



Australian Government

Department of Agriculture, Fisheries and Forestry
National Residue Survey

EXPORT CONTAINER PROGRAM

CHEMICAL RESIDUE MONITORING RESULTS

July 2006 to June 2007

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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 National Residue Survey (NRS) Export Container Program Report, covering the period 1 July 2006 to 30 June 2007, has been prepared for food and grain producing industries and others interested in the chemical residue status of Australian grain.

Executive Summary

The Export Container Program covering wheat, barley, oats, sorghum, field peas, chickpeas, canola and lupins exported in containers and in bags, is a collaborative project involving the Grains Council of Australia (GCA), those companies involved in grain exports and NRS. The program commenced in 2004 and is funded by industry levies.

Grain samples are collected from approximately 30 sites, located throughout Australia, where grain is loaded into container and bags for export.

During the reporting period, NRS arranged for the collection of 168 random grain samples.

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

There was 100% compliance with Australian Food Standards/MRLs.

Chemical residues below the MRL were detected in 6.5 % of samples. There were no detection above ½ MRL and 93.5% contained either no residues or residues below 1/5th the relevant MRL.

No residues were detected for organochlorines in the 168 samples tested.

No reportable levels of heavy metals were above the Australian Standard.

Background to the National Residue Survey

The National Residue Survey (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 2006-2007, over 40 animal, plant and selected fisheries and aquaculture products were monitored.

Since 1993, all the NRS programs have been fully funded by way of 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 on 1 July 1993.

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 the Grains Council of Australia (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. The results of the Bulk Export, Milled Products and Domestic Grain Programs are the subject of separate reports.

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 Containerised Grain

The Export Container Program involves the sampling of grain that is to be loaded into export containers

and bags. Currently, about 30 companies located throughout Australia participate in the Export Container Program.

Sample collection is entirely dependent on commercial activities, that is, if there is no trade in containerised grain then no samples are taken.

From 1 July 2007 an additional 13 grains were added to the program, although not many will be exported through grain export terminals. They are maize, triticale, cowpea, faba/broad bean, lentil, mung bean, navy bean, pigeon pea, vetch, linseed, safflower, soybean and sunflower.

Samples are collected in accordance with NRS established protocols. They are then forwarded by express freight 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 grain protectants used against insect infestation during grain storage. The NRS also monitors for environmental contaminants and organochlorines, which may 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 rates of application are designed to

ensure that, as the chemical breaks down and dissipates, any residue will be well below the MRL by the time the product gets to the consumer.

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 the Department of Health and Ageing also use the data.

The NRS results are also 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).

Table 1: Chemical screen for 1 July 2006 to 30 June 2007

Pesticide Residues:	
organophosphates	azamethiphos, chlorfenvinphos, chlorpyrifos, chlorpyrifos-methyl, diazinon, dichlorvos, dimethoate, ethoprophos, fenitrothion, malathion, methacrifos, omethoate, phosmet, pirimiphos-methyl, profenofos, terbufos
synthetic pyrethroids	bifenthrin, bioresmethrin, cyfluthrin, cyhalothrin, cypermethrin, deltamethrin, fenvalerate, permethrin, phenothrin, piperonyl butoxide
fungicides	captafol, flutriafol, hexaconazole, iprodione, penconazole, propiconazole, tebuconazole, triadimefon, triadimenol
other insecticides	carbaryl, diflubenzuron, fipronil, indoxacarb, methoprene, pyriproxyfen, triflumuron
Contaminants:	
organochlorines	aldrin, dieldrin, chlordane, oxychlordane, DDT and metabolites, dieldrin, endosulfan, endrin, HCB, HCH, heptachlor, heptachlor epoxide, lindane, methoxychlor, mirex and PCBs
heavy metals	lead, cadmium, mercury
Fumigant:	phosphine

Table 2: Results for Pesticide Residue Screen

Grain	Samples tested	Samples with nil residues	Number of samples with residues				% compliance with Australian standard
			LOR to 1/5 th MRL	1/5 th MRL to 1/2 MRL	1/2 MRL to MRL	above MRL	
wheat	107	106	1	0	0	0	100
canola	32	26	6	0	0	0	100
oats	12	9	3	0	0	0	100
barley	11	11	0	0	0	0	100
sorghum	3	2	1	0	0	0	100
chickpeas	2	2	0	0	0	0	100
field peas	1	1	0	0	0	0	100
Total	168	157	11	0	0	0	100

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.

Results

Pesticide Residue Screen

Table 2 presents a summary of the results of the NRS Export Container Program for the period July 2006 to June 2007. These results are an aggregate of all participating establishments.

In the reporting period 1 July 2006 to 30 June 2007, a total of 168 grain samples were randomly collected from participating companies throughout Australia.

There was 100 % compliance of samples with Australian standards.

Chemical residues below MRL were detected in 6.5 % of samples.

This represents 93.5% contained either no residues or residues below 1/5th the relevant MRL.

No MRL was above 1/5th of the relevant MRL.

Noting that individual grain samples may contain residues of more than one chemical, the chemical residue detected, in order of decreasing frequency were:

- cypermethrin (6 residues)
- fenitrothion (5 residue)
- methoprene (3 residue)
- pirimiphos-methyl (1 residues)

Organochlorine Screen

This screen, which is now included in the multiresidue screen covers a range of chemicals which, with the exception of endosulfan an insecticide registered for some agricultural uses.

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

No organochlorines were detected in all of the 168 samples randomly collected in the reporting period from 1 July 2006 to 30 June 2007, shown at Table 3.

Table 3: Multi-residue Results for Organochlorines in Export Container Grain

Grain	samples tested	samples with nil residues for Organochlorines	samples with Organochlorine residues	with residues above MRL	% compliance with Aust. standard
wheat	107	107	0	0	100
canola	32	32	0	0	100
oats	12	12	0	0	100
barley	11	11	0	0	100
sorghum	3	3	0	0	100
chickpeas	2	2	0	0	100
field peas	1	1	0	0	100
Total	168	168	0	0	100

Heavy Metals Screen

This screen reports on concentrations of the heavy metals lead, cadmium and mercury.

These elements occur naturally throughout the environment and concentrations at reportable levels

are not unusual in any biological samples.

There were no heavy metal detections at levels above the Australian Standards as shown at Table 4.

Table 4: Results for Heavy Metals

Grain	samples tested	Samples with levels above the ML	% compliance with Aust. standard
wheat	21	0	100
canola	2	0	100
sorghum	2	0	100
barley	1	0	100
chickpeas	1	0	100
field peas	1	0	100
oat	1	0	100
Total	29	0	100

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 in the **four** samples taken.