



National Chemical Contaminants Programme - Dairy Product Results Summary 2014/2015

September 2016

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1 Summary

This National Chemical Contaminants Programme (NCCP) – Dairy product results summary provides results for dairy products sampled over the full 2014/15 dairy season, spanning the period July 2014 to June 2015.

The purpose of the NCCP is to:

- provide an assurance that not less than 99% of dairy products manufactured in New Zealand conform to New Zealand and international dairy processing requirements
- verify that dairy processors have effective self-monitoring plans in place under their risk management programmes
- establish baseline levels for specific constituents naturally present in milk and dairy products
- confirm the accuracy of attestations provided to other competent authorities, and
- investigate unexpected findings to ensure that controls remain effective and that emerging hazards are identified and appropriate regulatory measures applied.

Over 480 individual dairy products were analysed for more than 31,500 individual test results with 100% compliance. All results complied with the action limits.

The dairy product summary results confirm that dairy products manufactured in New Zealand meet the limits for chemical residues and contaminants applied internationally and domestically. This indicates that the controls applied under the current regulatory framework are adequate and continue to ensure that New Zealand dairy products conform to both consumer expectations and international regulatory requirements.

In addition to the NCCP monitoring of dairy products, monitoring of raw milk and colostrum for chemical residues and contaminants is routinely undertaken. These two programmes combine to provide a high level of confidence in the safety and suitability of New Zealand dairy products.

1.1 WHAT WE LOOKED FOR

We looked for more than 500 compounds, elements and dairy components covering:

- antibiotics and other veterinary medicines
- pesticides
- herbicides
- fungicides
- compounds withdrawn or not permitted for use on or with food producing animals
- compounds not permitted for use in dairy products or food contact materials
- compounds with restrictions on their permitted use
- chemical contaminants
- radionuclides
- chemical elements, including heavy metals
- compositional parameters naturally present in milk and dairy products.

1.2 WHAT WE SAMPLED

Routine monitoring samples are independently collected by recognised persons, who are part of a MPI recognised agency. Samples for radionuclide testing are collected under MPI direction. The routine monitoring samples are collected over the period of July 2014 through to June 2015 without bias, from the range of dairy products manufactured in New Zealand, including milk, cream, cheese, butter, anhydrous milk fat (AMF), milk powders, infant formula and other formulated products, whey products and casein.

Dairy products sampled included those:

- intended as ingredients and which are typically in a concentrated form;
- retail ready products intended for sale as foods in a concentrated form that will be reconstituted prior to consumption; and
- that are foods in the form that they will be consumed or used.

The products sampled are set out in Table 1.

Table 1: Summary of dairy products sampled in 2014/2015

Product Type	Proportion of Samples
Powders (Includes whole milk powder, skim milk powder, butter milk powder, colostrum powder)	21.5%
Nutritional (Includes infant formula, follow-on formula and growing up milk powder)	72.9%
Protein (includes milk protein concentrate, whey powder, whey protein concentrate, casein and sodium caseinate)	3.1%
Liquids (Includes pasteurised and UHT milk and cream)	0.4%
Fat (Includes AMF and butter)	1.0%
Cheese (Includes various soft, firm and unripened cheeses)	0.8%
Lactose	0.2%

1.3 WHAT WE TESTED

We tested:

- 484 random product samples and obtained 31,561 individual chemical residue and contaminant test results for routinely monitored residues and contaminants (Table 3);
- 34 dairy powder samples and obtained 187 individual test results for routinely monitored radionuclides; and
- some of the random product samples were also tested for other residues and naturally occurring elements and other compounds, as well as compositional attributes for survey purposes. The results of these tests will help build a profile by dairy product type which may be used as a point of reference in the future for the assessment of product integrity and determination of adulteration or fraud (Tables 4, 5 and 6).

1.4 ACTION LIMITS

Action limits (ALs) are the maximum tolerable level of a particular compound detected in a specified matrix, before action is taken. The action includes confirmation that regulatory limits for New Zealand and intended markets have been met and investigation to determine the reason for the finding. The nominated ALs are based on those established for raw milk unless:

- a product or food specific tolerance limit applies, or
- the compound is not permitted for use as a veterinary medicine or agricultural compound, and is not permitted for use or addition during the manufacturing process.

In assessing results against ALs, concentration factors have been taken into consideration where permitted and where appropriate for the intended market(s) and New Zealand. The general principle applied is that if the raw milk used to manufacture a product conformed to all applicable limits, then the manufactured product is also expected to conform based on concentration factors.

If MPI becomes concerned that partitioning of a compound within a specific product stream is of concern then a specific tolerance limit will be established for that compound and product. For example some lipophilic compounds are expressed on a fat basis in accordance with Codex Alimentarius (Codex) conventions.

For compounds that are not permitted for use in or on milking animals any confirmed detection is considered unacceptable.

1.5 WHAT WE FOUND – RESIDUES AND CONTAMINANTS

There were 31,561 individual test results reported.

There were 258 detections below ALs (0.82%). No detections exceeded ALs.

A summary of the detections of residues and contaminants in dairy products is in Table 2 and a full set of all the results including compounds and numbers of tests for routinely monitored residues and contaminants in dairy products is in Table 3.

Given the breadth of products sampled and compounds tested for, the number of detections are considered to be very low. This indicates that dairy processors are operating under risk management programmes that are effective and ensure that the dairy products manufactured are safe, wholesome and free from contamination.

1.5.1 Detections below the action limits:

1.5.1.1 Nitrate & nitrite

Nitrate and nitrite occur naturally in raw milk, however, their presence in dried dairy products above ALs may indicate excessive exposure to heat, fouling or “burn-on” during processing or contamination of liquid milk with cleaning solutions.

58 samples were tested for nitrates and nitrite in casein, follow-on formula, growing up milk powder, infant formula, infant formula ingredients (paediatric grade), nutritionals, skim milk powder, sodium caseinate, whey protein concentrate, and whole milk powder.

Detections of nitrite were reported in all the products tested. Detections of nitrate were reported in all the product types but not all the samples tested. All the detections were below the AL for nitrate and nitrite set for dairy products.

1.5.1.2 Cyanuric acid

50 samples were tested for melamine and cyanuric acid in follow-on formula, growing up milk powder, infant formula, infant formula ingredients (paediatric grade), skim milk powder, and whole milk powder.

Cyanuric acid was found in in one (sheep) whole milk powder sample, below the AL (on a raw milk basis) of 1 mg/kg. This sample was also tested for melamine, with no trace detected, confirming that the detection is not associated with melamine.

MPI has previously investigated low level findings and has confirmed that these are not linked to any form of milk or feed adulteration.

1.5.1.3 Metals

48 samples were tested for heavy metals in butter, cheese, follow-on formula, growing up milk powder, infant formula, lactose, nutritionals, skim milk powder, sodium caseinate, whey protein concentrate, and whole milk powder:

- **Arsenic** was detected in 1 sample (whey protein concentrate), below the AL (on a raw milk basis) of 0.01 mg/kg
- **Cadmium** was detected in 15 samples (follow-on formula, growing up milk powder, infant formula, nutritionals, and whole milk powder), below the AL (on a raw milk basis) of 0.1 mg/kg
- **Lead** was detected in 1 sample (whole milk powder), below the AL (on an as consumed basis¹) of 0.02 mg/kg
- **Tin** was detected in 10 samples (follow-on formula, growing up milk powder, infant formula), well below the joint Australia New Zealand Food Standards Code limit.

These detections of metals in processed, concentrated dairy products are well below ALs and are not of concern.

1.5.1.4 Semicarbazide (SEM)

58 samples were tested for nitrofurans compounds including nitrofurazone, in follow-on formula, growing up milk powder, infant formula, infant formula ingredients (paediatric grade), nutritionals, skim milk powder, whey protein concentrate and whole milk powder. SEM is a metabolite of the veterinary medicine nitrofurazone which is prohibited in some countries and not registered or available for use in or on milking animals in New Zealand.

SEM was detected in 15 samples (follow-on formula, infant formula, milk protein concentrate, whey protein concentrate, and whole milk powder).

These detections do not represent a food safety concern and are not due to use of a withdrawn or prohibited medicine. The findings are consistent with previous studies that have demonstrated that SEM is an inherent component at very low levels of highly concentrated dried products. This has been highlighted in the NCCP sampling plan over the last several years.

SEM has been shown to be present from sources other than nitrofurazone and screening for these metabolites is considered to be more reliable than analysis for the parent drugs which are less stable. It is specifically noted that SEM will only be used as a trigger for further investigation and, on its own, is not a conclusive indicator of non-conformance.

1.5.1.5 Pesticides

54 samples were tested for a wide range of pesticides in AMF, butter, casein, cheese, cream, follow-on formula, growing up milk powder, infant formula, nutritionals, skim milk powder, sodium caseinate, and whole milk powder:

¹ GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED - CODEX STAN 193-1995s

- **DDE (p,p')** was detected in 10 samples (AMF, butter, cheese, whole milk powder). These detections were below the New Zealand MRL of 1.25 mg/kg on a fat basis and below the action limit of 0.50 mg/kg on a fat basis (0.02 mg/kg on a 4% milk fat basis) which is consistent with Codex limits. Periodic findings of DDE at low levels in the fat of dairy products are to be expected due to carryover from historical use. These findings are consistent with the raw milk programme and previous product monitoring results. There is active monitoring in place by dairy processors to ensure only milk that conforms to the DDE/DDT MRL requirements is collected for processing.

Metabolites of DDT are periodically identified very early in lactation from animals grazing land where DDT was historically applied to control *Costelytra zealandica*.

In 1970, New Zealand became one of the first countries in the world to ban the use of DDT on pastoral land. Most commonly residues of DDE, rather than the parent compound DDT, are identified which confirms historic rather than recent use of this pesticide in New Zealand

- **2-phenylphenol** was detected in 1 sample (butter). This active ingredient is registered for use in dairy cattle as an antiseptic teat spray. It is also used as a general surface disinfectant. The detection was below the NZ default MRL and is of no food safety concern.

1.5.1.6 Phthalates

55 samples were tested for a range of phthalates in AMF, butter, cheese, cream, follow-on formula, growing up milk powder, infant formula, infant formula ingredients (paediatric grade), nutritionals, skim milk powder, and whole milk powder.

Phthalates were detected in 26 samples (AMF, butter, cheese, follow-on formula, growing up milk powder, infant formula, nutritionals, and whole milk powder). The detections were all below the AL (on a raw milk basis) of 1 mg/kg, and do not represent a food safety concern.

11 results were for bis(2-ethylhexyl) phthalate (DEHP) that have been removed from use in the formulation of food contact materials (bis(2-ethylhexyl) phthalate (DEHP). DEHP is known to have been included in the formulation of milk liners to provide the required flexing of the component during milking. These milk liners have been found to be the primary source of DEHP in milk products. Consequently DEHP has been removed from use in the formulation of rubber components for the milking plant. The detections of DEHP are likely to reflect legacy use of old formulation milk liners.

16 samples contained bis(2-ethylhexyl) adipate (DEHA). The AL for DEHA has been established based on levels of the compound reasonably expected to be found in milk or dairy products, though DEHA is not a phthalate of high concern. DEHA has replaced DEHP in some materials and so detections are to be expected, but at low levels only.

3 samples contained diisononyl-phthalate (DINP). As well as DEHP and DEHA, DINP is reported in other surveys of phthalate results with the pack type of the food. The levels of DINP reported in dairy products were well below the specific migration limits set in the European Union Regulation².

Contaminant migration standards for milk contact materials are applied through the Code of

² COMMISSION REGULATION (EU) No 10/2011

Practice; Design and Operation of Farm Dairies (NZCP1). All findings of phthalates of concern will be acted upon, and investigations will be undertaken where necessary to determine the root source of contamination so that remedial action can be taken.

1.5.1.7 Quaternary Ammonium Compounds (QACs)

64 samples were tested for a range of QACs in AMF, butter, cheese, cream, follow-on formula, growing up milk powder, infant formula, infant formula ingredients (paediatric grade), milk protein concentrate, nutritionals, skim milk powder, whey protein concentrate, and whole milk powder.

QACs were detected in 30 samples (butter, cheese, follow-on formula, growing up milk powder, infant formula, nutritionals, milk protein concentrate, skim milk powder, whey protein concentrate, and whole milk powder).

The detections were all below the AL (on a raw milk basis) of 0.1 mg/kg.

QACs are widely used as surfactants and disinfectants in food processing and several products have been approved for sanitising dairy equipment. More recently QACs have become compounds of interest in some markets, with studies suggesting that residues may carry over in many food products exposed to QACs. This presents an added complication for trade as many dairy products are highly concentrated ingredients, and these concentrated forms usually only represent a minor portion of the final food. For a number of years dairy maintenance compounds containing QACs have been approved in New Zealand with the condition that milk contact surfaces are to be rinsed after use.

1.6 WHAT WE FOUND – RADIONUCLIDES

34 dairy product samples were tested for radionuclides (caesium-134 and caesium-137, iodine-131, plutonium-239, americium-241, and strontium-90) in conjunction with the national survey undertaken by the New Zealand National Radiation Laboratory. The results of the testing confirm activity concentrations of anthropogenic radionuclides far below the Codex guideline levels and consistent with expected background levels.

1.7 WHAT WE FOUND – SURVEYS

1.7.1 Dairy components

Samples of butter, cheese, follow on formula, growing up milk powder, infant formula, milk, milk protein concentrate, nutritionals, skim milk powder, whole milk powder, AMF, and whey protein concentrate were tested for fat, protein, ash and moisture. One skim milk powder sample has a milkfat content greater than 26% m/m (28.33% m/m). The other results complied with the Codex standard for fat, protein and moisture for milk powders and cream powders³ (noting the protein is reported on an as received basis and not on a SNF (solids non-fat) basis).

1.7.2 Dioxin and dioxin-like PCBs

Samples of AMF, butter, cream and cheese were tested for dioxin and dioxin-like PCBs. None of the samples contained dioxin or dioxin-like PCB levels exceeding the European Union Regulation⁴. The results will be summarised in a separate report.

³ CODEX STANDARD FOR MILK POWDERS AND CREAM POWDER (CODEX STAN 207-1999) - This Standard replaced the Standard for Whole Milk Powder, Partly Skimmed Milk Powder and Skimmed Milk Powder (A-5-1971) and the Standard for Cream Powder, Half Cream Powder and High Fat Milk Powder (A-10-1971). Adopted in 1999. Amendments 2010, 2013, 2014.

⁴ COMMISSION REGULATION (EC) No 1881/2006

1.7.3 Naturally occurring elements and other compounds

Samples of AMF, butter, cheese, cream follow on formula, growing up milk powder, infant formula (paediatric grade), infant formula, lactose, milk protein concentrate, nutritionals, skim milk powder, sodium caseinate, whey protein concentrate, and whole milk powder were tested for a range of endogenous and naturally occurring chemical elements and compounds, including hormones and resorcylic acids.

The results reported do not indicate manufacturing of dairy products using ingredients or additives that may contain naturally occurring elements or other compounds, at greater levels than that allowed for, or expected in raw milk.

2 Summary of dairy product results for 2014/2015

2.1 REPORTING OF RESIDUES AND CONTAMINANTS IN DAIRY PRODUCTS

Table 2: Detections of residues and contaminants in dairy products

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Arsenic	48	47	1	0	●
Benzyltrimethylammonium chloride (BDM-C12)	64	34	30	0	●
Bis(2-ethylhexyl) phthalate (DEHP)	55	44	11	0	●
Bis(2-ethylhexyl) adipate (DEHA)	55	39	16	0	●
Cadmium	48	33	15	0	●
Cyanuric acid	50	49	1	0	●
DDE (p,p')	54	44	10	0	●
Diisononyl-phthalate (DINP)	55	52	3	0	●
Lead	48	47	1	0	●
N-benzyltrimethylammonium chloride (BDM-C16)	64	62	2	0	●
N-benzyltrimethyltetradecylammonium chloride (BDM-C14)	64	40	24	0	●
N-didecyltrimethylammonium chloride (DM-DC10)	64	58	6	0	●
Nitrate	58	4	54	0	●
Nitrite	58	0	58	0	●
Nitrofurazone (SEM)	58	43	15	0	●
Tin	48	38	10	0	●
2-phenylphenol	42	41	1	0	●

² The number of detections reported at or below the maximum allowable level. In some cases no limit applies

³ Non-conforming results: detection of a compound above the New Zealand or export market maximum limit for the residue or contaminant, or detection at or above the limit of quantitation for a compound not permitted for food producing animals

Table 3: Reported results of residues and contaminants in dairy products

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Abamectin	54	54	0	0	
Acephate	54	54	0	0	
Acetamiprid	54	54	0	0	
Acetamiprid-N-Desmethyl	54	54	0	0	
Acetochlor	54	54	0	0	
Acibenzolar-S-methyl	33	33	0	0	
Acrinathrin	54	54	0	0	
Alachlor	54	54	0	0	
Alanycarb	50	50	0	0	
Aldicarb	54	54	0	0	
Aldicarb sulfone	54	54	0	0	
Aldicarb sulfoxide	54	54	0	0	
Aldrin	54	54	0	0	
Allidochlor	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Ametoctradin	54	54	0	0	
Ametryn	54	54	0	0	
Amoxicillin	50	50	0	0	
Ampicillin	50	50	0	0	
Anilofos	54	54	0	0	
Anthraquinone	54	54	0	0	
Arsenic	48	47	1	0	●
Atrazine	54	54	0	0	
Azaconazole	54	54	0	0	
Azamethiphos	54	54	0	0	
Azinphos-methyl	54	54	0	0	
Azoxystrobin	54	54	0	0	
Benalaxyl	54	54	0	0	
Bendiocarb	54	54	0	0	
Benfluralin	54	54	0	0	
Benodanil	54	54	0	0	
Benoxacor	54	54	0	0	
Bensulfuron-methyl	54	54	0	0	
Bensulide	54	54	0	0	
Benzyl dimethyldodecylammonium chloride (BDM-C12)	64	34	30	0	●
BHC (alpha)	54	54	0	0	
BHC (beta)	54	54	0	0	
BHC (delta)	54	54	0	0	
Bifenox	54	54	0	0	
Bifenthrin	54	54	0	0	
Bioresmethrin	54	54	0	0	
Bis(2-ethylhexyl) phthalate (DEHP)	55	44	11	0	●
Bis(2-ethylhexyl) adipate (DEHA)	55	39	16	0	●
Bisphenol A	44	44	0	0	
Bitertanol	54	54	0	0	
Boscalid	54	54	0	0	
Bromacil	53	53	0	0	
Bromobutide	54	54	0	0	
Bromophos	54	54	0	0	
Bromophos-ethyl	54	54	0	0	
Bromopropylate	54	54	0	0	
Bupirimate	54	54	0	0	
Buprofezin	54	54	0	0	
Butachlor	54	54	0	0	
Butafenacil	53	53	0	0	
Butamifos	54	54	0	0	
Butyl benzyl phthalate (BBP)	55	55	0	0	
Cadmium	48	33	15	0	●
Cadusafos	54	54	0	0	
Cafenstrole	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Carbaryl	54	54	0	0	
Carbendazim	54	54	0	0	
Carbetamide	54	54	0	0	
Carbofuran	54	54	0	0	
Carboxin	54	54	0	0	
Carfentrazone-ethyl	54	54	0	0	
Carpropamid	54	54	0	0	
Ceftiofur	50	50	0	0	
Cephalexin	50	50	0	0	
Cephalonium	50	50	0	0	
Cephuroxime	50	50	0	0	
Chlorantraniliprole	54	54	0	0	
Chlordane (cis)	54	54	0	0	
Chlordane (trans)	54	54	0	0	
Chlorfenapyr	54	54	0	0	
Chlorfenvinphos	54	54	0	0	
Chloridazon	54	54	0	0	
Chlorimuron-ethyl	54	54	0	0	
Chlorobenzilate	54	54	0	0	
Chlorotoluron	54	54	0	0	
Chloroxuron	54	54	0	0	
Chlorpropham	54	54	0	0	
Chlorpyrifos	54	54	0	0	
Chlorpyrifos-methyl	54	54	0	0	
Chlorsulfuron	54	54	0	0	
Chlortetracycline	50	50	0	0	
Chlorthal-dimethyl	54	54	0	0	
Chlorthiophos	54	54	0	0	
Chlozolinate	54	54	0	0	
Chromafenozide	54	54	0	0	
Cinidon- ethyl	50	50	0	0	
Clethodim	1	1	0	0	
Clodinafop-propargyl	54	54	0	0	
Clofentezine	54	54	0	0	
Clomazone	54	54	0	0	
Cloquintocet-mexyl	54	54	0	0	
Clothianidin	54	54	0	0	
Coumafos	54	54	0	0	
Coumaphos oxon	54	54	0	0	
Crufomate	54	54	0	0	
Cyanazine	53	53	0	0	
Cyanophos	54	54	0	0	
Cyantraniliprole	54	54	0	0	
Cyanuric acid	50	49	1	0	●
Cyazofamid	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Cyclosulfamuron	54	54	0	0	
Cyflufenamid	54	54	0	0	
Cyfluthrin	54	54	0	0	
Cyhalofop-butyl	54	54	0	0	
Cyhalothrin	54	54	0	0	
Cymoxanil	54	54	0	0	
Cypermethrin	54	54	0	0	
Cyproconazole	54	54	0	0	
Cyprodinil	54	54	0	0	
Cyromazine	5	5	0	0	
Daimuron	54	54	0	0	
DDD (o,p')	54	54	0	0	
DDD (p,p')	54	54	0	0	
DDE (o,p')	54	54	0	0	
DDE (p,p')	54	44	10	0	●
DDT (o,p')	54	54	0	0	
DDT (p,p')	54	54	0	0	
Deltamethrin	54	54	0	0	
Demeton-s-methyl	54	54	0	0	
Demeton-s-methyl-sulfoxide	54	54	0	0	
Desmedipham	54	54	0	0	
Diazinon	54	54	0	0	
Dichlobenil	54	54	0	0	
Dichlofenthion	54	54	0	0	
Dichlofuanid	50	50	0	0	
Dichlorvos	54	54	0	0	
Diclobutrazol	54	54	0	0	
Diclocymet	54	54	0	0	
Diclofop-methyl	54	54	0	0	
Dicloran	54	54	0	0	
Diclosulam	54	54	0	0	
Dicofol-BP	54	54	0	0	
Dicrotophos	50	50	0	0	
Dicyandiamide (DCD)	59	59	0	0	
Dicyclanil	54	54	0	0	
Didecyl phthalate (DDP)	55	55	0	0	
Dieldrin	54	54	0	0	
Diethofencarb	54	54	0	0	
Diethyl phthalate (DEP)	55	55	0	0	
Difenoconazole	54	54	0	0	
Diflubenzuron	54	54	0	0	
Diflufenican	54	54	0	0	
Dihexyl phthalate (DHXP)	55	55	0	0	
Dihydrostreptomycin	50	50	0	0	
Diisobutyl phthalate (DIBP)	55	55	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Diisodecyl phthalate (DIDP)	55	55	0	0	
Diisononyl-phthalate (DINP)	55	52	3	0	●
Diisopropyl phthalate (DIP)	55	55	0	0	
Dimepiperate	54	54	0	0	
Dimethenamid	54	54	0	0	
Dimethoate	54	54	0	0	
Dimethomorph	50	50	0	0	
Dimethyl phthalate (DMP)	55	55	0	0	
Dimethylditetradecylammonium chloride (DM-DC14)	64	64	0	0	
Dimethylvinphos	54	54	0	0	
Di-n-butyl phthalate (DBP)	55	55	0	0	
Di-n-heptyl phthalate (DNHP)	55	55	0	0	
Di-n-octyl phthalate (DNOP)	55	55	0	0	
Di-n-pentyl phthalate (DNPP)	55	55	0	0	
Dioxabenzofos	54	54	0	0	
Dioxathion	54	54	0	0	
Diphenamid	54	54	0	0	
Diphenylamine	54	54	0	0	
Disulfoton	54	54	0	0	
Dithiopyr	54	54	0	0	
Diuron	54	54	0	0	
Edifenphos	54	54	0	0	
Emamectin benzoate	54	54	0	0	
Endosulfan (alpha)	54	54	0	0	
Endosulfan (beta)	54	54	0	0	
Endosulfan sulphate	54	54	0	0	
Endrin	54	54	0	0	
Endrin ketone	54	54	0	0	
EPN	54	54	0	0	
Epoxiconazole	54	54	0	0	
EPTC	54	54	0	0	
Erythromycin	50	50	0	0	
Esprocarb	54	54	0	0	
Ethalfuralin	54	54	0	0	
Ethametsulfuron-methyl	54	54	0	0	
Ethiofencarb	54	54	0	0	
Ethion	54	54	0	0	
Ethiprole	54	54	0	0	
Ethofumesate	54	54	0	0	
Ethoprofos	54	54	0	0	
Ethoxyquin	53	53	0	0	
Ethoxysulfuron	54	54	0	0	
Ethychlozate	54	54	0	0	
Etobenzanid	54	54	0	0	
Etoxazole	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Etridiazole	54	54	0	0	
Etrimfos	54	54	0	0	
Famoxadone	54	54	0	0	
Famphur	54	54	0	0	
Fenamidone	54	54	0	0	
Fenamifos	50	50	0	0	
Fenarimol	53	53	0	0	
Fenbuconazole	54	54	0	0	
Fenchlorphos	54	54	0	0	
Fenhexamid	54	54	0	0	
Fenitrothion	54	54	0	0	
Fenobucarb	54	54	0	0	
Fenothiocarb	54	54	0	0	
Fenoxanil	54	54	0	0	
Fenoxaprop	53	53	0	0	
Fenoxaprop-ethyl	54	54	0	0	
Fenoxycarb	54	54	0	0	
Fenpiclonil	54	54	0	0	
Fenpropadin	1	1	0	0	
Fenpropathrin	54	54	0	0	
Fenpropimorph	54	54	0	0	
Fenpyroximate	50	50	0	0	
Fensulfothion	54	54	0	0	
Fenthion	54	54	0	0	
Fenthion sulfone	54	54	0	0	
Fenthion sulfoxide	54	54	0	0	
Fenthion-ethyl	54	54	0	0	
Fenthion-oxon	54	54	0	0	
Fenthion-oxon-sulfone	54	54	0	0	
Fenthion-oxon-sulfoxide	54	54	0	0	
Fentrazamide	54	54	0	0	
Fenvalerate	54	54	0	0	
Ferimzone	53	53	0	0	
Fipronil	54	54	0	0	
Fipronil-sulfide	54	54	0	0	
Fipronil-sulfone	54	54	0	0	
Flamprop	1	1	0	0	
Flamprop-methyl	54	54	0	0	
Flazasulfuron	54	54	0	0	
Fluacrypyrim	54	54	0	0	
Fluazifop-p-butyl	54	54	0	0	
Flubendazole	54	54	0	0	
Flubendiamide	54	54	0	0	
Flucythrinate	54	54	0	0	
Fludioxonil	50	50	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Flufenacet	54	54	0	0	
Flumethrin	54	54	0	0	
Flumiclorac pentyl	54	54	0	0	
Flumioxazin	54	54	0	0	
Fluometuron	54	54	0	0	
Fluopicolide	54	54	0	0	
Fluopyram	54	54	0	0	
Fluquinconazole	54	54	0	0	
Fluridone	54	54	0	0	
Flusilazole	54	54	0	0	
Fluthiacet-methyl	54	54	0	0	
Flutolanil	54	54	0	0	
Flutriafol	54	54	0	0	
Fluvalinate	53	53	0	0	
Fonofos	54	54	0	0	
Forchlorfenuron	54	54	0	0	
Fosthiazate	54	54	0	0	
Fuberidazole	54	54	0	0	
Furalaxyl	54	54	0	0	
Furaltadone (AMTZ)	58	58	0	0	
Furametpyr	54	54	0	0	
Furathiocarb	50	50	0	0	
Furazolidone (AOZ)	58	58	0	0	
Gentamycin	50	50	0	0	
Halosulfuron-methyl	54	54	0	0	
Haloxypop-etotyl	54	54	0	0	
Haloxypop-methyl	54	54	0	0	
Heptachlor	54	54	0	0	
Heptachlor-endo-epoxide	54	54	0	0	
Heptachlor-exo-epoxide	54	54	0	0	
Heptenophos	54	54	0	0	
Hexachlorobenzene (HCB)	54	54	0	0	
Hexaconazole	54	54	0	0	
Hexadecylpyridiniumammonium chloride (C16-PY)	64	64	0	0	
Hexadecyltrimethylammonium chloride (TM-C16)	64	64	0	0	
Hexaflumuron	50	50	0	0	
Hexazinone	54	54	0	0	
Hexythiazox	5	5	0	0	
Imazalil	54	54	0	0	
Imazamethabenz-methyl	54	54	0	0	
Imazosulfuron	54	54	0	0	
Imidacloprid	54	54	0	0	
Imidacloprid-5-hydroxy	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Imidacloprid-olefin	54	54	0	0	
Inabenfide	54	54	0	0	
Indanofan	54	54	0	0	
Indoxacarb	54	54	0	0	
Iodofenphos	54	54	0	0	
Iodosulfuron-methyl	54	54	0	0	
Iprobenfos	54	54	0	0	
Iprodione	54	54	0	0	
Iprovalicarb	54	54	0	0	
Isazophos	54	54	0	0	
Isofenphos	54	54	0	0	
Isofenphos-methyl	54	54	0	0	
Isoprocab	54	54	0	0	
Isoprothiolane	54	54	0	0	
Isoproturon	54	54	0	0	
Isopyrazam	54	54	0	0	
Isoxathion	54	54	0	0	
Kanamycin	50	50	0	0	
Karbutilate	54	54	0	0	
Kresoxim-methyl	54	54	0	0	
Lactofen	54	54	0	0	
Lasalocid	53	53	0	0	
Lead	48	47	1	0	●
Lenacil	54	54	0	0	
Leptophos	54	54	0	0	
Lindane	54	54	0	0	
Linuron	50	50	0	0	
Maduramicin	53	53	0	0	
Malathion	54	54	0	0	
Mandipropamid	54	54	0	0	
Mefenacet	54	54	0	0	
Mefenpyr-diethyl	54	54	0	0	
Melamine	50	50	0	0	
Mepanipyrim	54	54	0	0	
Mepronil	53	53	0	0	
Mercury	54	54	0	0	
Mesotrione	5	5	0	0	
Metalaxyl	54	54	0	0	
Metamitron	54	54	0	0	
Metconazole	54	54	0	0	
Methabenzthiazuron	54	54	0	0	
Methacrifos	54	54	0	0	
Methamidophos	54	54	0	0	
Methidathion	54	54	0	0	
Methiocarb	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Methiocarb-sulfone	54	54	0	0	
Methiocarb-sulfoxide	54	54	0	0	
Methomyl	54	54	0	0	
Methoxychlor	54	54	0	0	
Methoxyfenozide	54	54	0	0	
Metobromuron	54	54	0	0	
Metolachlor	54	54	0	0	
Metominostrobin (E)	54	54	0	0	
Metominostrobin (Z)	54	54	0	0	
Metosulam	54	54	0	0	
Metrafenone	54	54	0	0	
Metribuzin	54	54	0	0	
Metsulfuron-methyl	54	54	0	0	
Mevinphos	54	54	0	0	
Mirex	54	54	0	0	
Molinate	37	37	0	0	
Monensin	53	53	0	0	
Monocrotophos	54	54	0	0	
Monolinuron	54	54	0	0	
Myclobutanil	54	54	0	0	
Napropamide	54	54	0	0	
Narasin	53	53	0	0	
N-benzyltrimethyldecylammonium chloride (BDM-C10)	64	64	0	0	
N-benzyltrimethylhexadecylammonium chloride (BDM-C16)	64	62	2	0	●
N-benzyltrimethyloctadecylammonium chloride (BDM-C18)	64	64	0	0	
N-benzyltrimethyltetradecylammonium chloride (BDM-C14)	64	40	24	0	●
N-didecyltrimethylammonium chloride (DM-DC10)	64	58	6	0	●
N-didodecyltrimethylammonium chloride (DM-DC12)	64	64	0	0	
Nicotine	53	53	0	0	
Nitrate	58	4	54	0	●
Nitrite	58	0	58	0	●
Nitrofen	54	54	0	0	
Nitrofurantoin (AHD)	58	58	0	0	
Nitrofurazone (SEM)	58	43	15	0	●
Nitrothal-isopropyl	54	54	0	0	
Norflurazon	54	54	0	0	
Novaluron	54	54	0	0	
Ocithalinone	54	54	0	0	
Oleandomycin	50	50	0	0	
Omethoate	54	54	0	0	
Oryzalin	54	54	0	0	
Oxabetrinil	54	54	0	0	
Oxadiazon	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Oxadixyl	54	54	0	0	
Oxamyl	54	54	0	0	
Oxycarboxin	54	54	0	0	
Oxychlordane	54	54	0	0	
Oxyfluorfen	54	54	0	0	
Oxytetracycline	50	50	0	0	
Paclobutrazol	54	54	0	0	
Parathion	54	54	0	0	
Parathion-methyl	54	54	0	0	
Penconazole	54	54	0	0	
Pencycuron	54	54	0	0	
Pendimethalin	54	54	0	0	
Penicillin G	50	50	0	0	
Pentachlorobenzene	54	54	0	0	
Penthiopyrad	54	54	0	0	
Permethrin (cis,trans)	54	54	0	0	
Perthan	54	54	0	0	
Phenmedipham	54	54	0	0	
Phenthoate	54	54	0	0	
Phorate	54	54	0	0	
Phorate sulphone	54	54	0	0	
Phorate sulphoxide	54	54	0	0	
Phosalone	53	53	0	0	
Phosmet	54	54	0	0	
Phosphamidon	50	50	0	0	
Phoxim	54	54	0	0	
Picolinafen	54	54	0	0	
Piperonyl butoxide	54	54	0	0	
Piperophos	54	54	0	0	
Pirimicarb	54	54	0	0	
Pirimiphos-methyl	54	54	0	0	
Pretilachlor	54	54	0	0	
Prochloraz	54	54	0	0	
Procymidone	54	54	0	0	
Profenofos	50	50	0	0	
Promecarb	54	54	0	0	
Prometryn	54	54	0	0	
Propachlor	54	54	0	0	
Propamocarb	54	54	0	0	
Propanil	54	54	0	0	
Propaphos	54	54	0	0	
Propaquizafop	54	54	0	0	
Propargite	54	54	0	0	
Propazine	53	53	0	0	
Propetamphos	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Propham	54	54	0	0	
Propiconazole	54	54	0	0	
Propoxur	54	54	0	0	
Propyzamide	54	54	0	0	
Proquinazid	50	50	0	0	
Prosulfocarb	54	54	0	0	
Prothiofos	54	54	0	0	
Pymetrozine	54	54	0	0	
Pyraclufos	54	54	0	0	
Pyraclostrobin	54	54	0	0	
Pyraflufen ethyl	54	54	0	0	
Pyrasulfotole	5	5	0	0	
Pyrazophos	54	54	0	0	
Pyrethrin	50	50	0	0	
Pyributicarb	54	54	0	0	
Pyridaben	54	54	0	0	
Pyridafenthion	54	54	0	0	
Pyrifenox	5	5	0	0	
Pyriftalid	54	54	0	0	
Pyrimethanil	54	54	0	0	
Pyrimidifen	54	54	0	0	
Pyriminobac-methyl (E)	54	54	0	0	
Pyriminobac-methyl (Z)	54	54	0	0	
Pyriproxyfen	54	54	0	0	
Pyroquilon	54	54	0	0	
Pyroxulam	54	54	0	0	
Quinalphos	54	54	0	0	
Quinoclamine	50	50	0	0	
Quinoxifen	54	54	0	0	
Quintozene	54	54	0	0	
Quizalofop-ethyl	54	54	0	0	
Rimsulfuron	54	54	0	0	
Saflufenacil	54	54	0	0	
Salinomycin	53	53	0	0	
Sebuthylazine	54	54	0	0	
Semduramacin	53	53	0	0	
Sethoxydim	53	53	0	0	
Simazine	54	54	0	0	
Simeconazole	54	54	0	0	
Simetryn	54	54	0	0	
Sodium monofluoroacetate (1080)	460	460	0	0	
Spinetoram	54	54	0	0	
Spinosad	54	54	0	0	
Spiramycin	50	50	0	0	
Spiromesifen	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Spiromesifen-enol	54	54	0	0	
Spirotetramat	54	54	0	0	
Spirotetramat-enol	54	54	0	0	
Spirotetramat-enol-glucoside	5	5	0	0	
Spirotetramat-keto-hydroxy	54	54	0	0	
Spirotetramat-mono-hydroxy	54	54	0	0	
Spiroxamine	50	50	0	0	
Streptomycin	50	50	0	0	
Sulfentrazone	50	50	0	0	
Sulprofos	50	50	0	0	
Tebuconazole	54	54	0	0	
Tebufenozide	54	54	0	0	
Tebufenpyrad	54	54	0	0	
Tebuthiuron	54	54	0	0	
Tecnazene	54	54	0	0	
Tefluthrin	54	54	0	0	
Temephos	50	50	0	0	
Tepraloxymid	54	54	0	0	
Terbacil	54	54	0	0	
Terbufos	54	54	0	0	
Terbumeton	54	54	0	0	
Terbuthylazine	54	54	0	0	
Terbutryn	54	54	0	0	
Tetrachlorvinphos	54	54	0	0	
Tetraconazole	54	54	0	0	
Tetracycline	50	50	0	0	
Tetradifon	54	54	0	0	
Tetrahydrophthalimide-1,2,3,6	54	54	0	0	
Thenylchlor	54	54	0	0	
Thiabendazole	54	54	0	0	
Thiacloprid	54	54	0	0	
Thiamethoxam	54	54	0	0	
Thiazopyr	54	54	0	0	
Thidiazuron	54	54	0	0	
Thiobencarb	54	54	0	0	
Thiometon	54	54	0	0	
Tiadinil	54	54	0	0	
Tin	48	38	10	0	●
Tolclofos-methyl	54	54	0	0	
Tolyfluanid	50	50	0	0	
Tralkoxydim	50	50	0	0	
Transfluthrin	54	54	0	0	
Triadimefon	54	54	0	0	
Triadimenol	54	54	0	0	
Triallate	54	54	0	0	

Compound	Samples collected	Samples with no detections	Detections below the action limit ²	Detections above the action limit ³	Flag
Triasulfuron	54	54	0	0	
Triazophos	54	54	0	0	
Tribenuron-methyl	54	54	0	0	
Tribufos	54	54	0	0	
Trichlorfon	54	54	0	0	
Tricyclazole	54	54	0	0	
Trifloxystrobin	54	54	0	0	
Trifloxysulfuron sodium	54	54	0	0	
Triflumizole	54	54	0	0	
Triflumuron	54	54	0	0	
Trifluralin	54	54	0	0	
Triflusulfuron-methyl	54	54	0	0	
Triforine	54	54	0	0	
Triticonazole	54	54	0	0	
Tylosin	50	50	0	0	
Uniconazole P	54	54	0	0	
Vamidothion	54	54	0	0	
Vinclozolin	54	54	0	0	
XMC	54	54	0	0	
Zoxamide	54	54	0	0	
2-phenylphenol	42	41	1	0	●

² The number of detections reported at or below the maximum allowable level. In some cases no limit applies

³ Non-conforming results: detection of a compound above the New Zealand or export market maximum limit for the residue or contaminant, or detection at or above the limit of quantitation for a compound not permitted for food producing animals

2.2 REPORTING OF SURVEYS IN DAIRY PRODUCTS

Table 4: Dairy components

Product type	Samples collected			
	Ash	Fat	Moisture	Protein
Butter	1	2	2	2
Cheese	0	2	2	2
Follow on formula	5	5	5	5
Growing up milk powder	5	5	5	5
Infant formula	11	11	11	11
Milk	0	1	0	1
Milk protein concentrate	0	1	0	1
Nutritionals	4	4	4	4
Skim milk powder	4	4	4	4
Whole milk powder	12	12	11	11
AMF	0	1	1	1
Whey protein concentrate	8	0	0	0

Table 5: Steroids and resorcylic acid lactones

Substance	Samples collected	AMF	Butter	Cheese	Cream	Follow-on formula	Growing up milk powder	Infant formula	IF ingredients (Paediatric grade)	Skim milk powder	Whey protein concentrate	Whole milk powder
α - + β -boldenone	58	2	3	4	1	8	6	9	1	3	4	17
α -trenbolone	58	2	3	4	1	8	6	9	1	3	4	17
β -trenbolone	58	2	3	4	1	8	6	9	1	3	4	17
Dexamethasone	58	2	3	4	1	8	6	9	1	3	4	17
Dienestrol	58	2	3	4	1	8	6	9	1	3	4	17
Diethylstilbestrol	58	2	3	4	1	8	6	9	1	3	4	17
Hexestrol	58	2	3	4	1	8	6	9	1	3	4	17
Megesterol	58	2	3	4	1	8	6	9	1	3	4	17
Melengestrol	58	2	3	4	1	8	6	9	1	3	4	17
α -nortestosterone	58	2	3	4	1	8	6	9	1	3	4	17
β -nortestosterone	58	2	3	4	1	8	6	9	1	3	4	17
α -testosterone	58	2	3	4	1	8	6	9	1	3	4	17
β -testosterone	58	2	3	4	1	8	6	9	1	3	4	17
Estriol	58	2	3	4	1	8	6	9	1	3	4	17
Estrone	58	2	3	4	1	8	6	9	1	3	4	17
Ethinylestradiol	58	2	3	4	1	8	6	9	1	3	4	17
Hydroxyprogesterone	58	2	3	4	1	8	6	9	1	3	4	17
Medroxyprogesterone	58	2	3	4	1	8	6	9	1	3	4	17
Estradiol	58	2	3	4	1	8	6	9	1	3	4	17
α -methylprednisolone	58	2	3	4	1	8	6	9	1	3	4	17
Prednisolone	58	2	3	4	1	8	6	9	1	3	4	17
Progesterone	58	2	3	4	1	8	6	9	1	3	4	17
α -zearalanol	58	2	3	4	1	8	6	9	1	3	4	17
β -zearalanol	58	2	3	4	1	8	6	9	1	3	4	17
α -zearalenol	58	2	3	4	1	8	6	9	1	3	4	17
β -zearalenol	58	2	3	4	1	8	6	9	1	3	4	17
Zearalanone	58	2	3	4	1	8	6	9	1	3	4	17
Zearalenone	58	2	3	4	1	8	6	9	1	3	4	17

Table 6: Naturally occurring chemical elements and other compounds

Chemical elements	Samples collected	Product type collected												
		Butter	Cheese	Follow-on formula	Growing up milk powder	Infant formula	IF ingredients (Paediatric grade)	Lactose	Milk protein concentrate	Nutritional	Skim milk powder	Sodium caseinate	Whey protein concentrate	Whole milk powder
Aluminium	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Antimony	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Barium	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Bismuth	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Calcium	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Chromium	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Cobalt	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Copper	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Iodine	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Iron	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Magnesium	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Manganese	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Nickel	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Potassium	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Selenium	47	2	2	5	5	11	0	1	0	4	4	1	2	10
Sodium	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Sodium thiocyanate	59	0	0	8	6	9	1	0	1	0	6	0	8	20
Zinc	48	2	2	5	5	11	0	1	0	4	4	1	3	10
Butanal	59	0	0	8	6	9	1	0	1	0	6	0	8	20
Formaldehyde	59	0	0	8	6	9	1	0	1	0	6	0	8	20
Heptanal	44	0	0	7	4	8	1	0	0	0	3	0	8	13
Hexanal	59	0	0	8	6	9	1	0	1	0	6	0	8	20
Pentanal	59	0	0	8	6	9	1	0	1	0	6	0	8	20