) ISSN 0250-863X

No residues of malathion were detected in tissues in a goat metabolism study conducted at a nominal feeding level of 115 ppm[71]. There is no expectation of residues of malathion in tissues arising from the feeding of oilseeds.

It is anticipated that animal product residues will be below typical method LOQs.

Mancozeb (see Dithiocarbamates)
-is registered for use on *poppies* for the control of downy mildew at a maximum rate of 1.875 kg ai/ha. It is used on cotton (APVMA permit) for *Alterneria* on pima cotton at an application rate of 1.875 kg ai/ha and is registered for use on peanuts for the control of rust and leaf spot at a maximum rate of 1.36 kg ai/ha.
The harvest WHP is 7 weeks for cotton and poppies and 2 weeks for peanuts.

There are Australian, Codex and US MRLs for mancozeb in animal commodities. The Australian MRL for edible offal is 2 mg/kg while the Codex MRL is 0.1 mg/kg, both as CS_2. The USA residue definition is zinc ethylenebisdithiocarbamate and the MRL 0.5 mg/kg for liver and kidney. The MRLs for milk are *0.05 mg/kg for both Australia and Codex.

The poppy seed MRL is *0.2 mg/kg, peanuts 0.2 mg/kg and cottonseed 10 mg/kg.

Residues in oilseeds would be expected to be less than 10 ppm. The target tissue is liver. The TF for liver (45 ppm feeding study) was 0.003[72] giving an anticipated maximum residue from the feeding of oilseed/meal at 30% of the diet of 0.3×10×0.003 = 0.009 mg/kg, less than the relevant international MRLs. The TF for milk was <0.008.

It is anticipated that animal product residues will be below typical method LOQs.

MCPA (4-chloro-2-methylphenoxy)acetic acid or in the USA 2-methyl-4-chlorophenoxyacetic acid
-is a selective herbicide used for the control of broadleaf weeds in *linseed* (1.05 kg ai/ha), *oilseed poppies* (0.75 kg ai/ha) and *flax* (0.245g ai/ha).
Oilseed poppies: Do not harvest for 5 weeks after application.

There are no Codex MRLs for MCPA in animal tissues. The Australian (parent) and US (parent + metabolite) residue definitions differ. The Australian MRL for meat (mammalian) is *0.05 mg/kg as is the milk MRL. The US MRL for meat is *0.1 mg/kg as is the milk MRL. No MRLs set for oilseeds.

Cattle and sheep fed low to moderate doses of MCPA in the diet for 2 weeks showed no residues from levels less than about 18 mg/kg[73]. The major metabolite of MCPA is 2-methyl-4-chlorophenol in the free and conjugated form, which is formed in the liver. The US has a tolerance of 300 mg/kg for pasture indicating that feeding at this level should not result in residues in animal tissues above the US MRL (i.e. the residues would be <LOQ or 0.1 mg/kg).

[71] 1999 JMPR - Pesticide Residues in Food - 1999 Evaluations, Part I Residues FAO Plant Production and Protection Paper 157. FAO and WHO 2000
[72] 1993 JMPR - Pesticide Residues in Food - 1993 Evaluations, Part I Residues FAO Plant Production and Protection Paper 124. FAO and WHO 1994
[73] MCPA. List A Reregistration Case 0017. Chemical No. 030501, 030502, 030516, 030564. Revised Product and Residue Chemistry Chapters for the Reregistration Eligibility Decision. DP Barcode: D299360

In a feeding study where calves were fed in the diet at 250 or 500 ppm for 28 days, residues were <LOQ in meat and fat at slaughter and <LOQ for liver at the 250 ppm feeing level[74]. Residues in kidney at 250 ppm feed level were 1.4 mg/kg. Residues in kidney and liver at the 500 ppm feed level were 0.14 and 2.3 mg/kg respectively. Residues at 7 days on clean feed after feeding at 500 ppm were 0.1 mg/kg in kidney. The half-life for depletion in tissues is estimated to be <2 days. Estimated TF for fat is <0.1 mg/kg ÷ 500 ppm = <0.0002 and for offal (kidney) is 2.3 mg/kg ÷ 500 ppm = 0.005. No residues are expected in milk of animals fed at up to 300 ppm in the diet.

It is anticipated that animal product residues will be below typical method LOQs.

MCPB (4-(2-Methyl-4-chlorophenoxy) butyric acid)
-is a selective herbicide used for the control of broadleaf weeds in *peanuts*. It is applied at an application rate of up to 1.12 kg ai/ha.

There are no Codex or US MRLs for MCPB in animal tissues. The Australian MRLs for meat (mammalian) and milk are *0.05 mg/kg.

Glastonbury *et al.* sprayed Na-MCPB at a rate of 2.24 kg ai/ha on "Onward" peas[75]. The half-life of the MCPB was about 3 days in peas but was not detectable after 9 days in one experiment and 14 days in another. No MCPB was detected in the milk of cows fed MCPB in the ration at 50 ppm for four days (LOD 0.1 ppm) [76].

It is anticipated that animal product residues will be below typical method LOQs.

Mepiquat chloride
-is a plant growth regulator that is applied to *cotton* at a rate of 76 g ai/ha.
The harvest WHP is 28 days.

There are Australian, and US but no Codex MRLs for mepiquat in animal commodities. The Australian MRLs for edible offal and meat are 0.1 mg/kg while the milk MRL is 0.05 mg/kg. The US MRL for animal products are all set at 0.1 mg/kg (no milk tolerance). The Australian MRLs for cottonseed and hulls/meal are 1 and 2 mg/kg respectively.

The TF for fat is 0.0008[77]. No significant residues are expected from feeding seed/meal from cotton treated with mepiquat.

It is anticipated that animal product residues will be below typical method LOQs.

Metalaxyl
- is a fungicide used on a variety of crops. It is used on *poppies* at 140 g ai/100 kg seed as a seed treatment.
Do not harvest for 150 days following application.

[74] Leng. M.L., Comparative metabolism of phenoxy herbicides in animals, in Fate of pesticides in large animals edited by Ivie, G.W. and Dorough, H.W., Academic Press, New York 1977.
[75] Glastonbury, H.A., Stevenson, M.D. and Ball, R.W.E. 1959. The persistence of 4-(2-methyl-4-chlorophenoxy)butyric acid in peas. Weeds 7, 362-363.
[76] Bache, C.A., Lisk, D.J., Wagner, D.G. and Warner, R.G. 1964. Elimination of [(4-chloro-o-tolyl)oxy] butyric acid in urine from cows. J Dairy Sci. 47, 93-95.
[77] Reregistration Eligibility Decision, Mepiquat Chloride List B Case 2375, Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division, EPA 738-R-96-019 March 1997

There are Australian and US but no Codex MRLs for metalaxyl in animal commodities. The Australian and Codex residue definition is parent compound. The Australian MRLs for edible offal and meat are *0.05 mg/kg while the MRL for milk is *0.01 mg/kg. The US residue definition is the sum of metalaxyl and its metabolites containing the 2,6-dimethylaniline moiety, and N-(2-hydroxymethyl-6-methylphenyl)-N-(methoxyacetyl)-alanine methyl ester, each expressed as metalaxyl equivalents. The USA MRLs are 0.4 mg/kg for fat, liver and kidney and 0.05 mg/kg for meat and meat by-products and 0.02 mg/kg for milk.

In a lactating goat metabolism study conducted at a dose level equivalent of feeding at 7 ppm, radioactive residues in tissues, expressed in metalaxyl equivalents, were all <0.06 mg/kg[78]. It is considered unlikely that feeding of oilseed derived from plants grown from metalaxyl treated seed would generate tissue residues above regulatory LOQs.

It is anticipated that animal product residues will be below typical method LOQs.

Methamidophos
is used for white winged weevil control in *peanuts*. Application is at rates up to 145 g ai/ha.
The harvest WHP is 12 weeks.

There are Australian and Codex but not US MRLs for methamidophos in animal commodities. The Australian residue definition is parent compound. The Australian and Codex MRLs are *0.01 mg/kg for edible offal and meat mammalian. MRL for milk is *0.01 and 0.02 mg/kg respectively. It is assumed that in the US residues of methamidophos in animal tissues are assumed to be covered by the acephate MRLs (acephate residue definition is the sum of acephate and methamidophos). The US MRLs for cotton seed have been set at 0.1 mg/kg. The MRL for peanuts is *0.02 mg/kg and cottonseed 0.1 mg/kg.

In animal transfer studies with lactating cattle fed mixtures of acephate and methamidophos the transfer factors for muscle and kidney were 0.008 and 0.017 respectively[79]. It is considered unlikely that residues of methamidophos in animal tissues would exceed international tolerances. The TF for methamidophos in milk is 0.004.

It is anticipated that animal product residues will be below typical method LOQs.

Methidathion
- is an organophosphate insecticide used for the control of insects and mites in *cotton, peanuts*, *sunflowers* and *oilseeds*. The maximum application rate is 80 g ai/ha for mite control (bare earth treatment) in oilseeds and for grey cluster bug and Rutherglen bug in sunflowers at 400 g ai/ha. The maximum rate in cotton is up to 560 g ai/ha.
Sunflowers, peanuts, cotton: harvest WHP 3 days
Oilseeds: harvest WHP 7 days

There are Australian and Codex but no USA MRLs for methidathion in animal tissues. The Australian (Codex) and USA residue definitions differ: methidathion (Australia, Codex), sum of methidathion, its oxygen analogue, the sulfoxide and the sulfone (USA). The Australian and Codex that apply to animal tissues are 0.5 and *0.02 mg/kg respectively. The corresponding milk MRLs are 0.5 [in the fat] and 0.001 mg/kg. The oilseed MRL is 1 ppm.

[78] 1982 JMPR Pesticide Residues in Food - 1982 Evaluations, FAO Plant Production and Protection Paper 49. FAO and WHO 1983
[79] 2003 JMPR. Pesticide Residues in Food - 2003 Evaluations – Part I: Residues, FAO Plant Production and Protection Paper xxx. FAO and WHO 2004

No residues of methidathion were observed in tissues of cows fed at up to 50 ppm in the diet when measured by the Australian or USA residue definitions[80]. There is no expectation of residues in animal tissues.

It is anticipated that animal product residues will be below typical method LOQs.

Methiocarb
is a carbamate molluscicide and is used in *oilseeds* to control snails. The application rate is up to 0.44 kg ai/ha.
The harvest WHP is 7 days.
Do not graze or cut for stock food for 7 days after application.

There no Australian, Codex or US MRLs for methiocarb residues in animal commodities.

There is no Australian MRL for oilseeds.

The 1981 JMPR reported the results of beef and dairy cattle feeding studies where cattle were fed rations containing 10, 30 and 100 ppm methiocarb for 29 days[81]. Residues were detected only in the liver (animals fed 30 and 100 ppm methiocarb) and kidney (animals fed 100 ppm methiocarb). All other tissues (brain, heart, muscle and fat) showed no detectable residues.

It is anticipated that animal product residues will be below typical method LOQs.

Methomyl (also thiodicarb)
- is a carbamate insecticide used for the control of heliothis in *canola, linseed, peanuts, poppies, sesame seed* and *sunflowers* at rates of up to 450 g ai/ha and in *cotton* at up to 540 g ai/ha.
The harvest WHP is 14 days for poppies and peanuts and sesame and 7 days for canola, linseed and sunflowers and not required for cotton.

There are Australian and Codex but no USA MRLs for methomyl (as thiodicarb) in animal tissues. The MRLs have all been set at the LOQ.

The Australian MRL for rapeseed is 0.5 mg/kg, peanut and poppy seed *0.05 mg/kg, cotton, linseed, sunflower and sesame seed *0.1 mg/kg.

No residues of methomyl/thiodicarb were observed in tissues (<0.01 mg/kg) of cows fed at up to 86 ppm in the diet when measured by the Australian or USA residue definitions[82]. There is no expectation of residues in animal tissues.

It is anticipated that animal product residues will be below typical method LOQs.

Methoxyfenozide
- is an insecticide used for the control of heliothis, rough bollworm and loopers in cotton. The application rate is up to 0.6 kg ai/ha.

[80] Methidathion Reregistration Eligibility Decision Residue Chemistry Considerations Shaughnessy No. 100301; Case No. 0034 Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division
[81] 1981 JMPR Pesticide Residues in Food - 1981 Evaluations, FAO Plant Production and Protection Paper 42. FAO and WHO 1982
[82] 2001 JMPR Pesticide Residues in Food - 2001 Evaluations – Part I, FAO Plant Production and Protection Paper 171. FAO and WHO 2002

The harvest WHP is 28 days

There are Australian, Codex and USA MRLs for methoxyfenozide in animal tissues. The Australian MRLs have all been set at the LOQ (*0.01 mg/kg). The Codex MRLs are 0.05 mg/kg for fat, 0.02 mg/kg for edible offal and 0.01 mg/kg for milk. The US tolerances are 0.5 mg/kg for fat, 0.02 mg/kg for meat and 0.1 mg/kg for milk. The MRL for cottonseed is 3 mg/kg.

Based on available cattle feeding studies, there is no expectation of residues in animal tissues when fed at a maximum of 22 ppm in the diet[83].

It is anticipated that animal product residues will be below typical method LOQs.

Metolachlor
-is a selective herbicide used for the control of annual grasses and broadleaf weeds in crops. It is applied at an application rate of up to 0.36 kg ai/ha for *canola* and 2.88 kg ai/ha for *sunflowers*. On *cotton* application is pre-emergent at an application rate of up to 1.44 kg ai/ha while in peanuts application is up to 2.88 kg ai/ha.
No harvest WHP required.

There are no Codex MRLs for metolachlor in animal tissues. The Australian (parent) and US (parent + metabolite) residue definitions differ. The relevant US MRLs for animal tissues are 0.02 mg/kg for cattle meat, 0.2 mg/kg for cattle kidney and 0.02 mg/kg for milk. The Australian MRLs for meat (mammalian) and milk are *0.05 mg/kg. Metolachlor has a primary animal feed commodity MRL of 5 ppm. The MRLs for oilseeds are all *0.05 mg/kg except rapeseed at *0.02 mg/kg.

The US EPA Metolachlor Registration Standard dated March, 1980, concluded that the qualitative nature of the residue in animals was adequately understood. Metolachlor is rapidly metabolized and almost totally eliminated in the urine and feces of ruminants (goats), non-ruminants (rats), and poultry. Metolachlor *per se* was not detected in any of the excreta or tissues. Finite residues were detected in animal transfer studies.

In a study cows were fed 60 ppm metolachlor in the diet for up to 28 days (equivalent to 2.4 mg ai/kg bw/day) [84]. Metolachlor residues in meat and fat were all below the LOQ (<0.02 mg/kg); and residues in milk were all <LOQ (<0.01 mg/kg). In contrast, finite residues of ~0.4 mg/kg for kidney and ~0.1 mg/kg for liver were reported.

It is anticipated that animal product residues will be below typical method LOQs.

Metosulam
-is a triazolopyrimidine sulfonanilide herbicide used for the control of broad-leafed weeds in *oilseed poppies*. It is applied at an application rate of up to 7.14 g ai/ha.
Do not graze or cut for stock food for 12 weeks after application.

[83] Public Release Summary on Evaluation of the new active METHOXYFENOZIDE in the product PRODIGY 240 SC INSECTICIDE, National Registration Authority for Agricultural and Veterinary Chemicals, May 2002, Canberra Australia
[84] Revised Metolachlor and S-Metolachlor Residue Chemistry Chapter for the Tolerance Reassessment Eligibility Decision (TRED); PC codes 108801 and 108800; DP Barcode D282931; Rereg. Case 0001. Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division

There are Australian but no Codex or US MRLs for metosulam in animal commodities. The Australian MRLs have all been set at *0.01 mg/kg. No oilseed MRLs.

It is anticipated that animal product residues will be below typical method LOQs.

Metsulfuron-methyl
is a sulfonylurea herbicide used for the control of various weeds in *linseed* and *safflower*. Application is at rates up to 4.2 g ai/ha.
A harvest WHP is not required.

There are Australian and US but no Codex MRLs for metsulfuron-methyl in animal commodities. The Australian MRLs for animal commodities have all been set at *0.1 mg/kg. The US MRLs are 0.5 mg/kg for kidney and 0.1 mg/kg for other meat by-products, meat and fat and 0.05 mg/kg for milk.

The MRL for safflower and linseed is *0.02 mg/kg .

The fate of metsulfuron methyl and its metabolite was investigated in the lactating goat. Metsulfuron methyl and the metabolite were eliminated mostly in the urine and faeces. Traces of radioactivity were found in some tissues and in milk of the parent (0.008-0.009%) and no radioactivity of the metabolite was detected in the milk or any organ or tissue sample. In a cattle feeding study, metsulfuron methyl was rapidly excreted in the urine and faeces of the treated cows. Less than 0.1% of the daily dose was excreted in the milk as metsulfuron methyl and <10% of the metsulfuron methyl residue level was found as the glucoronide conjugate. Residues (<0.1 ppm) were found in the kidney of cows slaughtered 12 hours after treatment stopped but not in cows slaughtered a week later.

A lactating cow study reported the following disposition of metsulfuron-methyl residues (dosing regime: 0, 5, 20 or 100 ppm in the diet for 4 weeks) [85]. Fat and meat tissues were < 0.01 mg/kg (LOQ), except for one cow (100 ppm feeding study) with meat residues of 0.014 to 0.02 mg/kg. Liver and kidney tissues from cows fed 5 ppm were not greater than 0.053 mg/kg. Metsulfuron-methyl residues in milk samples from cows fed 5 ppm were less than 0.011 mg/kg; 20 ppm feeding resulted in residues that reached a plateau at day 7 post-treatment with residues at 0.016-0.033 mg/kg over the 4 week period.

The US EPA reported[86] a lactating goat metabolism study conducted at a dose level equivalent to 3.4 ppm in the feed, metsulfuron-methyl was the major component in milk. Saccharin was the major component in liver and was judged not to be of concern. Levels in other tissues were ≤20 ppb.

It is anticipated that animal product residues will be below typical method LOQs.

MSMA (monosodium methylarsenate)
-is a selective herbicide used on *cotton*. It is applied at an application rate of up to 2.24 kg ai/ha when cotton is 7 cm high and before 1st bloom and 3 weeks later.
A harvest WHP is not required

[85] Pest Management Regulatory Agency Decision Document E95-04 Tribenuron methyl 8 December 1995
[86] Metsulfuron methyl; Pesticide Tolerances for Emergency Exemptions [Federal Register: December 16, 1999 (Volume 64, Number 241)] [Page 70184-70191]

There are no Codex or US or Australian MRLs for MSMA in animal tissues. In animals MSMA would be converted to arsenic and regulated as such. There are no Australian MRLs for cottonseed or other cotton products.

It is anticipated that animal product residues will be below typical method LOQs.

Norflurazon

-is a fluorinated pyridazinone herbicide used for the pre-emergent control of annual grasses and broadleaf weeds in *cotton*, citrus, grapes and stone fruit etc. It is applied pre-emergent at an application rate of up to 3.36 kg ai/ha.
No harvest or grazing WHPs are required.

There are no Australian or Codex MRLs for norflurazon in animal tissues. The Australian (parent) and US (parent + metabolite) residue definitions differ. The relevant US MRLs for animal tissues are 0.5 mg/kg for cattle liver and 0.1 mg/kg for other tissues and milk. The MRL for cottonseed is 0.1 mg/kg. While the information available is limited, a goat metabolism study suggests residues of parent compound are not expected in cattle and sheep tissue from the feeding of cottonseed/meal from cotton treated with norfluazuron.

NOTE: US MRLs have been established for animal feed items (alfalfa forage and hay at 3 and 5 ppm respectively) as well as for animal commodities. If the US MRLs are used to estimate the dietary burden using the US EPA Guideline, a dietary burden of 7.7 ppm is estimated (3 ppm grass forage, 35% DM, 70% diet + 5 ppm hay, 89% DM 30% diet). An anticipated TF is the 0.25 ppm (animal commodity tolerances, liver) ÷ 7.7 ppm (dietary burden) = 0.03 (crude estimate). An anticipated TF is the 0.1 ppm (animal commodity tolerances, fat) ÷ 7.7 ppm (dietary burden) = 0.01 (crude estimate).

It is anticipated that animal product residues will be below typical method LOQs.

Omethoate

- is an organophosphate insecticide used for the control of mites in *oilseeds* and *poppies*. The maximum application rate is 34.8 g ai/ha. The application rate for cotton is up to 0.224 kg ai/ha.

There are Australian but no Codex or US MRLs for omethoate in animal tissues. The Australian MRLs for animal commodities including milk have been set at *0.05 mg/kg. The oilseed MRL is *0.05 mg/kg.

A metabolism study with lactating goats dosed orally with dimethoate suggests that residues of omethoate are not expected in animal tissues[87].

It is anticipated that animal product residues will be below typical method LOQs.

Oxyfluorfen

- is a diphenyl ether herbicide used for the control of weeds in various crops. The application rate is up to 18 g ai/ha prior to sowing (pre-plant).
There is no harvest WHP.
Do not graze treated weeds

[87] 1998 JMPR - Pesticide Residues in Food - 1998 Evaluations, Part I Residues FAO Plant Production and Protection Paper 152/1. FAO and WHO 1999

There are Australian and US but no Codex MRLs for oxyfluorfen in animal commodities. The Australian MRLs have all been set at *0.01 and the US ones at 0.01 mg/kg. The Australian and US MRL for cottonseed is the same at 0.05 mg/kg. The TF for fat is 0.035 and for milk is 0.003[88]. There is no expectation of residues in animal tissues including fat or in milk.

It is anticipated that animal product residues will be below typical method LOQs.

Paraquat

- is a herbicide used for the control of weeds in *oilseeds* (post-emergent). The application rate is up to 0.432 kg ai/ha.

The Australian and Codex MRLs for paraquat in kidney are 0.5 and 0.05 mg/kg respectively while *0.1 and 0.005 mg/kg for milk, respectively. The US MRL for kidney is 0.5 mg/kg and for milk 0.01 mg/kg. The cottonseed MRL is 0.2 mg/kg and peanut *0.01 mg/kg.

For residues in kidney to be less than the US MRL of 0.3 mg/kg, cattle would have to fed at less than *ca.* 80 ppm in the diet.

It is anticipated that animal product residues will be below typical method LOQs.

Parathion-methyl

- is an organophosphate insecticide used for the control of various insects in crops. It is registered on *cotton* for the control of heliothis, aphids and loopers. The application rate is up to 1.395 kg ai/ha.

The harvest WHP is 14 days.

There are Australian but no Codex or US MRLs for parathion methyl in animal commodities. The Australian MRLs for animal commodities have been set at T*0.05 mg/kg. There are Australian MRLs of T1 mg/kg for cottonseed, T10 ppm for cotton fodder (dry) and 25 ppm for legume animal feeds.

A metabolism study with lactating goats dosed orally with parathion methyl at the equivalent of 6.25 ppm in the diet suggests that residues of parathion methyl are not expected in animal tissues[89].

It is anticipated that animal product residues will be below typical method LOQs.

Pendimethalin

-is a selective dinitroaniline herbicide used for the control of annual ryegrass and certain broadleaf weeds in *peanuts, sunflower, safflower* and *canola*. It is applied at a maximum rate of 0.99 kg ai/ha at the time of sowing. In cotton it is applied at up to 1.49 kg ai/ha and is applied as soon as possible after planting (pre-plant or within 48 hours).

A harvest WHP is not required.

There are Australian but no Codex or US MRLs for pendimethalin in animal tissues. The Australian MRL for animal commodities all have been set at *0.01 mg/kg. MRL for oilseeds is *0.05 mg/kg. The MRL for rape forage and fodder is also *0.05 ppm. The US EPA notes that animal metabolism

[88] Reregistration Eligibility Decision (RED) Oxyfluorfen List A Case 2490, Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division

[89] 2000 JMPR. Pesticide Residues in Food - 2000 Evaluations – Part I, FAO Plant Production and Protection Paper 165. FAO and WHO 2001

studies in goats conducted at exaggerated feeding levels indicate that there is no reasonable expectation for residues of pendimethalin in tissues[90].

It is anticipated that animal product residues will be below typical method LOQs.

Permethrin
- is a synthetic pyrethroid insecticide used for the control of various insects in crops. It is registered on *linseed* with application at rates of up to 0.15 kg ai/ha.
The harvest WHP is 3 days.

There are Australian, Codex and USA MRLs for permethrin in animal tissues. The Australian and Codex residue definitions are parent compound while the USA residue definition includes some metabolites. The relevant MRLs for fat are 1, 1 and 1.5 mg/kg for Australia, Codex and the USA respectively. The relevant MRLs for offal are 0.5, 0.1 and 0.1 mg/kg for Australia, Codex and the USA respectively. The relevant MRLs for milk are 0.1 F, 0.1 F and 3 mg/kg for Australia, Codex and the USA respectively, the latter is for milk fat and represents 0.25 mg/kg on a whole milk basis. Oilseed MRLs ranged from 0.1 to 0.2 mg/kg.

The TF for fat is 0.04[91]. Anticipated maximum residues in fat resulting from feeding linseed/sunflower sed/meal at 30% of the diet are 0.3×0.2×0.04 = 0.0024 mg/kg.
The TF for milk is 0.002 and if fed at 0.2 ppm would give rise to residues in whole milk of 0.3×0.2×0.002 = 0.00012 mg/kg, less than the relevant international standards.

It is anticipated that animal product residues will be below typical method LOQs.

Phorate
- is an organophosphate insecticide used for the control of various insects in crops. It is registered on cotton for the control of aphids, thrips, jassids and susceptible two-spotted mite. The application rate is up to 1.7 kg ai/ha incorporated into the soil at planting or as a side dressing.
The harvest WHP is 10 days.

There are Australian and Codex but no US MRLs for phorate in animal commodities. The MRLs for animal commodities have all been set at *0.05 mg/kg. Codex MRL for edible offal and meat is set at *0.02 mg/kg while milk at *0.01 mg/kg. The residue definition for Australia and Codex is the sum of phorate, its oxygen analogue, and their sulfoxides and sulfones, expressed as phorate while in the USA it is the sum of phorate and its cholinesterase-inhibiting metabolites. This should have no impact as they are essentially the same. There is an Australian MRL of 0.5 mg/kg for cottonseed while the US MRL is 0.05 mg/kg.

In a ruminant feed study with animals dosed at the equivalent of a feeding level of 1.39 and 3.1 ppm, no residues were detected in any tissue or milk[92]. Note the higher feeding level is considered the maximum practical limit for feeding as animals exposed to higher levels resulted in clinical signs of organophosphate poisoning and death.

It is anticipated that animal product residues will be below typical method LOQs.

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[90] Reregistration Eligibility Decision Pendimethalin List A Case 0187, Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division
[91] 1981 JMPR Pesticide Residues in Food - 1981 Evaluations, FAO Plant Production and Protection Paper 42. FAO and WHO 1982
[92] PHORATE: Revised HED Chapter of the Reregistration Eligibility Decision Document (RED), Case #0103, PC Code 057201; Barcode No. D253368

Piperonyl butoxide (PBO)

- is a synergist used to increase the effectiveness of various synthetic pyrethroid (SP) insecticides. It is registered for use with various SPs in the control of insect pests on cotton. The application rate is up to 0.4 kg ai/ha.

The harvest WHP is that of the SP (range 7-28 days).

There are Australian, Codex and US MRLs for PBO in animal commodities. The Australian MRLs for animal tissues have all been set at 0.1 mg/kg. The Codex MRL for mammalian meat (fat) (except cattle) is 2 mg/kg and for cattle meat (fat) 5 mg/kg. The US tolerance for cattle tissue is 0.1 while milk fat is 0.25 mg/kg The Australian MRL for milks is 0.05 mg/kg. There is an Australian MRL of 8 mg/kg for cottonseed (oilseed).

The TF for PBO in fat is 0.004[93] (feeding at 100 ppm in the diet) resulting in an anticipated maximum residue from feeding cottonseed of 0.25×8×0.004 = 0.008 mg/kg, less than the relevant Australian and Codex MRLs.

The TF for PBO in milk is 0.0001 (feeding at 100 ppm in the diet) resulting in an anticipated maximum residue from feeding cottonseed at 25% of the diet of 0.25×8×0.0001 = 0.0002 mg/kg, less than the relevant Australian and Codex MRLs and likely regulatory method LOQ.

It is anticipated that animal product residues will be below typical method LOQs.

Pirimicarb

-is a carbamate aphicide used for the control of aphids in *canola* and *cotton*. The application rate is up to 500 g ai/ha in canola and 375 g ai/ha in cotton.

The harvest WHP is 14 days for canola and 21 days for cotton.

There are Australian and Codex but no USA MRLs for pirimicarb in animal commodities. The Australian and Codex MRLs for meat and milk are all set at *0.1 mg/kg. As the MRLs are set at the limit of analytical quantitation and are essentially the same. The MRL for rape seed is 0.2 mg/kg and cottonseed 0.05 mg/kg.

In a feeding study reported by JMPR residues of pirimicarb were <0.05 mg/kg for animals dosed at the equivalent of 200 ppm in the diet[94], a level of exposure much greater than would be anticipated to arise from canola/cotton seed/meal. The TF for milk is 0.00065 indicating a little likelihood that residues would be detected in milk.

It is anticipated that animal product residues will be below typical method LOQs.

Profenofos

- is an organophosphate insecticide used for the control of heliothis, mites and aphids in cotton crops. The application rate is up to 1 kg ai/ha.

The harvest WHP is 28 days.

There are Australian, Codex and USA MRLs for profenofos in animal commodities. The Australian, Codex and US MRLs for meat are 0.05 mg/kg. The Australian MRL for milk is *0.01

[93] 2002 JMPR. Pesticide Residues in Food - 2002 Evaluations – Part I: Residues Volume 1, FAO Plant Production and Protection Paper 175/1. FAO and WHO 2003

[94] 1978 JMPR - Pesticide Residues in Food - 1978 Evaluations, FAO Plant Production and Protection Paper 15 Suppl. FAO and WHO 1979

mg/kg. There are Australian MRLs of 1 mg/kg for cottonseed and 0.3 mg/kg for cottonseed oil, edible.
The Australian/Codex and USA residue definitions differ. The Australian/Codex definition is profenofos while the US definition is the sum of profenofos and metabolites containing 4-bromo-2-chlorophenol. The US EPA has proposed a change in the residue definition to be the same as Australia and Codex (US EPA interim Re-registration Eligibility Decision 09/2000).

An animal transfer study reported by the 1990 JMPR showed no residues of profenofos or metabolites containing 4-bromo-2-chlorophenol in muscle or fat of dairy cows fed at 0.7, 2.5 and 25 ppm in the diet for 28 days[95]. Profenofos was not detected in kidney or liver, however, metabolites containing 4-bromo-2-chlorophenol were detected in kidney (0.53 mg/kg) and liver (0.07 mg/kg) of animals fed at the highest rate (25 ppm).

It should be possible to feed at 2 ppm in the diet and not detect any residues in animal tissues above the current USA tolerances or at 25 ppm in the diet and not exceed the Australian and Codex MRLs for animal tissues.

It is anticipated that animal product residues will be below typical method LOQs.

Prometryn
- is a triazine herbicide used for the control of certain grasses in crops such as *cotton, sunflower*, legumes, *peanuts* and pastures. It is used on sunflowers and peanuts as a pre-emergent application at rates of up to 2 kg ai/ha. The application rate to cotton is up to 2.25 kg ai/ha with application to fallow crops, pre-emergent, when cotton is *ca.* 15 cm high and at last cultivation.
No harvest WHP is required.

There are Australian but no Codex or US animal commodity MRLs for prometryn. The Australian MRLs are all set at *0.05 mg/kg. It is considered unlikely that residues of prometryn would be detected in animal tissues. There is an MRL of *0.1 mg/kg for the oilseeds listed.

The US EPA considered that there is no reasonable expectation of detectable residues. Animals exposed to residues at levels anticipated in oilseeds expected to have detectable residues (US EPA refer to a feeding study conducted at 50 ppm) [96].

It is anticipated that animal product residues will be below typical method LOQs.

Propaquizafop
-is a herbicide used for the control of grass weeds in various crops. It is used on *canola, linseed* and *safflower* at rates of up to 45 g ai/ha and on *cotton, peanuts* and *sunflowers* at rates of up to 90 g ai/ha.
The harvest WHP is 16 weeks for canola and linseed, 20 weeks for safflower and 14 weeks for peanuts and sunflowers and 11 weeks for cotton.

There are Australian but no Codex or US MRLs for propaquizafop in animal commodities. The tissue MRLs have been set at *0.02 mg/kg while the milk MRL is *0.01 mg/kg. The MRL for oilseeds is *0.05 mg/kg. No detectable residues are expected in animal tissues.

[95] Pesticide Residues in Food - 1990 Evaluations, Part I Residues FAO Plant Production and Protection Paper 103/1. FAO and WHO 1990
[96] Reregistration Eligibility Decision Prometryn List A Case 0467, Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division, EPA 738-R-95-033 February 1996

It is anticipated that animal product residues will be below typical method LOQs.

Propargite
- is an acaricide used for the control of mites in *cotton* crops. The application rate is up to 1.5 kg ai/ha. Propargite residues decline with typical half-lives of 56 and 5 days for soil and foliage respectively.
The harvest WHP is 28 days.

There are Australian, Codex and US MRLs for propargite in animal commodities. The MRLs applicable to cattle fat (target tissue) have all been set at 0.1 mg/kg. The US MRL for milk fat is 2 mg/kg (0.08 mg/kg for whole milk). The Australian MRL for milk is *0.1 mg/kg while the Codex MRL is 0.1 F mg/kg. There is an Australian MRL of 0.2 mg/kg for cottonseed while the US MRL is 0.1 mg/kg.

The TF for cattle fat (50 ppm feeding study) was 0.004[97] giving an anticipated residue in fat from feeding cottonseed/meal of *ca.* 0.3×0.2×0.004 = 0.00024 mg/kg, less than the relevant international MRLs. The TF for milk (50 ppm feeding study) was 0.0002 giving an anticipated residue in fat from feeding cottonseed/meal at 30% of the diet of *ca.* 0.3×0.2×0.0002 = 0.000012 mg/kg, less than the relevant international MRLs.

It is anticipated that animal product residues will be below typical method LOQs.

Propiconazole
-is a DMI fungicide used for the control of various fungal rust, scald and mildew diseases in crops. It is used for the control of leaf smut in *poppies*. Application is at rates of up to 125 g ai/ha. It is used for the control of leaf spot and rust in peanuts. Application is at rates of up to 150 g ai/ha. The harvest WHP is 28 days for poppies and 14days for peanuts.

There are Australian, Codex and US MRLs for propiconazole in animal commodities. The Australian MRLs (propiconazole) are 1 mg/kg for edible offal, 0.1 mg/kg for meat and *0.01 mg/kg for milk. The Codex MRLs (propiconazole) for animal commodities are all set at *0.01 mg/kg. The US residue definition is the sum of propiconazole and its metabolites determined as 2,4-dichlorobenzoic acid, expressed as parent compound. The US MRLs are 2 mg/kg for liver and kidney, 0.05 mg/kg for fat and meat by-products (except liver and kidney) and 0.05 mg/kg for milk. The MRL for poppies is *0.01 mg/kg and peanuts *0.05 mg/kg.

Animal transfer studies were reported by the 1987 JMPR at feeding levels of 15-100 ppm for cows and 4.5 ppm for goats resulted in undetectable parent residues in milk and tissues (<0.05 mg/kg) [98]. After feeding cows for 14 days at 15 ppm the total residues were undetectable in milk and 0.63 mg/kg in kidney.

It is anticipated that animal product residues will be below typical method LOQs.

Pymetrozine
-is an insecticide used to control sliver leaf whitefly in cotton. The application rate is 0.15 kg ai/ha. The harvest WHP is 28 days.

[97] 2002 JMPR. Pesticide Residues in Food - 2002 Evaluations – Part I: Residues Volume 1, FAO Plant Production and Protection Paper 175/1. FAO and WHO 2003
[98] 1987 JMPR Pesticide Residues in Food - 1987 Evaluations, Part I Residues FAO Plant Production and Protection Paper 86/1. FAO and WHO 1988

Do not allow livestock to graze cotton crop, stubble or gin trash that has been treated with this product.

There are Australian but no Codex or US MRLs for pymetrozine in animal commodities. The Australian MRLs have all been set at *0.01 mg/kg. The Australian is *0.02 mg/kg for cottonseed and also for cottonseed meal and hulls.

The US EPA reported that no detectable residues of pymetrozine or CGA-313124 were observed in samples of liver, kidney, perirenal fat, omental fat, round muscle, or tenderloin muscle from cows dosed with 10 ppm pymetrozine[99]. The US EPA used these results to establish that there was no need to establish meat and milk tolerances.

It is anticipated that animal product residues will be below typical method LOQs.

Pyraflufen-ethyl
-is a herbicide used for the defoliation and acceleration of boll opening in cotton. The application rate is 2 g ai/ha.
DO NOT harvest for 7 days after application.

There are Australian and US but no Codex MRLs for pyraflufen-ethyl in animal commodities. The Australian MRLs are *0.02 mg/kg for edible offal, meat and milk. The US tolerances are 0.02 mg/kg for edible offal and milk. The Australian MRL for cotton seed is *0.05 mg/kg.

The APVMA-PRS reported: A lactating goat was orally administered [^{14}C-pyrazole]-pyraflufen-ethyl by capsule once daily for 3 days at a dose rate was equivalent to 10 mg pyraflufen-ethyl/kg feed (0.6 mg/kg bw/day). Milk was collected twice daily. Slaughter occurred 23 hours following cessation of the final dose. Following the course of administration the TRR recovered from all sources accounted for 79.8% of the administered dose. Within 23 hours of oral administration, absorbed pyraflufen-ethyl was quantitatively hydrolysed to metabolite E1 in liver, kidney and milk. Two other minor metabolites (E-2 and E-9) where observed in liver and kidney at less than 10% of the total. In milk no significant metabolite was observed and only E-9 was detected at any significant concentration (<10% total). No significant residues were observed in muscle or fat. Residues had declined to a maximum of 0.08 mg/kg in kidney at slaughter.

It is anticipated that animal product residues will be below typical method LOQs.

Pyridate
Is registered for use on *oilseed poppies* at 0.45 kg ai/ha.
A harvest WHP is not required.
Do not allow livestock to graze poppy stubble.

There are Australian but no Codex or US MRLs for pyridate in animal commodities. The Australian MRLs have all been set at *0.2 mg/kg. No residues are expected in oilseeds at harvest.

It is anticipated that animal product residues will be below typical method LOQs.

Pyrithiobac-sodium

[99] Pymetrozine Pesticide Tolerance Filing 9/98, Federal Register: October 7, 1998, Volume 63, Number 194, Page 53902-53911

- is a pyrimidinylthiobenzoates herbicide used for the control of broad-leafed weeds in *cotton* crops. The application rate is up to 0.102 kg ai/ha.
The harvest WHP is 42 days.

There are Australian but no Codex or US MRLs for animal commodities. The Australian MRLs have been set at *0.02 mg/kg. The Australian and US MRLs for cottonseed are *0.01 and 0.02 mg/kg respectively.

The US EPA have reported a ruminant feeding study[100]. The ruminant metabolism of pyrithiobac sodium was studied in lactating goats fed at a level of 15 ppm for 5 consecutive days, equalling a dose greater 100 times the anticipated residues in cotton gin by-products (US rate is 84 g ai/ha, WHP 60 days). Seventy- six to 80% of the total administered dose was recovered in the excreta plus cage washes. Concentrations of radioactivity in milk, muscle, fat, whole-blood, and plasma were negligible. Biotransformation of the parent compound was not substantial with 90% of urine radioactivity and 40% of faecal extract corresponding to parent test substance. The major biotransformation pathway was O-demethylation. The results of this study indicate low potential for transfer of residues of pyrithiobac sodium and/or its metabolites into edible tissues or milk of ruminants, even at exaggerated feeding levels.

It is anticipated that animal product residues will be below typical method LOQs.

Pyriproxyfen
-is an insecticide used for the control of silverleaf whitefly in cotton. The application rate is 50 g ai/ha.
DO NOT harvest for 28 days after application.
DO NOT graze or cut for stockfood.
DO NOT feed treated cotton trash to livestock.

There are Australian and Codex but no US (negligible residues) MRLs for pyriproxyfen in animal commodities. The Australian MRLs are *0.02 mg/kg for edible offal, meat (fat) and milk. The Codex MRLs are *0.01 mg/kg for cattle and goat meat and offal. The Australian MRL for cotton seed is *0.01 mg/kg.

The JMPR 1999 reported:
Table 44. Residues of pyriproxyfen and metabolites in the tissues from dairy cows dosed with pyriproxyfen equivalent to nominal feed levels of 3, 9 or 30 ppm dry weight for 28 days (Green, 1997). Metabolite residues include free and conjugated compounds.

Sample	Dose groups, ppm	Residues, mg/kg, from 3 cows			
		pyriproxyfen	POP	4'-OH-Pyr	2,5-OH-Py
Muscle	30	<0.01 (3)		<0.01 (3)	
Liver	30	<0.01 (3)	<0.01 (3)	<0.01 (3)	<0.01 (3)
Kidneys	9	<0.01 (3)			<0.01 (3)
Kidneys	30	<0.01 (3)	<0.02 (3)	<0.01 (3)	0.017 0.014 0.016
Fat	3	<0.01 (3)			
Fat	9	0.025 0.011 0.019			
Fat	30	0.058 0.046 0.072		<0.01 (3)	

It is anticipated that animal product residues will be below typical method LOQs.

[100] [Federal Register: September 24, 1997 (Volume 62, Number 185)] [Notices] [Page 49979-49983] ENVIRONMENTAL PROTECTION AGENCY [PF-764; FRL-5745-8] E.I. DuPont de Nemours and Co., Inc.; Pesticide Tolerance Petition Filing

Quintozene

-is a fungicide used to control soil borne diseases in vegetables and crops. It is applied as a seed treatment for peanuts at 120 g ai/100 kg seed for control of pre-emergence rot and seedling blight. A harvest WHP is not required.
It is also applied to control crown rot with application at pegging time. The maximum application rate is 16.5 kg ai/ha applied to the soil along the rows.
The harvest WHP is 28 days.

There are no Australian, Codex or US MRLs for animal tissues. The peanut MRL is 0.3 mg/kg. The TF for fat is ca. 0.005 (10 ppm feed level, residue as parent compound)[101]. Anticipated residues in fat are 0.3×0.005×0.3 = 0.00045 mg/kg.

Quintozene can contain up to 100 mg/kg hexachlorobenzene (HCB), an application rate of 16.5 kg ai/ha corresponds to application of HCB at 1.65 g/ha. Noting the half-life for HCB in soil is 3-6 years. Uptake of HCB by various crops was such that the ratio of soil to crop residues ranges from 0.03 – 2.4 for aerial parts and slightly higher for roots and tubers. The contribution from previous years applications (assumed 12 years of additions 1 spray per year at the maximum rate = 1.65 g HCB/ha = 19.8 g HCB/ha), distributed in the top 20 cm soil with density 1 g/mL would be 19800 mg/2000000 kg = 0.0099 ppm. Assuming a crop to soil ratio of 0.1, residues in peanuts would account for no more than 0.00099 ppm.
Feeding peanut meal with residues of 0.00099 ppm at 30% of the diet would give rise to residues of 0.3×0.00099×8 = 0.0024 mg/kg in fat and 0.3×0.00099×8.4 = 0.0025 mg/kg in milk fat.

It is anticipated that animal product residues will be below typical method LOQs.

Quizalofop-P

-is used for the control of certain grass and broad leaf weeds in *canola* and *peanuts*. The application rate is up to 38 g ai/ha for canola and 100 g ai/ha for peanuts.
The harvest WHP is 11 weeks.

There are Australian and US but no Codex MRLs for animal commodities. The Australian MRL for meat (mammalian) has been set at *0.02 mg/kg and for edible offal (mammalian) 0.2 mg/kg. The US MRLs are 0.05 mg/kg for fat and meat by-products and 0.02 mg/kg for meat. The US MRL for milk is 0.01 mg/kg and for milk fat 0.25 mg/kg. The US residue definition is the sum of quizalofop-ethyl, quizalofop- methyl and quizalofop expressed as quizalofop ethyl. There are MRLs of *0.02 mg/kg for rapeseed, *0.05 mg/kg for sunflower seed and *0.02 mg/kg for peanuts.

In a feeding study, three groups of three lactating dairy cows plus a control group were fed 0.1, 0.5, and 5.0 ppm quizalofop ethyl ester (encapsulated) for 28- consecutive days[102]. Whole milk, skim milk, and cream from the control, and the 0.1 and 0.5 ppm dose groups showed no quizalofop to <0.02 ppm (0.05 ppm in cream). From the 5 ppm dose, quizalofop residues ranged from 0.01 to 0.02 ppm in whole, and when these samples were separated into cream and skim milk, the quizalofop partitioned into the cream with residues plateauing at 0.26 to 0.31 ppm.

[101] 1995 JMPR - Pesticide Residues in Food - 1995 Evaluations, Part I Residues FAO Plant Production and Protection Paper 137. FAO and WHO 1996
[102] [Federal Register: August 25, 2004 (Volume 69, Number 164)] [Notices] [Page 52256-52261] ENVIROMENTAL PROTECTION AGENCY [OPP-2004-0245; FRL-7372-4] Quizalofop-Ethyl; Notice of Filing a Pesticide Petition to Establish a Tolerance for a Certain Pesticide Chemical in or on Food)

No quizalofop to <0.02 ppm was detected in skeletal muscle, and to <0.05 ppm was detected in any liver or fat sample from any of the three doses. Quizalofop was detected in one kidney sample as 0.05 ppm from the 5 ppm dose.

It is anticipated that animal product residues will be below typical method LOQs.

Sethoxydim
- is a cyclohexanedione herbicide used for the control of certain grass weeds in crops. It is used for the control of various weeds in *cotton, canola, linseed, peanuts* and *sunflowers* with application at rates of up to 0.192 kg ai/ha.
The harvest WHP is 17 weeks.

There are Australian and US MRLs for sethoxydim but no Codex MRLs. However, the Codex residue definition for clethodim is the "sum of clethodim and its metabolites containing 5-(2-ethylthiopropyl)cyclohexene-3-one and 5-(2-ethylthiopropyl)-5-hydroxycyclohexene-3-one moieties and their sulphoxides and sulphones, expressed as clethodim". Compariosn with the Australian residue definition indicates residues for sethoxydim will be covered by Codex MRLs for clethodim. The Codex MRLs for clethodim are *0.2 mg/kg for edible offal and meat and *0.05 mg/kg for milk. The Australian residue definition is sethoxydim and its metabolites containing 5-(2-ethylthiopropyl)cyclohexane-3-one and 5-(2-ethylthiopropyl)-5-hydroxycyclohexe-3-one moieties and their sulphoxides and sulphones, expressed as sethoxydim. The US residue definition is sethoxydim and its metabolites containing the 2-cyclohexen-1-one moiety. The Australian MRLs for animal commodities have been set at *0.05 mg/kg. The US MRLs for cattle tissues are 1 mg/kg for meat by-products , 0.2 mg/kg for other tissues while the milk MRL is 0.5 mg/kg. There are MRLs for rape seed and linseed at 0.5 mg/kg, cotton and poppy seed at 0.2 mg/kg and sunflower seed at *0.1 mg/kg as well as for peanuts at 3 mg/kg. The MRLs for rapeseed forage and fodder are 10 ppm.

Note: The USA also has tolerances for several major animal feeds including alfalfa forage and hay (40 ppm), bean hay and clover hay (50 ppm). The tolerances suggest that sethoxydim may be fed at up to 50 ppm in the diet without exceeding the USA animal commodity MRLs.

It is anticipated that animal product residues will be below typical method LOQs.

Simazine
- is a triazine herbicide used for the control of weeds in vegetable crops. It is registered for control of certain weeds in *canola* with application rates up to 2 kg ai/ha.
A harvest WHP is not required.
Do not graze or cut for stock food for 15 weeks after application.

There are Australian and US but no Codex MRLS for animal commodities. The Australian MRLs for animal tissue have been set at *0.01 mg/kg and milk at *0.02 mg/kg. The US MRLs are 0.03 (N) mg/kg for animal commodity MRLs.

Studies in rats, goats, and sheep reveal that 60 to 70% of the ingested dose may be absorbed into the system, with approximately 5 to 10% distributed systemically to tissues[103]. The remainder is eliminated via urine within 24 hours. Distribution led to detectable levels in red blood cells (highest), liver, kidney, fat, bone, and plasma. When a cow was fed 5 ppm for 3 days, no simazine was found in the cow's milk during the next 3 days. It has been reported that simazine residues were

[103] Evaluation of fully approved or provisionally approved products: Issue No. 72 simazine (2) July 1993: Evaluation on: Simazine (2) Disclosure document, Evaluation of the mammalian and ecotoxicity of simazine, UK PSD

present in the urine of sheep for up to 12 days after administration of a single oral dose. The maximum concentration in the urine occurred from 2 to 6 days after administration.

The Australian rapeseed MRL is *0.02 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

S-metolachlor
see metolachlor

Spinosad
- is an antibiotic insecticide used for the control of heliothis in cotton crops. The application rate is up to 96 g ai/ha.
The harvest WHP is 28 days.

There are Australian, Codex and USA MRLs for spinosad in animal commodities. The Australian and US MRLs applicable to cattle meat (fat) are 2 and 50 mg/kg respectively. The respective milk MRLs are T0.1 and 7 (85 mg/kg for whole milk fat) mg/kg. The Codex MRL is 3 mg/kg for cattle fat and 2 mg/kg for fat of other mammals and 1 mg/kg for cattle milk (5 m/kg for milk fat). There are Australian MRLs of *0.01 mg/kg for cottonseed and cottonseed by-products. The TF for cattle fat is 0.5-0.6[104] giving an anticipated maximum residue in cattle fat from feeding of seed/meal at 30% of the diet of 0.3×0.01×0.6 = 0.0018 mg/kg.
The TF for cattle milk is 0.05 giving an anticipated maximum residue in cattle fat from feeding of seed/meal at 30% of the diet of 0.3×0.01×0.05 = 0.00015 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Tebuconazole
-is a DMI fungicide used for the control of leaf spot, rust and net blotch in *peanuts*. The application rate is up to 189 g ai/ha.
The harvest WHP is 21 days.

There are Australian, Codex and US MRLs for tebuconazole in animal tissues. The Australian and Codex residue definition is tebuconazole while the USA residue definition is the sum of tebuconazole and its 1-(4- chlorophenyl)-4,4-dimethyl-3-(*1*H-1,2,4-triazole-1-yl-methyl)-pentane-3,5-diol metabolite. The Australian MRLs 0.5 mg/kg for edible offal mammalian, 0.1 mg/kg for meat (mammalian) and 0.05 mg/kg for milk. The Codex MRLs are *0.05 mg/kg for both cattle meat and cattle edible offal and *0.01 mg/kg for milk. The US MRLs are 0.2 mg/kg for meat byp and 0.1 mg/kg for milk. The MRL for cottonseed is T1 mg/kg and for peanuts 0.1 mg/kg.

Residues of tebuconazole were not detected (<0.05 mg/kg) in muscle and fat of dairy cattle dosed at the equivalent of 250 ppm in the diet for 28 days[105]. The residues in liver were 0.2 mg/kg. The TF for liver is 0.0008. There is no reasonable expectation of residues of tebuconazole in meat and fat arising from feeding of peanut seed/meal.

It is anticipated that animal product residues will be below typical method LOQs.

[104] 2001 JMPR Pesticide Residues in Food - 2001 Evaluations – Part I, FAO Plant Production and Protection Paper 171. FAO and WHO 2002
[105] 1994 JMPR - Pesticide Residues in Food - 1994 Evaluations, Part I Residues FAO Plant Production and Protection Paper 78. FAO and WHO 1995

Tepraloxydim
-is a cyclohexanedione herbicide for early post-emergence control of various grass weeds in canola. The application rate is up to 60 g ai/ha.
A harvest WHP is not required.
Do not graze or cut for stock food for 4 weeks after application.

The Australian MRLs for animal commodities are all *0.1 mg/kg except milk which is *0.02 mg/kg. The US MRLs are 0.5 mg/kg for kidney, 0.2 mg/kg for other meat by-products and meat, 0.15 mg/kg for fat and 0.1 mg/kg for milk. The MRL for canola is *0.1 mg/kg and for canola forage and fodder 3 ppm.

The APVMA PRS reported[106] an animal transfer study. In an animal transfer study, cattle were dosed for 28 consecutive days at either 6.3, 19 or 63 ppm in the feed. At the 6.3 ppm feed level residues in all tissues and milk were below quantifiable levels (<0.02 mg/kg milk and <0.1 mg/kg tissues). At the 19 ppm feed level residues were below LOQ in all tissues except muscle, which contained residues of 0.15 mg/kg. At the highest feeding level (63 ppm) quantifiable residues were detected in milk and all tissues of animals slaughtered at the end of the dosing period, except fat. Highest residues were present in kidney (0.39 mg/kg). After 2 days depuration residues in all tissues and milk had fallen below LOQ.

It is anticipated that animal product residues will be below typical method LOQs.

Terbufos
-is a organophosphorous insecticide/nematicide used for the control of wireworms in *sunflower* and is applied to the soil at 3 g ai/100 m row at the time of planting and for the control of white grubs and white-fringed weevil in *peanut* crops and is applied to the soil at 8.25 g ai/100 m row at the time of planting.
A harvest WHP is not required.

There are Australian and Codex but no US MRLs for terbufos in animal commodities. The Australian and Codex MRLs are *0.05 mg/kg for cattle edible offal and cattle meat. The Australian and Codex MRLs for milk have been set at *0.01 mg/kg.
The oilseed MRLs are all *0.05 mg/kg.

Residues are not expected in oilseeds at harvest therefore no residues are expected to result in animal commodities from the feeding of seed/meal to livestock.

It is anticipated that animal product residues will be below typical method LOQs.

Thiabendazole
-is used as a seed dressing in *sunflowers* with an application rate of 360 g ai/100 kg seed (QDPI Board Approval 70058).
No grazing/cutting restraints are required.

There are Australian, Codex and US MRLs for thiabendazole in cattle tissues. The Australian MRL for animal tissues have been set at 0.2 mg/kg while the milk MRL is 0.05 mg/kg. There is an Australian MRL for apples at 10 mg/kg. The Codex MRL for cattle kidney is 1 mg/kg while the MRL for cattle milk is 0.2 mg/kg. The US MRL for meat and milk are 0.1 mg/kg while the meat byproducts MRL is 0.4 mg/kg.

[106] Public Release Summary on Evaluation of the new active TEPRALOXYDIM in the product Aramo Herbicide Australian Pesticides and Veterinary Medicines Authority May 2003 Canberra Australia

It is considered unlikely that treated oilseed would give rise to residues in crops fed to animals.

Thiamethoxam
- is a nitroguanidine insecticide used as a seed dressing for the control of wireworms, seedling thrips and aphids in *cotton* crops. The application rate is up to 2.76 kg ai/tonne of seeds.
No harvest WHP required as is a seed dressing.

There are Australian and USA but no Codex MRLs for thiamethoxam in animal commodities. The Australian MRLs are all *0.02 mg/kg except milk which is *0.005 mg/kg. The US MRLs applicable to meat are 0.02, and meat byproducts 0.04 mg/kg. There are Australian MRLs of *0.02 mg/kg for cottonseed and 0.5 ppm for cotton hulls and trash (dry).

Metabolism studies in animals demonstrated that parent thiamethoxam was a major residue in all tissues, with the exception of liver[107]. A dose level equivalent to 100 ppm in the feed was used in these studies. If we assume that treated produce contains residues at the MRL of *0.02 ppm and comprises 30% of the animal diet, then scaling the residue results from the metabolism study (goats) gives an estimate of the likely residues in tissues from normal feeding of treated produce. Anticipated residues in muscle, fat, liver, kidney and milk are < 0.008 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Thidiazuron
is a thiadiazolylurea herbicide (defoliant) used on cotton crops for defoliation prior to harvest. The application rate is 0.1 kg ai/ha.
No harvest WHP required.

There are Australian and US but no Codex MRLs for thidiazuron in animal tissues. The Australian MRLs for tissues have been set at *0.05 mg/kg and for milks at *0.01 mg/kg with a residue definition of thidiazuron. The US MRLs for animal tissues are set at 0.4 mg/kg and for milk at 0.05 mg/kg with a residue definition the sum of thidiazuron and its aniline containing metabolites. The Australian MRL for cottonseed is *0.5 mg/kg and the US MRL 0.3 mg/kg.

Animal MRLs appear to be based on a goat metabolism study, in which goats were dosed at the equivalent of 1.5 ppm in the diet for 10 days, published in *J. Ag Food Chem* (1979), 28, 622-627. Total radioactive residues in were <0.01 mg/kg in fat, <0.013 mg/kg in muscle and 0.04-0.12 mg/kg in kidney and liver. Most of the radioactivity in goat liver was not extracted with acetonitrile, hexane or water and is probably not associated with parent compound. No cattle feeding data are available. Although there is limited useful data available to estimate the likely residues in tissues, it is considered unlikely that thidiazuron would be detected in muscle or fat tissues in a monitoring program.

It is anticipated that animal product residues will be below typical method LOQs.

Thiodicarb
see methomyl

Tolclofos-methyl

[107] Public Release Summary on Evaluation of the new active THIAMETHOXAM in the product CRUISER 350 FS INSECTICIDE SEED TREATMENT National Registration Authority for Agricultural and Veterinary Chemicals January 2001 Canberra Australia

-is a fungicide used for the control of *Rhizoctonia solani* in *cotton*. The maximum application rate is 400 g ai/100 kg seed.
A harvest WHP is not required.

There are no Australian, Codex or US MRLs for tolclofos-methyl in animal commodities. The Australian MRL for cottonseed is *0.01 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Triallate
-is a thiocarbamate herbicide used for the control of certain grass weeds (wild oats, annual rye grass) prior to crop emergence in *canola, linseed* and *safflower*. The maximum application rate is 0.8 kg ai/ha.
A harvest WHP is not required.

There are Australian but no Codex or US MRLs for triallate in animal commodities. The Australian MRLs are *0.1 for edible offal (except kidney), 0.2 mg/kg for kidney, 0.2 mg/kg for fat and *0.1 mg/kg for meat and milk.
The MRL for oilseeds is *0.05 mg/kg.

In a diary cattle feeding study conducted at dose levels equivalent to 3 and 10 ppm in the diet, residues in tissues at slaughter were <0.01 mg/kg for muscle, kidney and liver for both dose groups and were 0.01 and 0.03 mg/kg in fat for the 3 and 10 ppm dose groups respectively[108]. Residues in milk were <0.01 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Tribenuron-methyl
-is a sulfonylurea herbicide used for the control of various weeds in *fallow fields* and *pre-crop situations*. The maximum application rate is 22.5 g ai/ha.
A harvest WHP is not required.
It is recommended that weeds are grazed 2-3 days after application.

There are Australian but no Codex or US MRLs for animal commodities. The Australian MRLs have all been set at *0.01 mg/kg.

The Australian MRLs for rape and sunflower seed are *0.01 mg/kg. The PAFC MRL (fresh weight) is *0.05 ppm.

In a lactating goat study with labelled tribenuron methyl at a level of 6.7 ppm there was a total of 0.5% of the administered dose found in the assayed tissues and organs[109]. Based on this low potential for transfer of residues to tissues, it is concluded that feeding oilseeds/meal will not result in detectable residues in animal commodities.

It is anticipated that animal product residues will be below typical method LOQs.

Trichlorfon

[108] Reregistration Eligibility Decision for Triallate List B Case 2695EPA 738-R-00-021 March 2001. Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division
[109] PMRA Decision Document E95-04 Tribenuron methyl

- is an organophosphate insecticide used for the control of various insects in crops. It is registered on *linseed, oilseed rape, sunflowers* and *safflower* crops for the control of various pests. The application rate is up to 0.6 kg ai/ha.
The harvest WHP is 2 days.

There are no Codex MRLs for trichlorfon in animal tissues. The Australian MRL for cattle fat is 0.1 mg/kg and 0.5 mg/kg for the US tolerance. The Australian MRL for milks is *0.05 mg/kg while no milk MRL has been set in the US. The Australian MRL for oilseeds (except peanuts) is 0.1 mg/kg. Following peroral uptake of the trichlorfon (12.5 and 20 ppm in feed), no trichlorfon residues were detected (<0.1 ppm) in any of the examined tissues and organs (brain, heart, kidney, steak, fat) after a four week feeding period[110].

It is anticipated that animal product residues will be below typical method LOQs.

Trifloxysulfuron
-is a herbicide used for the control of certain broadleaf weeds and suppression of nutgrass in *cotton*. Application is at a maximum rate of 22.5 g ai/ha.
DO NOT harvest for 8 weeks after application.
DO NOT graze or cut for stock food.

There are Australian but no Codex or US MRLs for trifloxysulfuron in animal tissues. The Australian MRL for meat (mammalian) and milk are *0.01 mg/kg. The MRL for cotton seed is also *0.01 mg/kg.

It is anticipated that animal product residues will be below typical method LOQs.

Trifluralin
-is a selective dinitroaniline herbicide used for the control of certain grasses and annual broad-leafed weeds in *cotton, peanut*, *linseed, rape seed, safflower* and *sunflower*. Application is at a maximum rate of 0.816 kg ai/ha except for cotton for which the maximum rate is 1.1 kg ai/ha.

There are no Codex or US MRLs for trifluralin in animal tissues although there are registrations in the US including on vegetables (except carrot) MRL 0.05 mg/kg and carrot (MRL 1 mg/kg). There are no Codex or US MRLs for trifluralin in animal tissues. The Australian MRL for meat (mammalian) and milk are *0.05 mg/kg. The MRL for oilseeds is *0.05 mg/kg.

The US EPA evaluation of trifluralin states that based on a goat metabolism study where animals were fed at exaggerated rates there is no expectation of finite residues of trifluralin in animal tissues[111]. Therefore no residues are expected to result from the feeding of oilseeds/meal to animals.

It is anticipated that animal product residues will be below typical method LOQs.

[110] 1971 JMPR. Evaluations of some pesticide residues in food. AGP/1971/M/9/1; WHO Pesticide Residues Series No. 1, 1972
[111] Reregistration Eligibility Decision, Trifluralin, List A Case 0179, Environmental Protection Agency, Office of Pesticide Programs, Special Review and Reregistration Division EPA 738-R-95-040, April 1996