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4. RESIDUES ASSESSMENT

4.1 Introduction

Under Section 32(2) of the AgVet Code, the National Registration Authority selected fenitrothion as one of seven chemicals for review in the second cycle of the Existing Chemicals Review Program.

Fenitrothion is a broad-spectrum insecticide widely used for controlling plant pests, and particularly for stored grain protection by post-harvest treatment and for plague locust control. Industrial Biotest Laboratories (IBT) studies were associated with fenitrothion but none of these have been assessed in this review. Fenitrothion was last evaluated by JMPR in 1989.

4.2 Metabolism

4.2.1 Animal metabolism

HM-70-0070 Metabolism of Fenitrothion in Goats

Cattle

Data from a preliminary feeding study with fenitrothion in Jersey cattle at 3 mg/kg/day[1] for 7 days indicated that 0.002 mg/L of fenitrothion and 0.003 mg/L of aminofenitrothion[2] were found in fresh milk. No detectable residues were found 2 days after feeding with fenitrothion ceased.

Goats

Six female goats, weighing 35 kg each and producing 1 L of milk daily, were fed fenitrothion at 7.6 mg/kg (dry weight) in the feed[3] for 7 consecutive days. One day after the treatment had ceased, total radiocarbon levels were 0.848 mg/kg in the liver, 0.025 mg/kg in kidney, 0.008 to 0.012 mg/kg in fat, 0.003 to 0.005 mg/kg in muscle and 0.007 mg/L in milk (whole milk basis). On day 7, levels were 0.305 mg/kg in liver, 0.006 mg/kg in kidney, 0.005 to 0.010 mg/kg in fat, <0.001 to 0.001 mg/kg in muscle and 0.011 mg/L in milk. Radioactive residues in milk plateaued by day 4.
On day 18 residues of liver 0.100 mg/kg in liver, 0.003 mg/kg in kidney, 0.001 to 0.004 mg/kg in fat and 0.001 to 0.002 mg/kg in muscle were found. Milk residues on day 18 were not reported. Intact fenitrothion was not found in any organ or tissues analysed, nor in milk. ^{14}C-Fenitrothion completely disappeared during 30 min incubation with the rumen fluid with conversion to aminofenitrothion.

Characterisation of urinary and faecal metabolites led to the identification of metabolites such as aminofenitrothion; formylaminofenitrothion; acetylaminofenitrothion; 3-methyl-4-acetylaminophenol; aminofenitrooxon; formylaminofenitrooxon; acetylaminofenitrooxon; *N*-sulfo aminofenitrothion; *N*-sulfo aminofenitrooxon; desmethylaminofenitrothion; and desmethylacetylaminofenitrooxon. Acetylaminofenitrooxon; *N*-sulfo aminofenitrothion; *N*-sulfo aminofenitrooxon; and desmethylacetylaminofenitrooxon were found in whole milk but were not detected in cream.

Only about 0.1% of the total radiocarbon was excreted via milk during a seven-day post treatment period, while 50.2% and 44.0% was excreted in the urine and faeces during this period.

[1] Units indicated in the Sumithion Technical Manual to be mg/kg bodyweight/day.
[2] Assumed to be on a whole milk basis, unless otherwise specified.
[3] 2.3 kg feed containing 17.5 mg ^{14}C-fenitrothion/day

Acetylaminofenitrooxon made up 0.1% of the total radioactivity in the faeces and only a trace of this compound was detected in urine. *N*-sulfo aminofenitrothion, *N*-sulfo aminofenitrooxon and desmethylacetylaminofenitrooxon were not found in faeces and made up 0.7%, 0.4% and 0.6% respectively of the total radioactivity in urine.

No data is available for direct application of fenitrothion. Although fenitrothion is fat-soluble, it appears to be readily broken down in the rumen so that the main residues detected in cattle are as aminofenitrothion. Aminofenitrothion has been presumed by JMPR to have no biological activity (LD_{50} for aminofenitrothion in mouse >1000 mg/kg).

Miyamoto, J., et al, J. Pesticide Sci., (1976), 1, 9, pp 11 - 21.
Rabbits fed fenitrothion at 10 mg/kg of body weight daily for 6 months had 0.2 mg/kg of fenitrothion in the fat. The rest (>99%) is excreted as a range of metabolites, mainly in the urine but also in faeces.

Kohli, J.D., et al., Bulletin of Environmental Contamination and Toxicology, (1974), 11,1, pp 285 - 290.
Fenitrothion is readily absorbed (with 45% of that applied being absorbed in 24 h) through the skin of the rat when directly applied. Levels attained in blood were rather low (measured as cholinesterase inhibition) and it was claimed that this was because of rapid equilibration with tissues and excretion in urine (75% of absorbed material excreted within 24 h).

Snelson, J., Fenitrothion Monograph 1974
Thirty calves were confined on a pasture sprayed with 375 g fenitrothion/ha for the duration of the study. Initial residues of 11.8 mg/kg (presumed to be on an as received basis, but not specified) on pasture were reported. On day 1, residues in meat and fat were 0.01 mg/kg. Levels of 0.004 to 0.007 mg/kg of fenitrothion were found in the fat on day 3, with no detectable levels in the meat. Residues were almost at background levels by day 7 of the study.

Lactating dairy cows were fed 50 mg/kg of fenitrothion (dry weight basis) in the feed for 29 days. No residues of fenitrothion, fenitrooxon or 3-methyl-4-nitrophenol appeared in milk; the limit of detection not reported.

Jersey cows were fed on diets spiked with 0, 25, 50 and 100 mg/kg of fenitrothion for 28 days. Neither feed intake, milk production nor blood cholinesterase activity were depressed. Fenitrothion, fenitrooxon or 3-methyl-4-nitrophenol were not detected in milk, urine or faeces, however there were no reported results for tissues. Amino-fenitrothion was detected in milk (0.17 mg/L); urine (35.6 mg/L) and faeces (1.8 mg/kg). Seven days after termination of feeding with fenitrothion, residues were not detected in milk, urine or faeces.

Australian Plague Locust Commission – Meat and Fat of Cattle (Original Reference: Miyamato and Sato, 1969).
Ten cattle (average bodyweight 300 kg) were confined in two paddocks treated at either 125 or 375 g fenitrothion/ha. Maximum levels of fenitrothion detected in both meat and fat were 0.014 mg/kg at 1 day after treatment. Levels in meat were <0.001 mg/kg by day 3 after treatment; levels in fat were 0.003 to 0.004 mg/kg on day 7 and 0.001 mg/kg at 10 days after treatment.

Fenitrothion Trial Conducted Jointly by NSW Agriculture and the Australian Plague Locust Commission (APLC), Coonamble NSW 1998

Fenitrothion was aerially applied at a rate of 508 g ai/ha[4] to pastures on which 28 cattle were grazing. The rate applied is the maximum label rate, however it is twice the rate actually used by the APLC for control of Australian plague locusts. Another 38 cattle were introduced to the treated pasture immediately after spraying. Four animals were kept as untreated controls with no exposure to fenitrothion. The study was conducted for 21 days. Treated pasture was sampled at –3, 0, 1, 2, 4, 7, 10, 14 and 21 days after treatment to investigate a residues decline. Soil samples were also taken at the same time points as the pasture samples, at a depth of 25 mm and an area of 100 mm $\times$ 100 mm. Animals were slaughtered at 2, 4, 7, 14 or 21 days after overspraying and/or grazing on treated pasture; biopsy samples[5] were also taken before slaughter. Some cattle were withdrawn from the treated pasture for 2, 4 or 7 days prior to slaughter˄. Samples of subcutaneous fat, renal fat, muscle and liver were taken for analysis. The limit of determination was reported at 0.02 mg/kg in fat, meat and liver and 0.1 mg/kg in pasture samples.

Results from the decline study in pastures showed that average fenitrothion residues of 81 mg/kg on day 0 had declined to 50% of initial levels within 24 hours and declined to 10% of initial levels (2.5 mg/kg) within 7 days. A similar residues decline profile was found in soil, with residues declining within 7 days after treatment.

Fenitrothion residues above the limit of determination were not found in any muscle or liver samples taken (16 samples). Finite residues were detected in subcutaneous fat and renal fat samples as shown in the table below:

Treatment	DAT	Fenitrothion Residues (mg/kg)	
		Subcutaneous fat	Renal Fat
Control	2	0.064	0.025
Overspray and grazing	2	0.021	
Re-entry and grazing		0.020	
Overspray and grazing	4	0.036	
Overspray and grazing	7	0.043	0.037
		0.040	0.025
Re-entry and grazing	7	0.056	0.044

Limit of determination = 0.02 mg/kg.

Finite residues were found in one control animal, however this was thought to be a sample which was incorrectly labelled and thus was not considered valid. No detectable residues were found in any of the three remaining control animals. There were no obvious differences (from a residue perspective) between animals which had been oversprayed and were grazing treated pasture compared to animals which were introduced to the treated paddock and had not been oversprayed. Residues above the limit of determination were not found in any animals at 14 or 21 days after treatment, or in samples from animals which were withdrawn from the treated pasture.

Sumithion Meat and Milk Residue Study In Lactating Dairy Cattle, T-10416, 23 June 1980.

[4] Registered ULV formulation

[5] Fat samples were taken by biopsy. Subcutaneous fat was removed once from the left side and once from the right side near the tail butt. (Reference: modification of technique of Saville et al. 1972).

˄ Animals withdrawn following 3 – 13 days of grazing in the treated area.

Groups of three lactating cows received doses of 0, 10, 30 or 100 ppm in the feed for 28 days. These doses were equivalent to an average of 0.75, 1.80 and 9.6 mg/kg bodyweight. Blood samples were taken from all animals at 1 and 2 weeks prior to the study and on 0, 7, 14 and 28 days during the study. Cholinesterase activity was monitored in the blood samples and any animals which showed inhibition were withdrawn from the treated feed after the 28 day period and monitored until cholinesterase levels had returned to normal (levels on days –14 and –7).

All animals were milked twice daily, and milk samples from days –1, 0, 3, 7, 14, 21 and 28 were analysed for residues. The milk samples were a composite of the morning and afternoon milkings. Cream was analysed separately from milk. The cream and butterfat contents in the milk ranged from 5 – 8 and 3 – 5%, respectively. Residues of fenitrothion, fenitrooxon, aminofenitrothion and *p*-nitrocresol in milk were below the limit of determination of 0.01 mg/kg for all dose groups. The residues data for cream are shown in the table below. Residues of fenitrooxon and *p*-nitrocresol were also determined in cream, however all levels were below 0.01 mg/kg for all feed groups.

Feed Group (ppm)	**Residues in cream (mg/kg)**	
	Fenitrothion	**Aminofenitrothion**
Day 3		
10	<0.01, <0.01, <0.01	<0.01, <0.01, <0.01
30	<0.01, <0.01, <0.01	<0.01, <0.01, 0.01
100	<0.01, <0.01, <0.01, <0.01, 0.01	<0.01, <0.01, 0.01, 0.02, 0.02
Day 7		
10	<0.01, <0.01, 0.01	<0.01, 0.01, 0.01
30	<0.01, 0.01, 0.01	0.01, 0.01, 0.02
100	<0.01, <0.01, <0.01, 0.01, 0.01	0.01, 0.01, 0.02, 0.02, 0.03
Day 14		
10	<0.01, <0.01, <0.01	<0.01, <0.01, <0.01
30	<0.01, <0.01, 0.01	<0.01, <0.01, <0.01
100	<0.01, <0.01, <0.01, <0.01, 0.01	<0.01, 0.01, 0.01, 0.03, 0.04
Day 21		
10	<0.01, <0.01, <0.01	<0.01, <0.01, <0.01
30	<0.01, <0.01, 0.01	0.01, 0.01, 0.01
100	<0.01, <0.01, <0.01, <0.01, <0.01	0.01, 0.01, 0.02, 0.02, 0.03
Day 28		
10	<0.01, <0.01, <0.01	<0.01, <0.01, <0.01
30	<0.01, 0.01, 0.01	<0.01, <0.01, 0.01
100	<0.01, <0.01, <0.01, 0.01, 0.01	<0.01, 0.01, 0.01, 0.02, 0.02

The data show that maximum levels of aminofenitrothion were found in cream in day 7 to day 21 samples. Although there is no accumulation of fenitrothion residues in the cream, even at the 100 ppm level, the MRL of milks [in the fat] will be retained and amended to *0.01 mg/kg; CODEX have defined fenitrothion to be a fat-soluble compound.

For the tissue analyses, samples of liver, kidney, muscle (cardiac, hind-quarter and front-quarter) and fat (omental and perirenal) were taken. Residues above the limit of determination of 0.05 mg/kg were not found in any samples of liver, muscle or fat at any feed level. One finite residue of 0.11 mg/kg aminofenitrothion was found in a kidney sample for the 100 ppm feed group. Residues in the other 8 samples were <0.05 mg/kg. On the basis of the data provided, the single level above

0.05 mg/kg can be considered an outlier. As discussed above for milk, although there is no accumulation of fenitrothion residues in fat, even at the highest level, the meat (mammalian) entry will be amended to meat (mammalian) [in the fat] to be consistent with CODEX and the existing milk MRL description.

Recoveries in fenitrothion, fenitrooxon and p-nitrocresol were within acceptable limits for all samples, at all fortification concentrations ranging 0.05 to 0.3 mg/kg. Recoveries of aminofenitrothion were generally below 60% for all samples and fortification concentrations. Although the recoveries of aminofenitrothion were not within acceptable limits (70 to 110%), as aminofenitrothion is not included in the residue definition for fenitrothion, the recoveries are not crucial in relation to the establishment of an appropriate MRL.

Sumithion Poultry Residue Studies, Project Number T-1149 Broilers; T-1150 Layers, 19 December 1980.

Layer and broiler hens were divided into four treatment groups, each receiving either 0, 10, 30 or 100 ppm in the feed for 28 days. Average intakes for the 10, 30 and 100 ppm feed levels ranged from 0.72 – 2.63, 2.18 – 8.44 and 5.90 – 24.49 mg/kg bodyweight, respectively. Egg samples were collected twice a week from each dose group and frozen until ready for analysis. Eggs from animals in the same dose group were composited. Half of the hens from each dose group were sacrificed on day 14 and the remaining hens were sacrificed on day 28 of the study. Samples of red muscle, white muscle, liver and fat were taken at both sampling points. The residue analyses included fenitrothion and the two metabolites fenitrooxon and *p*-nitrocresol.

Residues in all tissue samples taken on day 14 of the study were below the limit of determination of 0.05 mg/kg over all dose groups. Similarly, residues in all tissue samples taken on day 28 of the study were <0.05 mg/kg over all dose groups. Finite residues of fenitrothion and the two metabolites were not found in any eggs taken over the 28 days period for all dose groups. Recoveries were conducted with fortification of fenitrothion, fenitrooxon and *p*-nitrocresol in tissues and eggs at concentrations of 0.05, 0.15 and 0.30 mg/kg. Recoveries at the limit of determination were within acceptable limits for fenitrothion and metabolites.

Trottier, B.L., and Jankowska, I., Bulletin of Environmental Contamination and Toxicology (1980), 24, 606-610,
Chickens were dosed with ^{3}H-methyl fenitrothion mixed with technical fenitrothion at a rate of 10 mg/kg body weight per week. The chickens were an average weight of 500 g giving and intake equivalent to a total rate of 5 mg per week in the feed (weekly intubations). Since assumed feed intake of chickens (i.e. laying and breeding pullets) is 110 g/day (Manual of Australian Agriculture), this equates to 5 mg in 770 g feed per week (i.e. about 6.5 mg/kg in the feed). Up to 8 intubations were performed over periods of up to 2 months. Maximum radioactivity content (expressed as µg equivalent of ^{3}H fenitrothion/g of tissue) at eight days after the final intubation were 0.071 for abdominal fat and 0.06 for liver. Sixteen days after the final intubation, total radioactive residues were 0.031 and 0.012 µg equivalent of ^{3}H fenitrothion/g of tissue respectively.

JMPR (1977)
Male rats were given a single oral dose of 15 mg/kg (not specified but assumed to be body weight) of ^{14}C-fenitrothion and tissue levels were determined at 1 and 24 h after administration. After 1 h significant levels of radioactivity were found in the kidneys (11.7 mg fenitrothion equivalents/kg),

stomach and intestines (both 5.4 mg/kg fenitrothion equivalents/kg) liver (2.6 mg/kg fenitrothion equivalents/kg), blood (2.1 mg/kg fenitrothion equivalents/kg) and lungs (1.1 mg/kg fenitrothion equivalents/kg). In these tissues, greater than 80% of the radioactivity was accounted for as water-soluble metabolites except in the stomach and intestines where 68% was fenitrothion. In kidneys, 3-methyl-4-nitrophenol at 2.1 mg/kg was detected. Fenitrothion was detected in the fat and pancreas at levels of 0.5 mg/kg.

After 24 h, all tissues contained <0.1 mg/kg of total radioactivity, with highest levels in liver, kidneys, fat, stomach and intestine. The radioactivity was described as being composed of fenitrothion and metabolites, but no values were reported.

Five male rabbits were fed 0.3 and 10 mg/kg fenitrothion (not specified, but assumed to be body weight)/day for six months. Neither fenitrothion (<0.005 mg/kg) nor fenitrooxon (0.001 mg/kg) were detected in blood or muscle. In the fat, 0.13 mg/kg of fenitrooxon was found.

Sumithion Technical Manual
Silage prepared from corn treated at up to 3.36 kg/ha of fenitrothion was fed to lactating dairy cattle for 8 weeks. Fenitrothion was not detected in the milk (<0.001 mg/L) although traces of aminofenitrothion (0.001 – 0.005 mg/L) were present. .

4.2.2 Plant metabolism

HR-80-0049 Degradation and Fate of Fenitrothion Applied to Harvested Rice Grains.
Rice grains (14% moisture content) were treated with ^{14}C-fenitrothion[6] at rates of 6 or 15 mg/kg. The half-life at 15°C was gteater than 12 months and at 30°C was 4 months. Desmethylfenitrothion was the main metabolite present in the first 4.5 months, comprising 10 – 20% of the applied radioactivity. 3-Methyl-4-nitrophenol is the main metabolite formed after 12 months at approximately 17 – 38% of the applied radioactivity. Other compounds formed in small amounts include fenitrothion (*S*-isomer), fenitrooxon, desmethylfenitrothion (*S*-isomer), desmethylfenitrooxon, 3-hydroxymethyl-4-nitrophenol, 1-methoxy-3-methyl-4-nitrobenzene, 1,2-dihydroxy-4-methyl-5-nitrobenzene and 1,2-dimethoxy-4-methyl-5-nitrobenzene.

Fenitrothion and its degradation products (as listed above) penetrated 0.1 mm from the rice grain surface to the outer portions of the endosperm after 12 months. With rice treated at 15 mg/kg, approximately 60% of applied radioactivity was removed by milling, *i.e.* transferred into bran at 30 to 40 times the concentration in unpolished rice, leaving a maximum residue of 4 mg/kg of fenitrothion in uncooked polished rice. With washing and cooking of polished rice, fenitrothion levels decreased to less than 1 mg/kg. Desmethyl fenitrothion and 3-methyl-4-nitrophenol were produced during cooking.

HW-41-0006 Foliage
The foliage came from white spruce [*Picea glauca* (Moench) Voss]. The data presented is consistent with a period of rapid loss of fenitrothion (with a $t_{1/2} \leq 2.5$ days; range 1.5 to 2.5 days) consistent with fenitrothion washing off the foliage. This is followed by a period of slower (and rate-controlling) decay with a $t_{1/2}$ of approximately 30 days. It was postulated that this rate-controlling decay could be as a result of storage of fenitrothion in cuticular waxes.

[6] Labelled in the methyl group on the phenyl ring.

This is consistent with the spray pattern on various parts of the tree canopy. The upper parts of the tree received nearly 6 times more fenitrothion (3.54 mg/kg) than the lower part (0.595 mg/kg) but the initial rate of loss was higher in the upper canopy probably as a result of photodegradation, volatilisation and elution by rain. After about 5 days, 5% of the residues in the upper canopy remained, whereas, for the lower canopy, 18% of the initial residues remained. Thus, levels in both upper and lower parts of the tree were reasonably comparable after this time. Dissipation from spruce foliage did not follow first order kinetics.

Fenitrooxon was found in small amounts, commencing from 1.5 days after spraying, at levels which rarely exceeded 20% of the total residues. No residues of 3-methyl-4-nitrophenol were found.

Spillner, C.J., The Fate of Fenitrothion after Foliar Application to Alfalfa (Stauffer Chemical Company).

^{14}C-Fenitrothion was formulated as an EC and sprayed at 1120g a.i./ha. After 6 weeks, 15.8% of the applied dose remained. Indoor studies showed that greater than 50% of initial residues dissipated by evaporation within 6 h of treatment. Residues (TRR) for fresh alfalfa at 0, 1, 2, 4 and 6 weeks were 23.7, 5.2, 7.1, 4.0 and 2.9 mg/kg (fresh weight basis). Levels of fenitrothion at the same times were 21.6, 0.7, 0.5, 0.01 and 0.003 mg/kg (fresh weight basis). Total radioactivity in hay at the same times were 49.4, 19.2, 20.5, 10.7 and 9.5 mg/kg (i.e. dry weight basis). Residues of fenitrothion at the same times in hay were 14.9, 1.1, 0.7, 0.1 and 0.02 mg/kg (dry weight basis).

4.2.3 Summary of animal and plant metabolism

Feeding studies were provided for dairy cattle, laying and broiler hens and goats.

In the dairy feeding study, animals were exposed to either 10, 30 or 100 mg/kg fenitrothion for 28 days. Residues of fenitrothion, fenitrooxon, aminofenitrothion and *p*-nitrocresol were determined in all tissues, milk and cream. Residues of fenitrothion and the three metabolites were not detected in any of the whole milk samples from all three feed levels. In cream, residues of aminofenitrothion were found at levels ranging from 0.01 to 0.04 mg/kg for the 100 mg/kg feed level. Residues of fenitrothion in cream were 'at or about' 0.01 mg/kg for all dose groups. Although there is no accumulation of fenitrothion residues in the cream, even at the 100 ppm level, the milks [in the fat] MRL entry will be retained and amended to *0.01 mg/kg; CODEX have defined fenitrothion to be a fat-soluble compound.

Residues above the limit of determination of 0.05 mg/kg were not found in any samples of liver, muscle or fat at any feed level. One finite residue of 0.11 mg/kg aminofenitrothion was found in a kidney sample from the 100 ppm feed group. Residues in the other 8 samples were <0.05 mg/kg. On the basis of the data provided, the single level above 0.05 mg/kg can be considered an outlier. As with milk, although there is no accumulation of fenitrothion residues in fat, even at the highest level, the meat (mammalian) entry will be amended to meat (mammalian) [in the fat] to be consistent with CODEX and the existing milk MRL description.

In the hen study, residues in all tissue samples taken on day 14 of the study were below the limit of determination of 0.05 mg/kg over all dose groups. Similarly, residues in all tissue samples taken on day 28 of the study were <0.05 mg/kg over all dose groups. Finite residues of fenitrothion and the two metabolites (fenitrooxon and *p*-nitrocresol) were not found in any eggs taken over the 28 day period for all dose groups.

The data from the hen and cattle feeding studies show that following feeding at levels up to 100 ppm for 28 days, fenitrothion residues above the limit of determination of 0.05 mg/kg were not found in any tissues or eggs and above 0.01 mg/kg in milk and cream.

In relation to the possible outcomes from the fenitrothion review, the transfer studies in hens and dairy cattle have covered the possible exposure levels resulting from pastures and post-harvest treatment of cereals. As there are no changes to the existing cereal grains, wheat bran and wheat germ MRLs, which are 10, 20 and 20 mg/kg, respectively, the existing MRLs of *0.05 mg/kg for poultry meat, poultry offal and eggs are acceptable. In relation to the existing meat (mammalian), edible offal (mammalian) and milk MRLs of *0.05 mg/kg, the feeding data show that the existing MRLs are acceptable considering the possible exposure of up to 100 ppm. A change from meat (mammalian) to meat (mammalian)[in the fat] is recommended to be consistent with the milk [in the fat] entry.

Data from the NSW Agriculture/APLC study have shown that:

- Fenitrothion residues in pasture (dry weight basis) decline within 7 days of treatment at a rate of 508 g ai/ha. A similar residues profile was observed in soil sampled at the same time as the pasture.

- Residues above the limit of determination of 0.02 mg/kg were found in fat samples up to 7 days after an aerial application of fenitrothion at 508 g ai/ha. No detectable residues were found in liver or muscle samples from animals which were oversprayed and/or grazing on treated pasture.

- The withhold from slaughter period of 14 days specified on Off-label Permit 1330 is appropriate for cattle which are oversprayed with fenitrothion and grazing on treated pastures. The withhold from slaughter period allows the existing MRLs for mammalian offal and meat to be adequately met.

Fenitrothion was found in fat of calves at 0.01 mg/kg after feeding for 1 day on pastures treated with fenitrothion at 375 g a.i./ha. In cattle meat and fat, maximum levels of fenitrothion (both at 0.014 mg/kg) occurred 1 day after treatment and were reduced to the limit of detection by 3 days (for meat) and 10 days (for fat) after treatment. Goat data [feeding for 7 days at 7.6 mg/kg (dry weight basis) for 7 days) showed maximum levels of 0.012 mg/kg total radiocarbon in fat and less in meat.

While no direct data are available to establish a metabolic profile in pigs, there is substantial data for other species. Rabbits were fed at a rate of 10 mg/kg body weight/day (equivalent to approximately 200 mg/kg in the diet) for six months, which resulted in levels of 0.2 mg/kg in the fat. Therefore, if a pig were to be fed at 200 mg/kg in the diet, this would equates to 20 times the MRL in cereal grain. Levels in pig fat are therefore unlikely to exceed the meat (mammalian) MRL of 0.05 mg/kg.

While there were 2 isolated results from the 1985 Market Basket Survey showing levels in pork fat above the MRL, subsequent results from the National Residue Survey have shown that there were no reported detections, with a limit of detection of 0.05 mg/kg, in 17992 samples of pork fat.

Rats fed one dose of fenitrothion at 15 mg/kg (not specified, but assumed to be body weight and therefore equivalent to 300 mg/kg in the diet) contained fenitrothion (0.5 mg/kg) in the fat and pancreas 1 h after treatment. When examined 24 hours after treatment, levels in liver, kidneys and fat were all <0.1 mg/kg.

Examination of all the above species, assuming similarity of metabolic profiles with that for pigs, suggests that levels in the fat of pigs fed at 10 mg/kg in the diet are unlikely to exceed 0.05 mg/kg.

With regard to plants, losses of fenitrothion from spruce foliage and alfalfa foliage do not appear to follow first-order kinetics. In stored rice grains, desmethylfenitrothion is the main metabolite formed initially, although 3-methy-4-nitrophenol is the main metabolite formed after 12 months.

With alfalfa [Lucerne] forage, >95% of applied fenitrothion dissipated within 1 week after application. Similarly, for lucerne hay approximately 92% of applied fenitrothion dissipated within a week.

4.3 Methods Of Residue Analysis

4.3.1 Analytical methods

GLC is the method of choice for the quantitation of fenitrothion and metabolites. Separation of fenitrothion and its polar metabolites can also be achieved using liquid column chromatography. For most substrates, the limit of detection is 0.005 mg/kg; limit of quantitation = 0.02 mg/kg, however lower limits of quantitation of 0.004 mg/kg have been reported with detection at 0.001 – 0.002 mg/kg.

HA-71-0031
Fenitrothion has a retention time of 0.93 relative to Parathion with a 10% OV-17 on 80/100 Gas Chrom Q column and can be detected with a flame photometric detector (FPD) in the phosphorus mode.

HR-71-0021
The response of specific phosphorus detectors is adequate for the detection of residues of fenitrothion.

4.3.2 Stability of pesticide residues in stored analytical samples

HR-71-0021
Bulk standards (1-10 g/L) were shown to be stable in methanol for 84 days at −15 to 5°C. Dilute methanolic sample extracts, 0.1 to 5 mg/L in wheat, were shown to be stable for 1 day at room temperature.

4.3.3 Residue definition

The Australian residue definition for fenitrothion is fenitrothion. The CODEX residue definition is fenitrothion (fat soluble). The US residue definition includes fenitrothion and the two metabolites, fenitrooxon and 3-methyl-4-nitrophenol.

4.4 Use Patterns

Table 1: Maximum use patterns from currently registered product labels.

Crop/Situation	Maximum Rate of Application (g ai/ha)	Minimum Re-Treatment Interval	Maximum Number of Applications	Application Timing	Withholding Period*
Pasture	1300	Not specified	As required	As required	7 days
Forage crops including forage sorghum	550	Not specified	As required	As required	7 days
Lucerne	650	Not specified	As required	As required	7 days
Apples	550	Not specified	As required	As required	*7 days/14 days
Cabbages	550	Not specified	As required	As required	*7 days/14 days
Cherries	550	Not specified	As required	As required	*7 days/14 days
Grapes	550	Not specified	As required	As required	*7 days/14 days
Lettuce	550	Not specified	As required	As required	*7 days/14 days
Tomatoes	550	Not specified	As required	As required	*7 days/14 days
Cereal crops (i.e. in the field)	1300	Not specified	As required	As required	*#7 days,
Vines	512	Not specified	As required	As required	7 days
Stored cereal grains	12 mg/kg	monthly intervals	no details	no details	90 days initially

In all of these situations, there is a 7 day restraint on harvesting, grazing or cutting for stockfood; 14 day WHP for harvest for human consumption.
In the case of field use on cereal s, there are a number of labels which specify a withholding period/grazing restraint for stockfood use only (i.e. no withholding period for harvest for human consumption) in addition to some which specify a 14 day WHP for human consumption.

Fenitrothion is also used as a surface spray in cereal storage sheds, broiler poultry house litter, walls, roof and feed sheds.

In addition, the following permits apply:
Maize: (ULV) 3 applications at 7 day intervals at 768 g a.i./ha. 14 day WHP.
Grain sorghum: (ULV) applications at 14 day intervals (no limit) at 768 g a.i./ha. 14 day WHP. (EC) applications at 7 day intervals (no limit) at 500 g a.i./ha. 14 day WHP. (Permit 693; expired but may be renewed)
Grasses and forage crops: (ULV) applications at 3 day intervals (no limit) at 508 g a.i./ha. nil WHP; 14 day withdraw from slaughter interval. (Permit 1330)
Pinus Radiata Plantation: applications (no limit) at 5 g a.i./ha. 7 day WHP (Permit 794)
Forestry experimental plots and native flower crops: applications (no limit) at 500 g a.i./ha. no WHP (Permit 711)

4.5 Residues Resulting From Supervised Trials

HR-81-0156 Pastures

Pastures were sprayed at a rate of either 125 g a.i./ha or 375 g a.i./ha. Following application at 125 g ai/ha, residues of 2.88 mg/kg (fresh weight) on day 1 decreased to 0.52 mg/kg on day 7. At 375 g ai/ha, residues of 6.59 mg/kg (fresh weight) on day 1 decreased to 1.84 mg/kg on day 7 and 1.04 mg/kg on day 10. This suggests a period of rapid decay in the first three days after application followed by a period of slower decay.

Australian Plague Locust Commission – Grass

The APLC provided data from six residue studies. Application of fenitrothion at 267 g ai/ha to pastures resulted in residues of up to 50 mg/kg on day 0, declining to 5 mg/kg 7 days later. The residues were expressed on a fresh weight basis. Data from a New Zealand study showed that 10% of the initial applied concentration remained on grass 9 days after treatment; details of rates etc were not provided.

Mill, A.J., and Tap, D.J., International Pest Control, 1983.
Fenitrothion residue levels were measured in various foods after a spray treatment. Various foods were exposed in a room sprayed with a ‘crack and crevice’ treatment of 1% fenitrothion WP. After 10 days exposure, residues were ≥ 0.3 mg/kg in sausage, ≥ 0.43 mg/kg in milk, 0.1 mg/kg in bread, 0.02 mg/kg in flour and 0.03 mg/kg in apples. The residues in all of the commodities were increasing on day 10, demonstrating absorption of fenitrothion from air, particularly where fatty foods were involved. Peach and sugar had levels of <0.01 mg/kg at day 10 and were not increasing aftre that time.

Table 2 shows use patterns with resulting residues at various times which have identified from a range of trials on file in the NRA. No information is available for intervals between applications.

Country, Year	Application				PHI, days	Residues (mg/kg)	Report
	Form	No	g a.i./ha	g a.i./hL			
Pastures							
New Zealand pre-1974	EC	1	1680		0 2 7 14	74.2 37.7 9.0 3.25	JMPR
Apple							
Japan pre-1974	WP	3		50	7 9-11 13 - 15	0.2 0.1 - 0.3[1] 0.03 - 0.06	JMPR
Cabbages							
Germany pre-1974		1	400		0 1 7 10 14	8.1 1.35 0.05 0.01 0.01	JMPR
Cherries							
		1		200	7 14	0.5 0.2	JMPR
Grapes							
Japan pre-1974	EC	3 3 3 6 6 6	1250		3 7 14 3 7 14	2.84, 2.65 1.15, 1.14 0.90, 0.79 1.60, 1.47 0.65, 0.66 0.61, 0.57	JMPR
Germany pre-1974		1	880		0 7 14 21 50	9.5, 8.8 1.5, 4.5 0.8, 0.27 0.7, 0.15 0.7, 0.1	JMPR
	EC	3	1000		3	1.15, 1.13	JMPR

pre-1974		3 3 6 6 6			7 14 3 7 14	0.64, 0.54 0.16, 0.18 1.43, 1.50 0.60, 0.56 0.15, 0.12	
Lettuce							
no location details (not Australian)		1		200	12.5 20 23	0.5 0.5 0.5	no details
no location details		1	300		1 7 14	0.65 0.06 0.01	JMPR
no location details		1	1000		7 14	1.05 0.3	Bayer 1969

Country, Year	Application				PHI, days	Residues (mg/kg)	Report
	Form	No	g a.i./ha	g a.i./hL			
Rice, polished							
pre-1974 no details		1	15 mg/kg		Initial 1 month 2 months 3 months 6 months	1.02 0.83 0.67 0.58 0.58	Sumitomo 1974
Rice bran (unprocessed)							
pre-1974		1	15 mg/kg		Initial 1 month 2 months 3 months 6 months	65.0 48.1 41.0 41.6 34.8	Sumitomo 1974
Sorghum grain							
Australia, 1996		1[2]	768		Control 0 2 4 6 14 27 34 41	0.16 3.8 0.7 4.4 1.7 0.6 0.5 0.39 0.26	Qld Dept of Natural Resources
Sorghum forage							
Australia, 1996		1[2]	768		Control 0 2 4 6 14 27 34 41	10.6[3] 33.0 4.0 35.4 13.1 4.8 0.49 0.46 0.38	Qld Dept of Natural Resources
Soya bean (dry)							
Japan pre-1974	EC	3	710		3-4 7 9-11 13-15	0.02 - 0.03 0.02 - 0.05 0.001 - 0.002 0.001 - 0.01	JMPR
Tea, Green, Black							
Japan pre-1974		1	78		7 13-14 20-21	0.20 0.09 0.02	JMPR
		1		100	14	0.27	Sumitomo, 1969
Tomato							
Japan pre-1974	EC	6	1000		1 3-4	0.09 - 0.2 0.02 - 0.05	no details

[1]Residues on the outside of the apple are up to 13 times the level in whole fruit at roughly Day 7
[2] Includes a previous application at the same rate at least 1 month previously.
[3] Maximum (dry weight basis) for forage. High blank values for untreated (i.e. all treated 1 month before) samples (10.6 mg/kg on a dry weight basis).

4.7 Fate Of Residues In Storage And Processing

In storage
HR-71-0021

Levels of fenitrothion in a hard, high protein wheat decreased to roughly half of the initially detected levels over a period of about 6 months, with storage at at Malu (Queensland). In a similar experiment at Wattamondra (NSW) there was no measurable decline over 10 weeks in a soft low protein wheat. Storage conditions ro related details such as temperature, applied concentration, etc. were not given. Results for initial concentrations at Malu varied from 3.4 mg/kg to 7.9 mg/kg, depending on the analysing laboratory and the depth of sampling. Initial measurements at Wattamondra were at week 3 and varied from 3.1 to 5.6 mg/kg.

HR-61-0050 Stored grain (wheat and barley)
The $t_{½}$ for fenitrothion in stored grain was claimed to be 4 months. In Queensland silos, levels fell from a mean of 8.7 mg/kg in January to a mean of 4 mg/kg in August (i.e. almost 7 months for a 50% decrease). It was also claimed that residues in aerated storage (e.g. South Australia) after 7-9 months storage were close to double those in unaerated storage. These results demonstrate that MRLs are unlikely to be exceeded by post-harvest treatment following appropriate storage.

HR-71-0054 Loss of Fenitrothion on Grains in Storage.
Loss of fenitrothion from post-harvest application to wheat, oats, paddy rice and sorghum follows a second-order rate process with rate of loss proportional to the amount of fenitrothion and the activity of water, at a fixed temperature. The effect of temperature follows the equation.

$\log t_{1/2} = 1.19 - 0.36T^*$ where T^* = temperature in ^{o}C less 20, and $t_{1/2}$ is in weeks.

The correlation coefficient is 0.998. On this basis, the $t_{1/2}$ for fenitrothion on stored grain at 20^{o}C is about 15.5 weeks but the actual values given for $t_{1/2}$ on wheat at 20^{o}C vary from 20 to 42 weeks. The model is therefore not a good predictor without knowledge of the moisture content.

Bengston et al (1983)
Fenitrothion residues in stored sorghum after 24 weeks were 8.0 and 9.0 mg/kg when used according to practice current at that time (application at 12 mg/kg). Although there have been changes in application procedures since that time, the use pattern is still covered by the label use pattern.

4.6.1 In processing

HR-91-0051
The mean loss of fenitrothion on cooking rice, oats, milled wheat, white flour and wholemeal flour (of wheat) is about 52%.

4.6.1.1 Post-harvest Treatment of Rice and Residues in Processed Commodities

Ito et al. (1976):

Husked rice was treated with fenitrothion at rates ranging 2 – 15 mg/kg, the rice was stored for 12 months and milled under standard commercial practices. During milling, the major part of the residue was removed with the rice bran and this was independent of the treatment rate or storage period. Very low levels of fenitrothion remained on polished rice and this was further reduced upon washing the rice before cooking. The residue in the washed grain was reduced by 50% with cooking. It was shown that the higher the temperature and pressure during cooking, the greater the reduction in residues. Processing data are shown in the tables below:

Rate of Application (mg/kg)	**Storage period (months)**	**Fenitrothion Residues (mg/kg) in Rice Commodities**		
		Husked Rice	**Polished Rice[1]**	**Rice Bran[1]**
2	12	0.61	0.09	4.03
6	12	1.66	0.25	11.7
15	0	9.38	1.02	65.0
	12	4.39	0.55	31.6

1. Ratio of polished rice to bran = 87:13.

Upon application at the maximum rate of 15 mg/kg, residues in husked rice at 0 and 12 months storage were below the existing Australian cereal grains MRL of 10 mg/kg. The maximum treatment rate in Australia is 12 mg/kg. Residues in polished rice were approximately 11 to 12% of the residues in the husked rice. Residues in bran had concentrated by a factor of 7 (in relation to husked rice) regardless of application rate or storage period. Similarly, fenitrothion residues had decreased by 85 to 90% by processing to polished rice. The data show that there is a high potential for residues to concentrate in rice bran and that the existing temporary MRL for rice bran is not appropriate.

Data showing the effect of cooking on fenitrothion residues in rice are shown below:

Rate of Application (mg/kg)	Storage Period (months)	Fenitrothion Residues (mg/kg)				Cooking Method
		Polished Rice	Washed Rice	Wash Water	Cooked Rice	
2	12	0.09	0.03	0.05	0.02	1
					0.01	2
					0.01	3
6	12	0.25	0.08	0.16	0.05	1
					0.03	2
					0.01	3
15	0	1.02		0.60	0.26	1
	12	0.55	0.18	0.37	0.12	1
					0.07	2
					0.04	3

Cooking Methods:
1: Boiling for 15 minutes in an equal volume of water, then cooking for 15 minutes at 80°C.
2: Boiling for 10 minutes at 110°C at 1.5 atm in an autoclave.
3: Cooking for 10 minutes at 120°C at 21 atm in an autoclave.

Under normal cooking conditions, *i.e.* method 1, residues in cooked rice had decreased by 75 to 80% of levels found in polished rice.

Desmarchelier et al. (1980a)

In this study, husked and polished rice was treated at a rate of 15 mg/kg and and sampled after storage at 3 and 6 months. The following residues were found in husked and polished rice:

Rate of Application (mg/kg)	Storage Period	Fenitrothion Residues (mg/kg)	
		Husked Rice	**Polished rice**
15	3	7.7	8.2
	6	4.5	5.5
		Cooked	**Cooked**
	3	3.6	3.2
	6	3.0	2.8

Residues in rice after milling of unhusked rice treated at 15 mg/kg are shown below:

Rate of Application (mg/kg)	Commodity	Fenitrothion Residues (mg/kg)
15	Unhusked Rice	7.7 (3 months storage) 3.5 (6 months storage)
	Husked Rice	0.62
	Polished Rice	0.27
	Cooked Husked	0.39
	Cooked Polished	0.13

The data show that there are significant residue reductions upon milling and cooking of treated unhusked rice.

Submission from Grains Council of Australia

Current treatment rates are 6 mg/kg for a storage period of up to three months and 12 mg/kg for three to nine months storage. The general industry view is that current Australian MRLs are appropriate, but they are only appropriate because the wheat industry has made changes to its outturn standard and the Bulk Handling Companies have modified their operational programs. The Australian Wheat Board and Flour Millers' Council impose a sub-MRL limit of 5 mg/kg for fenitrothion to ensure that residues in unprocessed wheat bran and wheat germ will not exceed the respective MRLs.

In the period 1994-1997, 11509 grain samples were analysed for fenitrothion by the National Residue Survey and only one (barley) MRL violation occurred for fenitrothion.

4.6.2 Residues in the edible portion of food commodities

The following results were on file in the NRA. The results came from grain treated with normal commercial treatment, *i.e.* at label rates of 12 mg/kg. At that time, application was normally directly to grain as it came off the conveyor belt into the silo. The results demonstrate that, particularly for unprocessed wheat bran, violations of the MRL were occurring at that time. These types of results led to the changes in the industry outturn standard mentioned above.

Australian Wheat Board 1984

In November 1983, six flour mills took samples of wheat, bran and wheat germ at 4-hourly intervals, giving a total of 10 sets of each of the three commodities from each mill.

maximum residue on wheat   5.0 mg/kg (mean 2.9 mg/kg)
maximum residue on bran   22.6 mg/kg (mean 12.8 mg/kg)
maximum residue on germ   19.8 mg/kg (mean 11.1 mg/kg)

Flourmiller's Council Ref No 1563/83 and 164/84

Wheat	0.8 – 5.5 mg/kg
Bran	4.7 – 21 mg/kg
Germ	2.8 – 17 mg/kg

Item 7.1.2, Nov 1984 PACSC, Annex A
Australian Survey

Raw bran	<10 – 20 mg/kg
Processed bran	<0.1 – 4 mg/kg
Wheat bran up to	23 mg/kg

4.6.3 Summary for residues in the edible portion of food commodities

The results above suggest that current MRLs for polished rice and wheat bran, unprocessed may not be appropriate. Levels in wheat germ also closely approach the relevant MRL and may have the potential to be a problem. The Australian polished rice MRL is in conflict with the existing CODEX MRL and there have been previous requests for it to be changed or removed. In addition, there is currently no Australian MRL for rice bran although there is a CODEX MRL for **Rice bran, unprocessed**.

Apart from rice bran, the general industry view, is that current Australian MRLs for cereals are appropriate, but they are only appropriate because the wheat industry has made changes to its outturn standard and the Bulk Handling Companies have modified their operational programs. The Australian Wheat Board and Flour Millers' Council impose a sub-MRL limit of 5 mg/kg for fenitrothion to ensure that residues in unprocessed wheat bran and wheat germ will not exceed the respective MRLs.

The CODEX MRL for **Rice bran, unprocessed** may be appropriate if similar practices to those followed by the Australian Wheat Board and Flour Millers' Council are followed for rice. If this process can be regarded as part of GAP for cereals, then no label changes are required to ensure that violations will not occur.

4.7 Residues In Food In Commerce At Consumption/ Dietary Intake. Anzfa

Market Basket Surveys (1982, 1983, 1985, 1986, 1987, 1990, 1992 and 1994)

In the earlier Market basket surveys, there were concerns as consumption of fenitrothion approached the ADI. This was the reason for obtaining the survey results which are on file in the NRA. In more recent years, changed application methods and use patterns with stored grains have led to a reduction in these concerns (refer to the submission from the Grains Council of Australia). By the time of the 1992 survey, fenitrothion consumption was estimated to be only 50.5% of the ADI for a child aged 2 in the worst case (adult 19%). An even lower result (15.1% of the ADI for a child aged 2; 5.5% for an adult) was found in the 1994 Market Basket survey.

The 1985 Market Basket Survey showed residues above MRLs detected in 2 out of 20 pork chops. The results from the National Residue Survey (see below), where no residues of fenitrothion were detected in over 17 000 pig samples from 1989 to 1997, have confirmed that there was no problem in this regard.

National Residue Survey

As part of the National Residue Survey's Random Monitoring Program from January 1989 to July 1997, 108985 meat or fat samples from animals were analysed. This included 48104 samples from cattle; 34659 samples from sheep and 17992 samples of fat from pigs. Fenitrothion was not detected in any samples. The limit of detection was 0.05 mg/kg in all cases.

4.8 National Maximum Residue Limits

Existing entries in the *MRL Standard*

Table 1

Fenitrothion

Codex	Code	Commodity	MRL	Comment
FP	0226	Apple	0.5	Feb 1974 (trade, from CODEX)
VB	0041	Cabbages, Head	0.5	February 1977
GC	0080	Cereal grains	10	November, 1975
FS	0013	Cherries	0.5	Feb 1974 (trade, from CODEX)
SB	0715	Cacao beans [cocoa beans]	0.1	Feb 1974 (trade, from CODEX)
MO	0105	Edible offal (mammalian)	*0.05	Separate entry 1991
PE	0112	Eggs	*0.05	September 1986
		Fruits [except cherries and grapes]	0.1	February 1981
FB	0269	Grapes	0.5	Feb 1974 (trade, from CODEX)
VL	0482	Lettuce, Head	0.5	Feb 1974 (trade, from CODEX)
VL	0483	Lettuce, Leaf	0.5	Feb 1974 (trade, from CODEX)
MM	0095	Meat [mammalian]	*0.05	February 1977
ML	0106	Milks [in the fat]	*0.05	February 1977
PO	0111	Poultry, Edible offal of	*0.05	September 1986
PM	0110	Poultry meat	*0.05	September 1986
CM	1205	Rice, polished	0.1	February 1977
VD	0541	Soya bean (dry)	0.3	November, 1975
GS	0659	Sugar cane	0.02	November, 1975
DT	1114	Tea, Green, Black	0.5	February 1977
VO	0448	Tomato	0.5	February 1977
TN	0085	Tree nuts	0.1	February 1981
		Vegetables [except cabbages, head; lettuce, head; lettuce, leaf; soya bean (dry); tomato]	0.1	February 1981
CM	0654	Wheat bran, unprocessed	20	February 1977
CF	1210	Wheat germ	20	November 1984

Table 3
Fenitrothion Fenitrothion

Table 4

Compound	*Animal feed commodity*	*MRL (mg/kg)*
Fenitrothion		
AS 0161	Straw, fodder (dry) and hay of cereal grains and other grass-like plants (dry weight basis).	T10

The above temporary MRL will expire on 30 June 1999.

Table 5
Fenitrothion -for use in seed dressings.

Water MRLs

A MRL in water was set at 0.03 mg/L in 1979. Water MRLs have normally been set at a level equivalent to an intake of 10% of the ADI**.** In February 1982, this MRL was amended to 0.06 mg/L. The basis for this revision is unclear. JMPR in 1982 recommended a revised (lower) temporary ADI as a result re-evaluation in the light of the IBT situation. In September 1986, the water MRL was revised to 0.02 mg/L. These MRLs were removed from the *MRL Standard* some years ago.

CODEX MRLs

FP 0226	Apple	0.5	
VB 0041	Cabbages, Head	0.5	
SB 0715	Cacao beans	0.1	
VB 0404	Cauliflower	0.1	
GC 0080	Cereal grains	10	
FS 0013	Cherries	0.5	
FC 0001	Citrus fruits	2	
VC 0424	Cucumber	0.05	(*)
VO 0440	Egg plant	0.1	
FB 0269	Grapes	0.5	
VA 0384	Leek	0.2	
VL 0482	Lettuce, Head	0.5	
MM 0095	Meat (from mammals other than marine mammals)	0.05	(*)(fat) E
ML 0106	Milks	0.002	(*) E
VA 0385	Onion, Bulb	0.05	
FS 0247	Peach	1	
FP 0230	Pear	0.5	
VP 0063	Peas (pods and succulent = immature seeds)	0.5	
VO 0051	Peppers	0.1	
VR 0589	Potato	0.05	(*)
VR 0494	Radish	0.2	
CM 1206	Rice bran, unprocessed	20	
CM 1205	Rice, Polished	1	
VD 0541	Soya bean (dry)	0.1	
FB 0275	Strawberry	0.5	
DT 1114	Tea, Green Black	0.5	
VO 0448	Tomato	0.5	
CF 0654	Wheat bran, Processed	2	
CM 0654	Wheat bran, unprocessed	20	
CF 1211	Wheat flour	2	
CF 1212	Wheat, wholemeal	5	
CP 1211	White bread	0.2	

4.9 Appraisal

From performance questionnaires, important uses for fenitrothion appear to be uses on stored cereals, for locust control in cereals and pastures, in poultry houses and on pastures in Tasmania for control of several pest insects. It is also used on skins and hides.

The TMDI calculation for fenitrothion, using the proposed entries for commodities and MRLs, is 2300% of the ADI. This is a gross overestimate as, according to Market Basket results, consumption of treated food accounts for <6% of the ADI for adults. It is clear that the use of TMDI calculations is not appropriate for this chemical, given its wide range of very limited uses as discussed below.

Many of the MRLs were established for locust control, and while residues may occur, they only occur at levels approaching the MRL with very low frequency e.g. APLC states that grapes have been sprayed for locust control once in 15 years and that vegetables have never been sprayed by APLC for locust control.

Post-harvest storage treatment of cereals will almost always leave significant levels of fenitrothion, but only rarely will these levels approach the MRL due to current application practices and standards set by the grains industry.

There has been some difficulty in defining current use patterns on registered labels and relating label use patterns to current good agricultural practice. Without clearly defined use patterns it is difficult to tell whether or not existing MRLs are appropriate.

There appear to be a number of situations where there are existing MRLs with no label use patterns:

SB	**0715**	**Cacao beans [cocoa beans]**	0.1
GS	**0659**	**Sugar cane**	0.02
DT	**1114**	**Tea, Green, Black**	0.5
TN	**0085**	**Tree nuts**	0.1

These entries should be deleted if they are not considered necessary.

Conversely, there is a need for MRLs to cover some existing use patterns: There are use patterns for lucerne and there are measurable residues in rice bran for post-harvest treatment of rice.

There are a large number of crops which could be potentially at risk from locust damage, for which there are no defined use patterns and no MRLs. According to QDPI, for example, crops at risk from spur-throated locust included citrus, macadamia, mangoes, avocado, litchi, sugar cane, cashews, lettuce, kiwi fruit, stone fruit, pome fruit, persimmons, custard apple, sunflower, pulse crops, cotton, dates, cucurbits, capsicums, plus some native flower crops and some forestry experimental plots.

In some cases, the seven day withholding period on the label is not appropriate. This can be explained by the fact that the commodities were first considered prior to 1976. It was then a routine procedure to set a seven day withholding period for any uses on fruit and vegetables. It has been assumed that these trials were based on current Good Agricultural Practice. It is suggested that these use patterns should be applied to the labels, using the current label application rates, unless there is a perceived problem with efficacy. Where there is insufficient data to allow the setting of a permanent MRL or where only overseas data are available, it is suggested that the MRL be temporary for a period of 3 years to allow appropriate data to be generated.

It is evident that there can be spray drift associated with aerial spraying of fenitrothion, therefore it is suggested that aerial application only be allowed for those situations where such application is essential. One reason for minimising the potential for spray drift is the fact that fenitrothion can be readily absorbed when applied to animals. The recent studies conducted by NSW Agriculture show that an appropriate withhold from slaugher period allows residues in oversprayed animals to fall within the animal commodity MRLs.

Relevant MRLs (for fruits and vegetables, as discussed below) would need to be in place to cover locust control treatments where such crops may be aerially sprayed. In such a situation, consideration would need to be given to how such MRLs are to be used in calculating dietary intake. For control of other insect pests listed on current registered labels, appropriate data would have to be generated.

Lucerne

The following use pattern has been defined from trials: Maximum of 1 application per season and a 7 day withholding period.

The current maximum label application rate for lucerne is 650 g a.i./ha. According to the results reported by Spillner, C.J., (a published metabolism study) for an EC sprayed at 1120 g a.i./ha., for fresh alfalfa, levels of fenitrothion at 1 week after application were 0.7 mg/kg (fresh weight basis) or 4.7 mg/kg (dry weight basis, assuming 85% moisture). Residues of fenitrothion at the same times in hay were 1.1 mg/kg (dry weight basis).

On that basis, the following interim Table 4 entries (dry weight basis) appear appropriate for use of fenitrothion on lucerne.

AL 1020	**Alfalfa fodder [Lucerne]**	T5
AL 1021	**Alfalfa forage (green) [Lucerne]**	T5

Apples

The following use pattern has been defined from trials: Maximum of 3 applications per season, with 14 days between each application and a 14 day withholding period.

The current maximum label application rate for apples is 550 g a.i./ha. The residues resulting in apples from three applications at 50 g a.i./hL (no information on a per area basis but this does equate to 1000 g a.i./ha if an application of 2000 L/ha of a 50 g a.i./hL solution is assumed) were 0.3 mg/kg at 9-11 days after treatment. Residues in apple skin were up to 13 times the levels in whole fruit (i.e. 4 mg/kg). Feeding at up to 10 mg/kg does not cause problems with animal commodity MRLs (108773 samples analysed by the NRS over a nine year period with no detections; LOD 0.05 mg/kg). As apple pomace is fed wet and does not make up 100% of an animal’s diet it is unlikely that this will cause problems with animal commodity MRLs. The dairy transfer study shows that feeding at levels of 10 mg/kg does not lead to residues above the current animal commodity MRLs. On that basis, the current Table 1 value (0.5 mg/kg) would appear to be appropriate for use of fenitrothion on apples. However, because there is no Australian data for apples and no authenticated record that application of fenitrothion to apples has occurred for many years, the entry should be deleted i.e.

DELETE

FP	**0226**	**Apple**	0.5

An emergency use application with the above maximum use pattern, could be granted as required without further evaluation. Resulting residues of fenitrothion would be covered by the proposed MRL for fruits (below).

Cabbages

The following use pattern has been defined from trials: Maximum of 1 application per season and a 7 day withholding period.

The current maximum label application rate for cabbages is 550 g a.i./ha. From trial data, 1 application at 400 g a.i./ha results in residues of 0.05 mg/kg 7 days after application. On that basis, the current Table 1 value (0.5 mg/kg and consistent with CODEX) should not be exceeded by the current label use of fenitrothion on cabbages. However, because there is no Australian data for cabbages and no authenticated record that application of fenitrothion to cabbages has occurred for many years, the entry should be deleted i.e.

DELETE

VB	**0041**	**Cabbages, Head**	0.5

An emergency use permit application with the above maximum use pattern, could be granted as required without further evaluation. Resulting residues of fenitrothion would be covered by the proposed MRL for vegetables (below).

Cereal Grains

The existing MRLs appear to be adequate for cereals (except rice) if existing industry practices are maintained. Current treatment rates are 6 mg/kg for a storage period of up to three months and 12 mg/kg for three to nine months storage. The current use patterns followed by industry should be defined on registered labels. On that basis, the following entries in Table 1 of the *MRL Standard* should be maintained:

GC	**0080**	**Cereal grains**	10
CM	**0654**	**Wheat bran, unprocessed**	20
CF	**1210**	**Wheat germ**	20

The cereal grain entry covers **CM 1205 Rice, polished.** This entry is therefore superfluous and can be deleted.

The basis of the current entry for **CM 1205 Rice, polished** is difficult to ascertain, although the Pesticides and Agricultural Chemicals Committee (PACC) may have adopted the MRL recommended by JMPR in 1974 of 0.1 mg/kg in 1977. The CODEX MRL subsequently changed to 1 mg/kg. Requests have been made for a change to this entry in the past and in 1989, PACC recommended its deletion as residues in polished rice would be covered by the MRL for cereal grains. This deletion did not occur then. It should occur now, for the same reasons.

There is a need for an entry in Table 1 of the MRL Standard to cover the situation with Rice Bran. While the data indicates that a higher MRL could be required, if the same industry practices are followed with rice bran as with wheat bran, the following temporary Table 1 entry, consistent with the current CODEX MRL, should suffice:

CM	**1206**	**Rice bran (unprocessed)**	T20

Once processing data have been provided to establish an appropriate rice bran MRL, the entry will be amended.

Cherries
The following use pattern has been defined from trials: Maximum of 1 application per season, and a 7 day withholding period

From trial data, 1 application with a 200 g a.i./hL spray (no indication on an area basis, but this does equate to 4000 g/ha if an application of 2000 L/ha of a 200 g a.i./hL solution is assumed) results in residues of 0.5 mg/kg 7 days after application to the fruit. The current maximum label application rate for cherries is 550 g a.i./ha.

On that basis, the existing Australian and CODEX MRL value (0.5 mg/kg) appears appropriate. However, because there is no Australian data for cherries and no authenticated record that application of fenitrothion to cherries has occurred for many years, the entry should be deleted i.e.

DELETE

FS	**0013**	**Cherries**	0.5

An emergency use application with the above maximum use pattern, could be granted as required without further evaluation. Resulting residues of fenitrothion would be covered by the proposed MRL for fruits (below).

Cocoa
There is no data or use pattern. This entry is required only because there is a CODEX MRL. Therefore, it is recommended that the following entry should be deleted:

SB	**0715**	**Cacao beans [cocoa beans]**	0.1

'Animal' MRLs

Australian MRLs for milk are set [in the fat]. Although the Australian MRL for meat is not [in the fat], original Australian MRLs were set at the same value for meat and fat of meat. These were then translated to CODEX commodities as meat, not as meat [in the fat]. Metabolism studies suggest that while peak levels in meat and fat are similar, residues are more persistent, and therefore more likely to be detected, in fat.

Although the dairy cattle feeding study showed that residues of fenitrothion are unlikely to exceed the existing animal commodity MRLs, the entries will become temporary until additional data are received. These data will confirm the animal feed commodity MRL of T10 mg/kg for straw and fodder of cereal grains and sorghum.

MO	**0105**	**Edible offal (mammalian)**	T*0.05
MM	**0095**	**Meat (mammalian) [in the fat]**	T*0.05
ML	**0106**	**Milks [in the fat]**	T*0.01

There is a CODEX MRL for meat [in the fat]. There do not seem to have been problems with meat in the US, even with a different residue definition. However, in the case of dispute, the CODEX residue definition is applicable to residues in meat and there is no concern with metabolites for this commodity.

The study jointly conducted by APLC and NSW Agriculture showed that the 14 day withhold from slaughter period for Australian Plague locust control allows residues in animal commodities to fall to below the animal commodity MRLs. The rate used in the trial was 508 g ai/ha; the APLC have indicated that the actual rate used is approximately half the label rate.

The situation is less clear for offal with regard to trade. There is no CODEX MRL for edible offal. There is no US tolerance for fenitrothion in offal, so any detection of any of the components of the US residue definition is a violation for produce exported to the US. Therefore, the US residue definition is relevant for exported offal, and metabolites (i.e. fenitrooxon and 3-methyl-4-nitrophenol) must be considered. Historically, however, there is no indication of a problem in this regard.

With regard to aminofenitrothion, there are measurable levels present in cream as long as feeding of treated material continues. The residues dissipate within seven days when feeding of treated material ceases. Aminofenitrothion is not considered by JMPR to be of toxicological concern and is not included in any residue definition. Therefore, the presence of aminofenitrothion in cream is not considered to be an issue.

With regard to poultry MRLs,

PE	**0112**	**Eggs**	*0.05
PO	**0111**	**Poultry, Edible offal of**	*0.05
PM	**0110**	**Poultry meat**	*0.05

it should be noted that, as stated in the trade report, fenitrothion has not been detected in poultry products in any of the residue surveys. The hen feeding study showed that at levels up to 100 mg/kg in the feed, residues above the limit of determination (0.05 mg/kg) were not found in eggs, poultry meat or offal. The compounds analysed in the study included fenitrothion, fenitrooxon and *p*-nitrocresol.

Fenitrothion is used in poultry houses, with results in Mill, A.J., and Tap, D.J., *International Pest Control*, (1983) suggesting that fenitrothion may accumulate in fatty tissue in sealed rooms. As the exposure to hens from such a treatment is unlikely to result in residues greater than the existing poultry MRLs, such a use is considered to be negligible from a residues perspective. Again, the 'meat' entry should be [in the fat].

For food animals in general, however, there does not appear to be any likelihood of bioaccumulation of fenitrothion, based on over 100 000 survey results. On available information, and as borne out in practice, feeding of pasture containing fenitrothion at a maximum of 10 mg/kg (dry weight basis) does not appear to be inconsistent with existing 'animal' MRLs but it is not possible to safely define a maximum feeding level without appropriate data.

Fruit
The existing entry for fruit i.e.

Fruits [except cherries and grapes]	0.1

is inappropriate and should be deleted. It should be replaced with the following entry to cover any emergency use situations which may arise from time to time:

Fruits	1

This value is required to cover the possible levels which may arise from application to grapes (see below).

Grapes
Although the existing label withholding period for grapes is 14 days (7 days for harvest for stockfood), the following use pattern has been defined from trials: Maximum of 1 application per season and a 21 day withholding period.

The existing entry is:

FB	**0269**	**Grapes**	0.5

A use pattern with 1 application at 880 g a.i./ha gives fenitrothion residues in grapes of 0.7 mg/kg at 21 days. The current maximum label application rate for grapes is 550 g a.i./ha. The use pattern above may be consistent with the existing MRL because of current application procedures but it cannot be assumed that foliar application and/or aerial application does not occur. The existing label use pattern with a 14 day withholding period (7 day for harvest for stockfood) is not likely to be appropriate.

There is no Australian data for grapes. Also, although there is a possible current situation where fenitrothion may need to be applied to grapes for locust control, there is only one authenticated record that application of fenitrothion to grapes has occurred in the last 20 years. Therefore, the entry should be deleted i.e.

DELETE

FB	**0269**	**Grapes**	0.5

An emergency use application with the above maximum use pattern, could be granted as required without further evaluation. The recommended fruits MRL (above) should be adequate for such a use pattern on grapes.

Lettuce
The following use pattern has been defined from trials: Maximum of 1 application per season and a 14 day withholding period.

A use pattern of 1 application at 1000 g a.i./ha gives fenitrothion residues of 0.3 mg/kg at 14 days. The current maximum label application rate for lettuce is 550 g a.i./ha. On that basis, the current Table 1 entries would appear to be appropriate for use of fenitrothion on lettuce. Because there is no Australian data at the maximum label use pattern and no authenticated record that application of fenitrothion to lettuce has occurred for many years, the entry should be deleted i.e.

DELETE

VL	**0482**	**Lettuce, Head**	0.5
VL	**0483**	**Lettuce, Leaf**	0.5

An emergency use application with the above maximum use pattern, could be granted as required without further evaluation. Resulting residues of fenitrothion would be covered by the proposed MRL for vegetables (below).

Soya bean

The following use pattern has been defined from trials: Maximum of 3 applications per season, with 14 days between each application and a 7 day withholding period.

A use pattern of 3 applications at 710 g a.i./ha with 14 days between each application gives fenitrothion residues of 0.05 mg/kg for soya bean (dry) at 7 days. The current maximum label application rate for soya bean is either 550 g a.i./ha or 1300 g a.i/ha (if soya bean can be regarded as pasture). In either situation, the current Table 1 entry would appear to be appropriate for use of fenitrothion on soya bean. Because there is no Australian data at the maximum label use pattern and no authenticated record that application of fenitrothion to soya bean has occurred for many years, the entry should be deleted i.e.

DELETE

VD	**0541**	**Soya bean (dry)**	0.3

An emergency use application with the above maximum use pattern, could be granted as required without further evaluation. Resulting residues of fenitrothion would be covered by the proposed MRL for vegetables (below).

Sugar Cane

There is no data and no use pattern for fenitrothion on sugar cane. Therefore, it is recommended that the following Table 1 entry should be deleted:

GS	**0659**	**Sugar cane**	0.02

Tea

There is no use pattern for fenitrothion on tea. It is required only because there is a CODEX MRL. Therefore, it is recommended that the following Table 1 entry should be deleted:

DT	**1114**	**Tea, Green, Black**	0.5

Tomatoes

The following use pattern has been defined from trials: Maximum of 6 applications per season, with 7 days between each application and a 4 day withholding period.

A use pattern of 6 applications at 1000 g a.i./ha gives fenitrothion residues of 0.05 mg/kg in tomatoes at 3-4 days after the final application. The current maximum label application rate for tomatoes is 550 g a.c/ha. On that basis, the current Table 1 entry would appear to be appropriate for use of fenitrothion on tomatoes. Because there is no Australian data at the maximum label use pattern and no authenticated record that application of fenitrothion to tomatoes has occurred for many years, the entry should be deleted i.e.

.

DELETE

VO	**0448**	**Tomato**	0.5

An emergency use application with the above maximum use pattern, could be granted as required without further evaluation. Resulting residues of fenitrothion would be covered by the proposed MRL for vegetables (below).

Tree nuts

There is no data and no label use pattern for fenitrothion on tree nuts (although, in the case of locust control, it would presumably be the use pattern of the APLC). Therefore, in the absence of better information, it is recommended that the following Table 1 entry should be deleted:

TN	**0085**	**Tree nuts**	0.1

If data is provided, this situation could be re-assessed since Cashew Nuts, for example, could be at risk of locust attack in some situations.

Vegetables [except cabbages, head; lettuce, head lettuce, leaf; soya bean (dry); tomato

The entry for vegetables i.e.

Vegetables [except cabbages, head; lettuce, head; lettuce, leaf; soya bean (dry); tomato]	0.1

is inappropriate and should be deleted. It should be replaced with the following entry to cover any emergency use situations which may arise from time to time:

Vegetables	0.5

This value should be appropriate to cover residues arising from emergency use situations on cabbage, lettuce, soya beans and tomatoes.

Vines

There is no data, and no *MRL Standard* entry to cover this use pattern. Therefore, it should be deleted from relevant labels.

Straw, fodder (dry) and hay of cereal grains and other grass-like plants (including sorghum)

The existing temporary MRL should be appropriate. Off-label permit use on sorghum at up to 768 g a.i./ha (1 application) at 14 day intervals requires a 14 day withholding period and grazing restraint [Situation 1]. The label use pattern for field use on cereal crops should then be as for sorghum unless it can be demonstrated on efficacy grounds that a higher application rate is needed.

Applications under off-label permit to pasture at up to 508 g a.i./ha at 3 day intervals (maximum 2 applications), require no grazing restraint; 14 day withdraw from slaughter interval and 7 day WHP for harvest of treated material [Situation 2]. While data indicated that a retreatment interval of greater than 3 days and/or a longer withholding period could be required for sorghum, it is understood that this treatment is applied only to sorghum seed crops rather than forage crops intended for animal consumption. On this basis, the retreatment interval may be appropriate.

With regard to grain from treated sorghum, sorghum treated at 768 g a.i./ha with a previous application at least one month before had levels of 4.4 mg/kg 4 days after treatment. Thus an MRL of 10 mg/kg for cereal grain will not be exceeded for the first of the two situations. For the second situation, residues on grain, following 2 applications are unlikely to exceed 8.8 mg/kg 4 days after application, even if both applications were made at once. With actual application rates lower, 3 days between the first and second applications and an extra 3 days after application for further decay to occur, it is unlikely, even in the second situation, that an MRL of 10 mg/kg would be exceeded for grain.

With regard to fodder and forage, sorghum treated at 768 g a.i./ha with a previous application at least one month before had levels of 4.8 mg/kg (on a dry weight basis) 14 days after treatment (although it is noted that a sample treated at an unspecified rate about 1 month before contained 10.6 mg/kg fenitrothion). Thus the recommended temporary Table 4 figure is probably appropriate to cover the situation in the first case, although more data are required to clarify the situation. Pasture treated at 1680 g a.i./ha (i.e. at a total rate greater than that which would result from 2 applications at 7 day intervals at 768 g a.i./ha or from 3 applications at 508 g a.i./ha at 3 day intervals, or a single application at 1300 g a.i./hL) contained 9 mg/kg Fenitrothion on Day 7 after treatment. Thus, the existing temporary MRL is probably appropriate, but with little margin, for maize and pastures other than sorghum. It is understood that a repeat application is seldom required.

Data indicates that feeding of animals on pasture containing fenitrothion initially at 10 mg/kg (but with rapid decrease in the field) is unlikely to result in violations of existing ‘animal’ MRLs. With regard to sorghum in the case of the second use pattern, sorghum treated at 768 g a.i./ha with a previous application at least one month before had levels of 13.1 mg/kg (on a dry weight basis) 6 days after treatment. It is unlikely that a 7 day WHP would be appropriate in the case of sorghum fodder for animal feed with this use pattern but it understood that this situation does not arise.

Spray Drift.
For locust control, it is understood that spray applications will be made downwind of animals, houses, water bodies etc., and, where applicable, not within legally specified distances. Also, it is recognised that the Australian Plague Locust Commission allows a buffer zone of 1.5 km downwind from spray sites because the Commission exclusively applies ULV formulations with a Volume Median Diameter of ≈ 90 μ (APLC, pers comm.). Resulting spray drift has been demonstrated to occur up to 600 m downwind in these circumstances, as shown in residue results in the APLC submission.

Crack and Crevice’ treatment (relevant to poultry)
The data published by Mill, A.J., and Tap, D.J**.** shows that fenitrothion from ‘crack and crevice ’treatment is still being absorbed into fatty tissue 10 days after application. This is however, not the way food would normally be stored. The question of levels of fenitrothion in air in a closed room is

not a residue issue. There is a product registered for this type of use, but it is for use in external situations only (i.e. not in a closed environment). It is therefore unlikely that there will be a residue issue with normal food storage from this type of use.

There is nevertheless evidence that fenitrothion can lead to measurable levels in food which does not come into direct contact with the spray. Fenitrothion is used as a surface spray in silos and in chicken sheds. It is not an issue for cereal storage where there is already an MRL to cover stored grain, but this is another reason why Australian data for poultry should be requested.

Table 5

There is a Table 5 entry for fenitrothion for use as a seed dressing, yet no labels have been provided for seed dressings containing fenitrothion. This entry can therefore be deleted. There are also two permits which are not covered by Table 5 entries. One of these is for use in *Pinus Radiata* plantations and appears to have a very low application rate. No comment will be made on this at this stage unless this is raised as an issue in the efficacy or environment reports.

4.10 Conclusions

The following conclusions are made as a result of this review:

Definition of the residue: fenitrothion.

Delete *MRL Standard* entries (Table 1) for:

FP	**0226**	**Apple**	0.5
VB	**0041**	**Cabbages, Head**	0.5
SB	**0715**	**Cacao beans [cocoa beans]**	0.1
FS	**0013**	**Cherries**	0.5
MO	**0105**	**Edible offal (mammalian)**	*0.05
		Fruits [except cherries and grapes]	0.1
FB	**0269**	**Grapes**	0.5
VL	**0482**	**Lettuce, Head**	0.5
VL	**0483**	**Lettuce, Leaf**	0.5
MM	**0095**	**Meat [mammalian]**	*0.05
ML	**0106**	**Milks [in the fat]**	*0.05
CM	**1205**	**Rice, polished**	0.1
VD	**0541**	**Soya bean (dry)**	0.3
GS	**0659**	**Sugar cane**	0.02
DT	**1114**	**Tea, Green, Black**	0.5
VO	**0448**	**Tomato**	0.5
TN	**0085**	**Tree nuts**	0.1
		Vegetables [except cabbages, head; lettuce, head; lettuce, leaf; soya bean (dry); tomato]	0.1

ADD the following Table 1 entries:

MO	**0105**	**Edible offal (mammalian)**	T*0.05
		Fruits	1
MM	**0095**	**Meat (mammalian)[in the fat]**	T*0.05
ML	**0106**	**Milks [in the fat]**	T*0.01
CM	**1206**	**Rice bran, unprocessed**	T20
		Vegetables	0.5

Table 4

DELETE

AS	**0161**	**Straw, fodder (dry) and hay of cereal grains and other grass-like plants (dry weight basis)**	T10

ADD:

AL	**1020**	**Alfalfa fodder [Lucerne]**	T5
AL	**1021**	**Alfalfa forage (green) [Lucerne]**	T5
AS	**0161**	**Straw, fodder (dry) and hay of cereal grains and other Grass-like plants**	T10

The current Table 5 entry appears to be unnecessary and should also be deleted.

The Table 1 entries for fenitrothion in the MRL Standard will be:

Table 1

Compound		**Food**	**MRL (mg/kg)**
Fenitrothion			
	GC 0080	Cereal grains	10
	MO 0105	Edible offal (mammalian)	T*0.05
	PE 0112	Eggs	*0.05
		Fruits	1
	MM 0095	Meat (mammalian) [in the fat]	T*0.05
	PO 0111	Poultry, Edible offal of	*0.05
	PM 0110	Poultry meat [in the fat]	*0.05
	ML 0106	Milks [in the fat]	T*0.01
	PO 0111	Rice bran, unprocessed	T20
		Vegetables	0.5
	CM 0654	Wheat bran, unprocessed	20
	CF 1210	Wheat germ	20

Table 4

Compound		**Animal Feed Commodity**	**MRL (mg/kg)**
Fenitrothion			
Add:			
	AL 1020	Alfalfa fodder [Lucerne]	T5
	AL 1021	Alfalfa forage (green)[Lucerne]	T5
	AS 0161	Straw, fodder (dry) and hay of cereal grains and other grass-like plants	T10

The following withholding periods are recommended in relation to the above MRLs:

Sorghum and cereal forage and fodder	14 days
Pastures and lucerne	7 days for grazing
Locust control (aerial application)	14 days withhold from slaughter for oversprayed animals

Define the following use patterns on labels (all at existing label application rates unless otherwise specified):

Lucerne:
Maximum of 1 application per season at 650 g a.c/ha and a 7 day withholding period.

Stored Cereals
Use patterns should be as per current industry practice i.e.
Maximum of 1 application at 6 mg/kg when storage periods are less than 3 months.
Maximum of 1 application at 12 mg/kg when storage periods are 3 to 9 months.

Field use on cereal grains and other grass-like plants (including sorghum and pastures)
For applications at up to 768 g a.i./ha(sorghum) at 14 day intervals, 14 day withholding period and grazing restraint. The label use pattern for field use on cereal crops should be as for sorghum. For applications to pastures other than cereals and lucerne, at a label rate of up to 1300 g a.i./ha (for example, for control of Corbie, Winter Corbie or Oxycanus Grass Grub), a single application only should be allowed with a 7 day withholding period and grazing restraint. If the rates are to be lowered then the data requirements will be re-considered.

Field use on cereals and other grass-like plants (including sorghum and pastures)

For applications to pastures at up to 508 g a.i./ha at 3 day intervals (maximum 2 applications), no grazing restraint; 14 day withdraw from slaughter interval and 7 day WHP for harvest of treated material. This should be a permit, not a label statement. Existing conditions should apply.

The NRA would need to establish a procedure for rapid response to permit applications relevant to locust control. Such permits could include conditions with regard to spraying, aimed at minimising drift, and possibly requests for monitoring data. For emergency use on apple, cabbages, cherries, grapes, lettuce, soya beans, tomatoes, or cereals and other grass-like plants (including sorghum and pastures) applications with maximum use patterns no greater than those specified above can be approved with no further residue evaluation required and with no changes required to the proposed MRLs. For other commodities, data would need to be provided and assessed.

4.11 Further Work Or Information

The following considerations apply:

<u>Required</u>

- Australian data for lucerne, other grass-like pasture situations and other forage crops (e.g. sorghum) where non-locust pests are to be controlled. Trials shuld be conducted that address the maximum Australian use pattern and permit suitable grazing restraints and withholding periods to be set.

- An industry management process is required for rice, as for other cereals, particularly with reference to rice bran. Data to establish that this management process is achieving the desired result is appropriate.

For data in this category it is recommended that applicants be given 3 years to generate the necessary data.

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Attachment 1: Calculations of TMDI (ADI) for Fenitrothion.

Commodity	Food Consumption Kg/person/day	MRL mg/kg	TMDI mg/person
Cereal grains	0.276	10	2.76
Edible offal	0.0046	0.05	0.00023
Eggs	0.022	0.05	0.0011
Fruits	0.177	1	0.177
Meat [in the fat]	0.0256	0.05	0.00128
Poultry offal	0.0002	0.05	0.00001
Poultry meat [in the fat]	0.0058	0.05	0.00029
Milk	0.246	0.01	0.00246
Rice bran	0	20	0
Vegetables	0.298	0.5	0.149
Wheat bran	0.054	20	1.08
Wheat germ	0.0004	20	0.008
Total			4.17937
		0.069656167 mg/kg body weight**	

* At or about the limit of determination
** Equivalent to 2321.9% of the hypothetical ADI

These calculations have been made in accordance with 'Guidelines for Predicting Dietary Intake of Pesticide Residues' (World Health Organization)

TMDI - Theoretical Maximum Daily Intake
ADI - Acceptable Daily Intake
(Chemicals Safety Unit, Commonwealth Department of Human Services and Health)
MRL - Maximum Residue Limit