



Australian Government

Department of Agriculture, Fisheries and Forestry
National Residue Survey

**DOMESTIC GRAINS
(STOCKFEED MANUFACTURERS)
PROGRAM**

**CHEMICAL RESIDUE
MONITORING RESULTS**

July 2005 to June 2006

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Acronyms and Definitions

DAFF:	Australian Government Department of Agriculture, Fisheries and Forestry
NRS:	National Residue Survey
GCA:	Grains Council of Australia
APVMA:	Australian Pesticides and Veterinary Medicines Authority
FSANZ:	Food Standards Australia New Zealand

Maximum Residue Limit (MRL)

An MRL is defined as the maximum concentration of a residue which is legally permitted or recognised as acceptable in or on a food, agricultural commodity or animal feed. It results from the officially authorised safe use of an agricultural or veterinary chemical, known as good agricultural practice (GAP). The concentration is expressed in milligrams per kilogram (mg/kg) of the commodity.

Australian standard

MRLs become Australian Standards when they are adopted into the *Food Standards Code*, which occurs as the result of a decision by the Australia New Zealand Food Regulation Ministerial Council (ANZFRMC) following a recommendation by Food Standards Australia New Zealand (FSANZ).

Limit of Reporting (LOR)

The LOR is the minimum concentration of a residue used for reporting purposes. Results of analyses lower than the LOR are not included in this report. Typically, the LOR is about one hundredth of the respective MRL.

Maximum Level (ML)

The ML applies to natural contaminants such as metals or toxicants rather than residues of agricultural or veterinary chemicals. An ML is established only where it serves an effective risk management function and only for those foods which provide a significant contribution to the total dietary exposure. Foods not listed may contain low levels of contaminants or natural toxicants.

Residue

A residue, for the purposes of this document, is the amount of chemical (or its metabolites) that remains on the commodity after application. The amount of residue depletes over time but varies between commodities, chemicals, application methods and environmental conditions.

Good Agricultural Practice (GAP)

GAP is defined as the nationally recommended, authorised or registered use-pattern of chemicals, that is necessary for effective and reliable pest control under actual conditions at any stage of production, storage, transport, distribution and processing of food commodities and animal feed.

Introduction

This NRS Domestic Grains Program Report, covering the period 1 July 2005 to 30 June 2006, has been prepared for food and grain producing industries and others interested in the chemical residue status of Australian grain.

The results of the Milled Products and Export Grain Programs are the subject of separate reports.

Executive Summary

Domestic Program

The Domestic Grains Program covering wheat, barley, oats, sorghum, field peas, chickpeas, canola and lupins, is a collaborative project involving the Grains Council of Australia (GCA), those companies involved in grain usage and the NRS. The program commenced in 1964 and has been funded by industry levies since 1994.

Grain samples are collected from domestic grain deliveries to stockfeed manufacturers, malting barley establishments, oilseed crushers, livestock feedlots and oat processors.

During the reporting period, NRS arranged for the collection of 760 randomly selected domestic grain samples.

Each grain sample was analysed for a range of insecticides, fungicides and environmental contaminants, as listed in Table 1. Some grain samples are randomly selected for an additional screen for phosphine.

There were two pesticide residue detections and no phosphine detections above the relevant MRL.

There was 99.7% compliance with Australian Standards for all Domestic Grains Program samples.

The 760 random grain samples were taken at the premises of 71 participating grain users and processors, during the reporting period. As previously stated, two samples contained a violative pesticide residue in breach of the Australian Food Standard.

Chemical residues below the MRL were detected in 29.1% of samples.

However 85.9% of samples contained either no residues or residues below 1/5th of the relevant MRL.

No organochlorine residues were detected in the 76 samples tested.

Phosphine was detected in one sample of the 62 randomly selected samples at less than 1/5th of the MRL.

Background to NRS

The NRS is part of the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) located in Canberra. The NRS was established in the early 1960s as the Commonwealth response to growing concerns about pesticide residues in major meat exporting markets. Since then the range of commodities covered by the NRS monitoring surveys has expanded and in 2005-2006 over 40 animal, plant and selected fisheries and aquaculture products were monitored.

Since 1993, all the NRS programs have been fully funded through levies on production, through a reserve fund established by the NRS Administration Act 1992. Partial cost recovery for the NRS was introduced in 1986 and full cost recovery since 1994.

The primary function of the NRS is to monitor chemical residues and environmental contaminants in the products of participating industries.

Export and domestic marketing initiatives are underpinned by Australia's status as a producer of clean food. Surveys for chemical residues are important as a measure of overall product quality, particularly for exporting countries such as Australia. The NRS monitoring programs help support this reputation by providing an independent and authoritative assessment of the residue status of Australian foods.

Residue monitoring is an important part of an overall strategy to minimise unwanted residues and environmental contaminants in food. It serves to identify potential problems and indicates where follow-up action is required. A history of nil residue violations and low residue detections is recognised by importing countries as evidence of good agricultural practices instituted by producers.

History of Grains Programs

Grain has been included in the NRS monitoring programs since 1964, when the NRS expanded to cover a wide range of agricultural commodities.

The NRS Grains Program was independently reviewed in 1993, 1998 and 2003 in collaboration with GCA and industry. The Grain Monitoring Program was revised following the 1993 review to provide extensive coverage of export grain, as well as wheat and milled products being processed through Australian flour mills.

Following the 1998 review, NRS developed and implemented a new program, which commenced in 2000, providing greater coverage of domestically traded grain. Following the 2003 review, NRS established the Export Container Program.

All NRS Grains Programs are funded by a 0.015% 'farm-gate-value' levy on producers of participating grains which are wheat, barley, oats, sorghum, canola, field peas, chickpeas and lupins.

Sampling of Domestic Grain

The Domestic Grains Program (Stockfeeds) involves the random sampling of grain whilst it is being delivered to stockfeed plants. Individual trucks are 'spear-sampled' a number of times, and a composite sample is placed into a tamper evident sample jar. Information is recorded at the sample collection point to assist in the event of a trace back being necessary.

After samples are collected, in accordance with NRS established protocols, they are then forwarded by courier to a contracted laboratory for analytical testing. At the same time the sample information is forwarded to Canberra where it is entered in the NRS database.

Testing

The NRS tests for a wide range of chemicals including registered 'in-crop' pesticide products and registered grain protectants used against insect infestation during grain storage. The NRS also monitors for environmental contaminants and organochlorines, which persist in the environment and, with the exception of endosulfan, are no longer used in agriculture.

Many of the chemicals, the NRS tests for in the Grains Program, are registered grain protectants. These are chemicals that may be applied to grain after harvest to prevent it being spoiled by grain insects. Residues below MRL are expected in treated grain. The registered rate of application are designed to ensure that any residue will be below the MRL after any applicable withholding period.

The tests conducted are sufficiently sensitive to detect levels well below the MRL. MRLs are usually set in milligrams per kilogram (parts per million). For example, the grain protectant chlorpyrifos-methyl has a MRL of 10 mg/kg in cereal grain and its level of reporting is 0.1 mg/kg.

The chemical screen for the analysis of residues and contaminants in all grain samples is at Table 1.

Data Management

The NRS uses automated systems in its data management. Results from laboratories are transferred to the NRS electronically, where they are coupled to sample data.

At the NRS, data are collated for industry and government use. The origin of samples can be determined from sample collection forms, which enables samples to be 'traced-back' if any follow-up action is needed.

Reporting

Residues above the MRL are considered unacceptable, but do not necessarily represent a hazard to consumers because of the generous safety margins used in the setting of these standards. Australian MRLs are generally either the same as, or more stringent than, those prescribed by the international Codex Alimentarius Commission.

Where an MRL has not been established for a chemical-commodity combination, the MRL is effectively zero and any detection is treated as a contravention.

Analyses showing residues above the MRL are reported immediately to the NRS, which then advises industry and the relevant State or Territory authority so that appropriate action can be taken.

Results are also used by the State Government agencies responsible for the management of pesticides and veterinary medicines. Australian Government bodies involved in chemical regulation and policy such as the APVMA, FSANZ and Department of Health and Ageing also use the data.

The NRS results are used by Australian delegations to international organisations such as the Codex Alimentarius Commission. Summarised national results are published annually in the *National Residue Survey Annual Report* and are available on the NRS website (www.daff.gov.au/nrs).

Program Review

The program is reviewed annually upon completion of each year's sampling program. The review covers aspects such as sampling arrangements, sampling numbers, test types, test chemicals, liaison with industry and reporting procedures.

Table 1: Chemical screen for 1 July 2005 to 30 June 2006

Pesticide Residues	
organophosphates	azamethiphos, chlorpyrifos, chlorpyrifos-methyl, diazinon, dichlorvos, fenitrothion, malathion, pirimiphos-methyl, profenofos
synthetic pyrethroids	bifenthrin, bioresmethrin, cyfluthrin, cypermethrin, deltamethrin, fenvalerate, permethrin, phenothrin, piperonyl butoxide
fungicides	flutriafol, iprodione, tebuconazole
other insecticides	fipronil, indoxacarb, methoprene, carbaryl
Contaminants:	
organochlorines	aldrin, chlordane, DDT and metabolites, dieldrin, endosulfan, endrin, HCB, HCH, heptachlor, lindane and PCBs
heavy metals	lead, cadmium, mercury
Fumigant:	phosphine

Results

Pesticide Residue Screen

Stockfeed Manufacturers

In the reporting period 1 July 2005 to 30 June 2006, a total of 484 grain samples were collected from grain receivals at 31 stockfeed manufacturer sites located throughout Australia.

Of the 484 randomly collected samples, two contained pesticide residues above Australian standards. The samples that contained residues over MRL are listed at Table 2.

Table 2: Pesticide residue violations

Commodity	Pesticide	Number of violations
wheat	dichlorvos	1
	cypermethrin	1

Reports on these residue violations are provided later under Traceback Investigations.

There was 99.6% compliance with Australian Standards.

Table 3 presents a summary of the results of the NRS Domestic Grains Program (Stockfeed Manufacturers). These results are an aggregate of all participating establishments.

Chemical residues below MRL were detected in 25.0% of samples.

However, only 2.1% of stockfeed samples contained residues above half the relevant MRL and 85.9% of samples contained either no residues or residues below 1/5th the relevant MRL.

Table 3: Results for pesticide residue screen in grain sampled at receipt

Grain	Samples tested	Samples with nil residues	Number of samples with residues				% compliance with Australian Standards
			LOR to 1/5 th MRL	1/5 th MRL to 1/2 MRL	1/2 MRL to MRL	above MRL	
wheat	256	193	28	30	3	2	99.2
sorghum	74	49	9	14	2	0	100
barley	66	47	11	8	0	0	100
lupins	34	33	0	0	1	0	100
oats	32	22	3	6	1	0	100
field peas	15	15	0	0	0	0	100
canola	7	5	2	0	0	0	100
chickpeas	0	0	0	0	0	0	100
Total	484	364	53	58	7	2	99.6

Organochlorine Screen

This screen covers a range of chemicals which, with the exception of endosulfan an insecticide registered for some agricultural uses, were widely used.

There were no organochlorines detected in the 54 samples randomly collected in the reporting period as shown at Table 4.

Although these chemicals are no longer in use, some are known to persist in the environment

Table 4: Results for organochlorines in grain destined for stockfeed

Grain	samples tested	samples with nil residues	samples with residues	with residues above ML	% compliance with Aust. standard
wheat	20	20	0	0	100.0
barley	5	5	0	0	100.0
sorghum	8	8	0	0	100.0
lupin	7	7	0	0	100.0
canola	2	2	0	0	100.0
oats	4	4	0	0	100.0
field pea	8	8	0	0	100.0

Total	54	54	0	0	100.0
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Phosphine Screen

This screen reports on concentrations of the fumigant phosphine.

A predefined number of incoming domestic samples have been selected at random by the laboratory and tested to determine total phosphine residues.

Where residues were detected equal to or above 0.002 mg/kg, the original sample underwent a further analysis to determine what component of the residues was due to unreacted phosphide and/or absorbed phosphine.

There were no phosphine detections above MRL, as shown at Table 5.

Table 5: Results for phosphine

Grain	samples tested	Samples with levels above the MRL	% compliance with Aust. Std.
wheat	25	0	100.0
barley	2	0	100.0
sorghum	4	0	100.0
oats	3	0	100.0
lupins	4	0	100.0
field pea	3	0	100.0
Total	41	0	100.0

Traceback Investigations

There were two violative pesticide residues of wheat during the reporting period. The chemical residues were cypermethrin and dichlorvos.

Cypermethrin residues at 0.54 mg/kg (MRL 0.2 mg/kg) were found in a wheat sample purchased by a stockfeed manufacturer. Traceback investigation to a grain producer revealed poor on-farm practices. The chemical was applied to the interior of a concrete silo. The silo was then filled with wheat. When the grain was out-loaded, grain residue and debris was augured onto the load, causing the top of the load to be contaminated with cypermethrin residues.

Dichlorvos residues of 576 mg/kg were detected in wheat (MRL is 5 mg/kg). The traceback investigation could not explain how this gross violation occurred. The investigating officer interviewed all parties and examined the relevant documentation. Traceback data indicated that the chemical was applied at the correct rate and in accordance with the label. By implication, it would appear that the violation occurred through misapplication or lack of adherence to instructions on the label. However, investigations failed to reveal the place or timing of the misapplication.