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Attachment 2
A Risk Profile of Dairy Products in Australia

Appendices 7-14

DRAFT ASSESSMENT REPORT

PROPOSAL P296

PRIMARY PRODUCTION AND PROCESSING
STANDARD FOR DAIRY

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Chemical Risk Assessment Framework

Evidence-based risk assessments underpin the development of food standards for chemicals. The risk assessment framework used to develop food standards for Australia and New Zealand are broadly based on the principles and procedures recommended by the international food standards setting body, the Codex Alimentarius Commission (CAC, 2005). The steps used by FSANZ to identify and quantify risks associated with chemicals in food are described briefly below and in the FSANZ framework document (ANZFA, 1996).

Hazard identification and characterisation

The first two steps in a risk assessment process are hazard identification and characterisation. Chemical hazards are identified through standard toxicity tests performed according to internationally accepted protocols such as those published by the Organisation for Economic Cooperation and Development (OECD, 1993). Hazard characterisation considers the dose-response relationship for particular hazards and, if possible, establishes an intake level considered to be safe for the vast majority of the population.

Chemicals intentionally used in food production

FSANZ uses a cautious approach when assessing the safety of chemicals intentionally added to food. For food additives and agricultural and veterinary chemicals, there is generally sufficient data available to identify and characterise hazards and to establish a safe level of human exposure to these chemicals, as determined by the Office of Chemical Safety for the APVMA. Various international bodies, such as the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Joint FAO/WHO Meeting on Pesticide Residues (JMPR), have also established safe levels of exposure for these chemicals. The acceptable daily intake (ADI) intake is the amount of the chemical, which may be safely consumed by a human over a lifetime without appreciable risk. The ADI is usually derived from experiments in animals in which a no-observed effect level (NOEL) is determined. Generally the NOEL for the most sensitive animal species is then divided by a safety factor, usually 100, to arrive at the ADI.

Chemicals unintentionally present in food

For many chemicals unintentionally present in food such as contaminants, there is a paucity of reliable data on which to identify and characterise hazards and thus to establish a safe level of human exposure. The reference value used to indicate the safe level of intake of a contaminant is the so-called 'tolerable intake', which can be calculated on a daily, weekly or monthly basis. Reference values, which define an acceptable level of exposure to a contaminant, are established internationally by JECFA. The tolerable intake (TI) is generally referred to as 'provisional' since there is often a lack of data on the consequences of human exposure at low levels, and new data may result in a change to the tolerable level. For contaminants that may accumulate in the body over time such as lead, cadmium and mercury, the provisional tolerable weekly intake (PTWI) or monthly intake (PTMI) is used as a reference value in order to minimise the significance of daily variations in intake. For contaminants that do not accumulate in the body, such as arsenic, the provisional tolerable daily intake (PTDI) can be used.

Exposure evaluation

Estimation of exposure to chemicals in food depends on the knowledge of the level of the substance in food, coupled with knowledge of the amount of each food consumed, though there is a degree of uncertainty associated with both of these parameters. With respect to food contaminants the level of contamination of food is influenced by a variety of factors such as geographic and climatic conditions, agricultural practices, local industrial activity and food preparation and storage conditions.

The level of exposure to a substance in food, as consumed, can be determined from food surveillance data when available. Different methods of dietary modelling combine data on the levels of substances in food with food consumption data in different ways to provide estimates of the daily or weekly dietary exposure to a particular substance from food commodities for all sections of the population for which food consumption data are available.

Australian Total Diet Study

FSANZ monitors the food supply to ensure that existing food regulatory measures provide adequate protection to consumer health and safety. The Australian Total Diet Study (ATDS) is part of that monitoring.

The ATDS, formerly known as the Australian Market Basket Survey, is a comprehensive assessment of consumers' dietary exposure (intake) to pesticide residues, contaminants and other substances. The survey is conducted approximately every two years.

The survey estimates the level of dietary exposure of the Australian population through the testing of food representative of the total diet. In order to achieve more accurate dietary exposure, the foods examined in the ATDS are prepared to a 'table ready' state before they are analysed. As a consequence, both raw, processed and cooked foods are examined from both domestic and international sources.

FSANZ coordinate the survey while the States and the Northern Territory purchase and prepare the food samples.

Dietary modelling

Dietary exposure assessments are conducted using dietary modelling techniques that combine food consumption data with food chemical concentration data to estimate the exposure to the food chemical from the diet. The assessment of the dietary exposure is conducted using FSANZ's dietary modelling computer program, DIAMOND.

$$\text{Dietary exposure} = \text{food chemical concentration} \times \text{food consumption}$$

Exposures are estimated by combining usual patterns of food consumption, as derived from national nutrition survey (NNS) data, with both current and proposed levels of use of the food chemicals in the foods.

Risk characterisation

Risk characterisation brings together information on the hazard characterisation and on level of exposure to the substance in food for various population groups in order to characterise the risk for various population groups. This might be expressed in terms of a margin-of-safety between an ADI or TI level and the known level of human exposure via the whole diet.

Regulatory Framework for Agricultural and Veterinary Chemicals

Agricultural and veterinary chemical regulation

The Australian Pesticides and Veterinary Medicines Authority (APVMA) is responsible for regulating the manufacture, import and supply of all Agvet chemicals onto the Australian market.

As of August 2005, Standard 1.4.2 had MRLs for 244 chemicals in Schedule 1 – Maximum Residue Limits and 7 chemicals listed in Schedule 2 – Extraneous Residue Limits, in association with dairy products (Appendix 3). The list includes veterinary medicines used for prophylaxis and growth promotion, and agricultural chemicals used as crop and grain protection agents.

Manufacturers of agricultural and veterinary chemical products must have their manufacturing premises licensed by the APVMA to produce specified chemicals. They must also comply with Codes of Good Manufacturing Practice (GMP). No veterinary or agricultural chemical product (including imported products) can be legally supplied in Australia without being registered by the APVMA. All products must be supplied with an APVMA approved label.

Veterinary and agricultural chemical products that are not registered by the APVMA can only be supplied in accordance with specific APVMA permits, such as for the purposes of conducting experimental trials. The only other instance where unregistered chemical products can be used is by a veterinary practitioner who may prescribe to an animal under his or her care.

No hormones for dairy cattle are included in the MRL Standard of the Code. This is consistent with dairy industry practices, which has seen the use of hormone treatments for growth promotant purposes banned since the 1960's. The Commonwealth Government's National Residue Survey program tests for hormonal growth promotants in beef cattle and sheep edible and non-edible (i.e. urine and faeces) matrices.

Maximum residue limits

Maximum residue limits (MRLs) for agricultural and veterinary chemicals are established in the Code. FSANZ evaluates the potential dietary exposure associated with the proposed MRLs and ensures that this exposure does not represent an unacceptable risk to public health and safety. MRLs are listed in Standard 1.4.2 – Maximum Residue Limits of the Code. MRLs relevant to dairy produce are listed in Appendix 3.

The inclusion of the MRLs in the Code allows produce treated according to Good Agricultural Practice (GAP) to be legally sold, provided that the residues in the treated produce do not exceed the MRL. Changes to Australian MRLs reflect the changing patterns of agricultural and veterinary chemicals available to farmers. These changes include both the development of new products and crop uses, and the withdrawal of older products following review by the APVMA.

Standard 1.4.2 lists the maximum permissible limits for agricultural and veterinary chemical residues present in food. Schedule 1 lists all of the agricultural and veterinary chemical limits

in particular foods and Schedule 2 lists all extraneous agricultural chemical limits in particular foods. If a maximum residue limit for an agricultural or veterinary chemical in a food is not listed in the schedules there must be no detectable residues of that agricultural or veterinary chemical in that food. Also, if an agricultural or veterinary chemical is not listed in the schedules, there must be no detectable residue of that chemical and no detectable residue of any metabolites of that chemical in food (whether or not that the particular food is listed in the schedules).

Current analytical technology can detect chemicals at very low concentrations. The detection of a residue is not a matter for concern except when the use of the relevant chemical is unauthorised or its concentration is greater than the MRL set on the basis of GAP. In reality, human health is rarely an issue since even at the MRL the level of dietary intake is well below the ADI established from animal studies.

In regard to MRLs in milk, the APVMA and JECFA both recommend MRLs based on residues on an individual animal basis. This method is adopted world-wide and is documented in Codex policy both in the EU and the USA. Hence, the APVMA's recommendations to FSANZ for milk MRLs have individual cows as the basis for its recommendations. This is the case for all milk MRLs.

Stockfeed MRLs

Stockfeed is also subject to treatment with crop and grain protection agents. Sources of residues may result from applications made during the growth of the crop and also post-harvest, for protection mainly against fungal and insect infestation (covered in Section 3.2.2). The APVMA have established guidelines for MRLs based on livestock dietary exposure and internationally accepted methodology (APVMA, 2002). Stockfeed legislation in some States directly includes reference to the APVMA MRL Standard (Table 1 and Table 4) as the legislative control for stockfeed legislation.

Animal feed controls are currently under review in Australia with the aim of developing an enhanced national capability framework.

Maximum Residue Limits

Residue limits for agricultural and veterinary chemicals approved for use in dairy products used in food as of March 2005 listed in the *Food Standards Code* Section 1.4.2 schedule 1 and 2. Maximum residue limits (MRLs) are expressed in milligrams of the chemical per kilogram of the food (mg/kg).

The portion of the commodity to which the MRL applies (and which is analysed) is the whole commodity. When an MRL for cattle milk or milks is qualified by “(in the fat)” the compound is regarded as fat-soluble, and the MRL applies to the fat portion of the milk. In the case of a derived or a manufactured milk product with a fat content of 2% or more, the MRL also applies to the fat portion. For a milk product with a fat content less than 2%, the MRL applied should be 1/50 that specified for “milk (in the fat)”, and should apply to the whole product (as defined in the Food Standards Code Section 1.4.2 schedule 4).

Note that “cattle milk” refers to bovine milk and “milks” refers to all mammalian milk.

- *: an asterix denotes that the maximum residue limit or the extraneous residue limit is set at or about the limit of determination.
- T: a ‘T’ denotes that the maximum residue limit or the extraneous residue limit is a temporary residue limit or extraneous residue limit.
- E: an ‘E’ denotes extraneous residue limit

** A recent review of endosulphan has resulted in changes in the MRL Standard for endosulfan found in milk together with changes to livestock feeding restraints and label approvals.

RISK PROFILE OF DAIRY PRODUCTS IN AUSTRALIA

ABAMECTIN	
SUM OF AVERMECTIN B 1A, AVERMECTIN B 1B AND D-8,9 ISOMER OF AVERMECTIN B 1A	
CATTLE MILK	0.02
ACETAMIPRID	
<i>COMMODITIES OF PLANT ORIGIN: ACETAMIPRID COMMODITIES OF ANIMAL ORIGIN: SUM OF ACETAMIPRID AND N-DIMETHYL ACETAMIPRID ((E)-N¹-[(6-CHLORO-3-PYRIDYL)METHYL]-N²-CYANOACETAMIDINE), EXPRESSED AS ACETAMIPRID</i>	
MILKS	*0.01
ACIFLUORFEN	
ACIFLUORFEN	
MILKS	*0.01
ALDICARB	
SUM OF ALDICARB, ITS SULFOXIDE AND ITS SULFONE, EXPRESSED AS ALDICARB	
MILKS	*0.01
ALDOXYCARB	
SUM OF ALDOXYCARB AND ITS SULFONE, EXPRESSED AS ALDOXYCARB	
MILKS	*0.02
ALIPHATIC ALCOHOL ETHOXYLATES	
ALIPHATIC ALCOHOL ETHOXYLATES	
CATTLE MILK	1
AMETRYN	
AMETRYN	
MILKS	*0.05
AMITRAZ	
SUM OF AMITRAZ AND N-(2,4-DIMETHYLPHENYL)-N'-METHYLFORMAMIDINE, EXPRESSED AS AMITRAZ	
MILKS	0.1
AMITROLE	
AMITROLE	
MILKS	*0.01
AMOXYCILLIN	
INHIBITORY SUBSTANCE, IDENTIFIED AS AMOXYCILLIN	
CATTLE MILK	*0.01
SHEEP MILK	*0.01
AMPICILLIN	
INHIBITORY SUBSTANCE, IDENTIFIED AS AMPICILLIN	
CATTLE MILK	*0.01
ASULAM	
ASULAM	
MILKS	*0.1

ATRAZINE	
ATRAZINE	
MILKS	T*0.01
AVOPARCIN	
AVOPARCIN	
MILKS	*0.01
AZINPHOS-METHYL	
AZINPHOS-METHYL	
MILKS	*0.05
AZOXYSTROBIN	
AZOXYSTROBIN	
MILKS	0.005
BACITRACIN	
INHIBITORY SUBSTANCE, IDENTIFIED AS BACITRACIN	
MILKS	*0.5
BENDIOCARB	
COMMODITIES OF PLANT ORIGIN: UNCONJUGATED BENDIOCARB; COMMODITIES OF ANIMAL ORIGIN: SUM OF CONJUGATED AND UNCONJUGATED BENDIOCARB, 2,2-DIMETHYL-1,3-BENZODIOXOL-4-OL AND N-HYDROXYMETHYLBENDIOCARB, EXPRESSED AS BENDIOCARB	
MILKS	0.1
BENFLURALIN	
BENFLURALIN	
MILKS	T*0.01
BENTAZONE	
BENTAZONE	
MILKS	*0.05
BENZYL G PENICILLIN	
INHIBITORY SUBSTANCE, IDENTIFIED AS BENZYL G PENICILLIN	
MILKS	*0.0015
BIFENAZATE	
SUM OF BIFENAZATE AND BIFENAZATE DIAZENE (DIAZENECARBOLXYLIC ACID, 2-(4-METHOXY-[1,1'-BIPHENYL-3-YL] 1-METHYLETHYL ESTER), EXPRESSED AS BIFENAZATE	
MILKS	*0.01
BIFENTHRIN	
BIFENTHRIN	
MILKS	0.5
BITERTANOL	
BITERTANOL	
MILKS	0.2

BROMACIL BROMACIL	
MILKS	*0.04
BROMOXYNIL BROMOXYNIL	
MILKS	*0.02
BUPROFEZIN BUPROFEZIN	
MILKS	*0.01
BUTAFENACIL BUTAFENACIL	
MILKS	*0.01
BUTROXYDIM BUTROXYDIM	
MILKS	*0.01
CAPTAN CAPTAN	
MILKS	*0.01
CARBARYL CARBARYL	
MILKS	T*0.05
CARBENDAZIM SUM OF CARBENDAZIM AND 2-AMINO BENZIMIDAZOLE, EXPRESSED AS CARBENDAZIM	
MILKS	*0.1
CARBETAMIDE CARBETAMIDE	
MILKS	*0.1
CARBOFURAN SUM OF CARBOFURAN AND 3-HYDROXYCARBOFURAN, EXPRESSED AS CARBOFURAN	
MILKS	*0.05
CARFENTRAZONE-ETHYL CARFENTRAZONE-ETHYL	
MILKS	*0.025
CEFTIOFUR DESFUROYLCEFTIOFUR	
CATTLE MILK	0.1
CEFUROXIME INHIBITORY SUBSTANCE, IDENTIFIED AS CEFUROXIME	
CATTLE MILK	*0.1

CEPHALONIUM INHIBITORY SUBSTANCE, IDENTIFIED AS CEPHALONIUM	
CATTLE MILK	*0.02
CEPHAPIRIN CEPHAPIRIN AND DES-ACETYLCEPHAPIRIN, EXPRESSED AS CEPHAPIRIN	
CATTLE MILK	*0.01
CHLORFENAPYR CHLORFENAPYR	
MILKS	*0.01
CHLORFENVINPHOS CHLORFENVINPHOS, SUM OF E AND Z ISOMERS	
CATTLE MILK (IN THE FAT)	T0.2
CHLORFLUAZURON CHLORFLUAZURON	
CATTLE MILK	0.1
CHLORHEXIDINE CHLORHEXIDINE	
MILKS	0.05
CHLORMEQUAT CHLORMEQUAT CATION	
MILKS	*0.1
CHLORPYRIFOS CHLORPYRIFOS	
MILKS (IN THE FAT)	T0.2
CHLORPYRIFOS-METHYL CHLORPYRIFOS-METHYL	
MILKS (IN THE FAT)	*0.05
CHLORSULFURON CHLORSULFURON	
MILKS	*0.05
CHLORTHAL-DIMETHYL CHLORTHAL-DIMETHYL	
MILKS	*0.05
CLAVULANIC ACID CLAVULANIC ACID	
CATTLE MILK	*0.01
CLODINAFOP-PROPARGYL CLODINAFOP-PROPARGYL	
MILKS	*0.05
CLODINAFOP ACID (R)-2-[4-(5-CHLORO-3-FLUORO-2-PYRIDINYLOXY)PHENOXY] PROPANOIC ACID	
MILKS	*0.1

CLOPYRALID CLOPYRALID	
MILKS	0.05
CLOQUINTOCET-MEXYL CLOQUINTOCET-MEXYL	
MILKS	*0.05
CLOQUINTOCET ACID 5-CHLORO-8-QUINOLINOXYACETIC ACID	
MILKS	*0.1
CLORSULON CLORSULON	
CATTLE MILK	1.5
CLOXACILLIN INHIBITORY SUBSTANCE, IDENTIFIED AS CLOXACILLIN	
CATTLE MILK	*0.01
COUMAPHOS SUM OF COUMAPHOS AND ITS OXYGEN ANALOGUE, EXPRESSED AS COUMAPHOS	
MILKS (IN THE FAT)	0.1
CYCLANILIDE SUM OF CYCLANILIDE AND ITS METHYL ESTER, EXPRESSED AS CYCLANILIDE	
MILKS	0.05
CYFLUTHRIN CYFLUTHRIN, SUM OF ISOMERS	
MILKS	0.1
CYHALOTHRIN CYHALOTHRIN, SUM OF ISOMERS	
MILKS (IN THE FAT)	0.5
CYPERMETHRIN CYPERMETHRIN, SUM OF ISOMERS	
MILKS (IN THE FAT)	1
CYPROCONAZOLE CYPROCONAZOLE, SUM OF ISOMERS	
MILKS	*0.01
CYPRODINIL CYPRODINIL	
MILKS	*0.01
CYROMAZINE CYROMAZINE	
MILKS	*0.01
2,4-D 2, 4-D	
MILKS	*0.05

DAMINOZIDE DAMINOZIDE	
MILKS	*0.05
2,4-DB 2, 4-DB	
MILKS	*0.05
DELTA METHRIN DELTA METHRIN	
CATTLE MILK (IN THE FAT)	0.5
GOAT MILK (IN THE FAT)	0.2
SHEEP MILK (IN THE FAT)	0.2
DEXAMETHASONE AND DEXAMETHASONE TRIMETHYLACETATE DEXAMETHASONE	
CATTLE MILK	*0.05
DIAFENTHIURON SUM OF DIAFENTHIURON; N-[2,6-BIS(1- METHYLETHYL)- 4-PHENOXYPHENYL]-N ¹ -(1,1- DIMETHYLETHYL)UREA; AND N-[2,6-BIS(1- METHYLETHYL)-4-PHENOXYPHENYL]- N ¹ -(1,1- DIMETHYLETHYL)CARBODIIMIDE, EXPRESSED AS DIAFENTHIURON	
MILKS	*0.02
DIAZINON DIAZINON	
MILKS (IN THE FAT)	0.5
DICAMBA DICAMBA	
MILKS	0.1
DICHLORVOS DICHLORVOS	
MILKS	0.02
DICLOFOP-METHYL DICLOFOP-METHYL	
MILKS	*0.05
DIFENOCONAZOLE DIFENOCONAZOLE	
MILKS	*0.01
DIFLUBENZURON DIFLUBENZURON	
CATTLE MILK	0.05
SHEEP MILK	0.05
DIFLUFENICAN DIFLUFENICAN	
MILKS	0.01

DIMETHIPIN DIMETHIPIN	
MILKS	*0.01
DIMETHOATE SUM OF DIMETHOATE AND OMETHOATE, EXPRESSED AS DIMETHOATE <i>SEE ALSO OMETHOATE</i>	
MILKS	*0.05
DIMETHOMORPH SUM OF E AND Z ISOMERS OF DIMETHOMORPH	
MILKS	*0.01
DIQUAT DIQUAT CATION	
MILKS	*0.01
DISULFOTON SUM OF DISULFOTON AND DEMETON-S AND THEIR SULFOXIDES AND SULFONES, EXPRESSED AS DISULFOTON	
MILKS	0.01
DITHIOCARBAMATES TOTAL DITHIOCARBAMATES, DETERMINED AS CARBON DISULPHIDE EVOLVED DURING ACID DIGESTION AND EXPRESSED AS MILLIGRAMS OF CARBON DISULPHIDE PER KILOGRAM OF FOOD	
MILKS	*0.2
DIURON SUM OF DIURON AND 3,4- DICHLOROANILINE, EXPRESSED AS DIURON	
CATTLE MILK	0.1
DORAMECTIN DORAMECTIN	
CATTLE MILK	T0.06
2,2-DPA 2,2-DICHLOROPROPIONIC ACID	
MILKS	*0.1
EMAMECTIN EMAMECTIN B1A, PLUS ITS 8,9-Z ISOMER AND EMAMECTIN B1B, PLUS ITS 8,9-Z ISOMER	
MILKS	*0.0005
ENDOSULFAN** SUM OF A- AND B- ENDOSULFAN AND ENDOSULFAN SULPHATE	
MILKS (IN THE FAT)	T0.5
EPRINOMECTIN EPRINOMECTIN B1A	
CATTLE MILK	0.03

EPTC EPTC	
MILKS	*0.1
ERYTHROMYCIN INHIBITORY SUBSTANCE, IDENTIFIED AS ERYTHROMYCIN	
MILKS	*0.04
ESFENVALERATE <i>SEE FENVALERATE</i>	
ETHAMETSULFURON METHYL ETHAMETSULFURON METHYL	
MILKS	*0.02
ETHEPHON ETHEPHON	
MILKS	0.1
ETHION ETHION	
MILKS (IN THE FAT)	0.5
ETHOFUMESATE ETHOFUMESATE	
MILKS (IN THE FAT)	0.2
FENAMIPHOS SUM OF FENAMIPHOS, ITS SULFOXIDE AND SULFONE, EXPRESSED AS FENAMIPHOS	
MILKS	*0.005
FENBENDAZOLE FENBENDAZOLE	
MILKS	0.1
FENHEXAMID FENHEXAMID	
MILKS	*0.01
FENITROTHION FENITROTHION	
MILKS (IN THE FAT)	T*0.05
FENOXAPROP-ETHYL SUM OF FENOXAPROP-ETHYL (ALL ISOMERS) AND 2- (4-(6-CHLORO-2-BENZOXAZOLYLOXY)PHENOXY)- PROPANOATE AND 6-CHLORO-2,3- DIHYDROBENZOXAZOL-2-ONE, EXPRESSED AS FENOXAPROP-ETHYL	
MILKS	0.02
FENTHION SUM OF FENTHION, ITS OXYGEN ANALOGUE, AND THEIR SULFOXIDES AND SULFONES, EXPRESSED AS FENTHION	
MILKS	T0.2

FENVALERATE FENVALERATE, SUM OF ISOMERS	
MILKS (IN THE FAT)	0.2
FIPRONIL SUM OF FIPRONIL, THE SULPHENYL METABOLITE (5-AMINO-1-[2,6-DICHLORO-4-(TRIFLUOROMETHYL)PHENYL]-4-[(TRIFLUOROMETHYL)SULPHENYL]-1H-PYRAZOLE-3-CARBONITRILE), THE SULPHONYL METABOLITE (5-AMINO-1-[2,6-DICHLORO-4-(TRIFLUOROMETHYL)PHENYL]-4-[(TRIFLUOROMETHYL)SULPHONYL]-1H-PYRAZOLE-3-CARBONITRILE), AND THE TRIFLUOROMETHYL METABOLITE (5-AMINO-4-TRIFLUOROMETHYL-1-[2,6-DICHLORO-4-(TRIFLUOROMETHYL)PHENYL]-1H-PYRAZOLE-3-CARBONITRILE)	
MILKS	0.01
FLAMPROP-METHYL FLAMPROP-METHYL	
MILKS	*0.01
FLAVOPHOSPHOLIPOL FLAVOPHOSPHOLIPOL	
CATTLE MILK	T*0.01
FLUAZIFOP-BUTYL FLUAZIFOP-BUTYL	
MILKS	0.1
FLUCYTHRINATE FLUCYTHRINATE	
MILKS	*0.05
FLUDIOXONIL FLUDIOXONIL	
MILKS	*0.01
FLUMETHRIN FLUMETHRIN, SUM OF ISOMERS	
MILKS	T0.05
FLUMETSULAM FLUMETSULAM	
MILKS	*0.1
FLUQUINCONAZOLE FLUQUINCONAZOLE	
MILKS	0.1
FLUROXYPYR FLUROXYPYR	
MILKS	0.1

FLUTOLANIL <i>COMMODITIES OF PLANT ORIGIN: FLUTOLANIL</i> <i>COMMODITIES OF ANIMAL ORIGIN: FLUTOLANIL AND METABOLITES HYDROLYSED TO 2-TRIFLUOROMETHYL-BENZOIC ACID AND EXPRESSED AS FLUTOLANIL</i>	
MILKS	*0.05
FLUTRIAFOL FLUTRIAFOL	
MILKS	*0.05
GLUFOSINATE AND GLUFOSINATE-AMMONIUM SUM OF GLUFOSINATE-AMMONIUM, N-ACETYL GLUFOSINATE AND 3-[HYDROXY(METHYL)-PHOSPHINOL] PROPIONIC ACID, EXPRESSED AS GLUFOSINATE (FREE ACID)	
MILKS	*0.05
GLYPHOSATE GLYPHOSATE	
MILKS	*0.1
HALOSULFURON-METHYL HALOSULFURON-METHYL	
MILKS	T*0.01
HALOXYFOP SUM OF HALOXYFOP, ITS ESTERS AND CONJUGATES, EXPRESSED AS HALOXYFOP	
MILKS	0.02
HEXAZINONE HEXAZINONE	
MILKS	*0.05
IMAZAMOX IMAZAMOX	
MILKS	*0.05
IMAZAPIC SUM OF IMAZAPIC AND ITS HYDROXYMETHYL DERIVATIVE	
MILKS	*0.01
IMAZAPYR IMAZAPYR	
MILKS	*0.01
IMAZETHAPYR IMAZETHAPYR	
MILKS	*0.1
IMIDACLOPRID SUM OF IMIDACLOPRID AND METABOLITES CONTAINING THE 6-CHLOROPYRIDINYMETHYLENEMOIEITY, EXPRESSED AS IMIDACLOPRID	
MILKS	0.05

IMIDOCARB (DIPROPIONATE SALT) IMIDOCARB	
CATTLE MILK	0.2
INDOXACARB INDOXACARB	
MILKS	0.05
IODOSULFURON METHYL IODOSULFURON METHYL	
MILKS	*0.01
IPRODIONE IPRODIONE	
MILKS	*0.1
ISOXAFLUTOLE THE SUM OF ISOXAFLUTOLE, 2-CYCLOPROPYLCARCONYL-3-(2-METHYLSULFONYL-4-TRIFLUOROMETHYLPHENYL)-3-OXOPROPANENITRILE AND 2-METHYLSULFONYL-4-TRIFLUOROMETHYLBENZOIC ACID EXPRESSED AS ISOXAFLUTOLE	
MILKS	T*0.05
IVERMECTIN H ₂ B _{1A}	
CATTLE MILK	0.05
KETOPROFEN KETOPROFEN	
CATTLE MILK	*0.05
KRESOXIM-METHYL <i>COMMODITIES OF PLANT ORIGIN: KRESOXIM-METHYL</i> <i>COMMODITIES OF ANIMAL ORIGIN: SUM OF A-(P-HYDROXY-O-TOLYLOXY)-O-TOLYL (METHOXYIMINO) ACETIC ACID AND (E)-METHOXYIMINO[A-(O-TOLYLOXY)-O-TOLYL]ACETIC ACID, EXPRESSED AS KRESOXIM-METHYL</i>	
MILKS	*0.001
LASALOCID LASALOCID	
CATTLE MILK	*0.01
LEVAMISOLE LEVAMISOLE	
GOAT MILK	0.1
MILKS [EXCEPT GOAT MILK]	0.3
LINCOMYCIN INHIBITORY SUBSTANCE, IDENTIFIED AS LINCOMYCIN	
CATTLE MILK	*0.02
GOAT MILK	*0.1

LINURON SUM OF LINURON PLUS 3,4-DICHLOROANILINE, EXPRESSED AS LINURON	
MILKS	*0.05
LUFENURON LUFENURON	
MILKS	T0.2
MALDISON MALDISON	
MILKS (IN THE FAT)	1
MCPA MCPA	
MILKS	*0.05
MCPB MCPB	
MILKS	*0.05
MEBENDAZOLE MEBENDAZOLE	
MILKS	0.02
MECOPROP MECOPROP	
MILKS	*0.05
MEFENPYR-DIETHYL MEFENPYR-DIETHYL	
MILKS	*0.01
MELOXICAM MELOXICAM	
CATTLE MILK	0.005
MEPIQUAT MEPIQUAT	
MILKS	0.05
MESOSULFURON-METHYL MESOSULFURON-METHYL	
MILKS	*0.01
METALAXYL METALAXYL	
MILKS	T*0.05
METHAMIDOPHOS METHAMIDOPHOS <i>SEE ALSO ACEPHATE</i>	
MILKS	*0.01
METHIDATHION METHIDATHION	
MILKS (IN THE FAT)	0.5

METHOMYL SUM OF METHOMYL AND METHYL HYDROXYTHIOACETIMIDATE ('METHOMYL OXIME'), EXPRESSED AS METHOMYL <i>SEE ALSO</i> THIODICARB	
MILKS	0.05
METHOPRENE METHOPRENE, SUM OF CIS- AND TRANS-ISOMERS	
CATTLE MILK	0.1
METHOXYFENOZIDE METHOXYFENOZIDE	
MILKS	*0.01
METOLACHLOR METOLACHLOR	
MILKS	*0.05
METOSULAM METOSULAM	
MILKS	*0.01
METRIBUZIN METRIBUZIN	
MILKS	*0.05
METSULFURON-METHYL METSULFURON-METHYL	
MILKS	*0.1
MEVINPHOS MEVINPHOS	
MILKS	*0.05
MONENSIN MONENSIN	
CATTLE MILK	*0.01
MORANTEL MORANTEL	
MILKS	*0.1
MOXIDECTIN MOXIDECTIN	
CATTLE MILK (IN THE FAT)	2
NALED SUM OF NALED AND DICHLORVOS, EXPRESSED AS NALED	
MILKS	T*0.05
NEOMYCIN INHIBITORY SUBSTANCE, IDENTIFIED AS NEOMYCIN	
MILK	T1.5
NOVOBIOCIN NOVOBIOCIN	
CATTLE MILK	*0.1

OMETHOATE OMETHOATE <i>SEE ALSO</i> DIMETHOATE	
MILKS	*0.05
OXABETRINIL OXABETRINIL	
MILKS	*0.05
OXAMYL SUM OF OXAMYL AND 2-HYDROXYIMINO-N,N- DIMETHYL-2-(METHYLTHIO)-ACETAMIDE, EXPRESSED AS OXAMYL	
MILKS	*0.02
OXFENDAZOLE OXFENDAZOLE	
MILKS	0.1
OXYCLOZANIDE OXYCLOZANIDE	
MILKS	0.05
OXYDEMOTON-METHYL SUM OF OXYDEMOTON-METHYL AND DEMOTON-S- METHYL SULPHONE, EXPRESSED AS OXYDEMOTON- METHYL	
MILKS	*0.01
OXYFLUORFEN OXYFLUORFEN	
MILKS	*0.01
OXYTETRACYCLINE INHIBITORY SUBSTANCE, IDENTIFIED AS OXYTETRACYCLINE	
MILKS	0.1
PARAQUAT PARAQUAT CATION	
MILKS	*0.01
PARATHION-METHYL PARATHION-METHYL	
MILKS	T*0.05
PARBENDAZOLE PARBENDAZOLE	
MILKS	*0.1
PENDIMETHALIN PENDIMETHALIN	
MILK	*0.01
PERMETHRIN PERMETHRIN, SUM OF ISOMERS	
MILKS	0.05

PHENMEDIPHAM PHENMEDIPHAM	
MILKS	*0.1
PHENOTHRIN SUM OF PHENOTHRIN (+)CIS- AND (+)TRANS- ISOMERS	
MILKS	*0.05
PHORATE SUM OF PHORATE, ITS OXYGEN ANALOGUE, AND THEIR SULFOXIDES AND SULFONES, EXPRESSED AS PHORATE	
MILKS	*0.05
PHOSMET SUM OF PHOSMET AND ITS OXYGEN ANALOGUE, EXPRESSED AS PHOSMET	
MILKS (IN THE FAT)	0.2
PICLORAM PICLORAM	
MILKS	*0.05
PICOLINAFEN <i>COMMODITIES OF PLANT ORIGIN:</i> PICOLINAFEN <i>COMMODITIES OF ANIMAL ORIGIN:</i> SUM OF PICOLINAFEN AND 6-[3-TRIFLUOROMETHYL PHENOXY]-2-PYRIDINE CARBOXYLIC ACID	
MILKS	*0.01
PIPERONYL BUTOXIDE PIPERONYL BUTOXIDE	
CATTLE MILK	0.05
PIRIMICARB SUM OF PIRIMICARB, DIMETHYL-PIRIMICARB AND N- FORMYL-(METHYLAMINO) ANALOGUE (DIMETHYLFORMAMIDIO-PIRIMICARB), EXPRESSED AS PIRIMICARB	
MILKS	*0.1
PIRIMIPHOS-METHYL PIRIMIPHOS-METHYL	
MILKS	*0.05
PROCAINE PENICILLIN INHIBITORY SUBSTANCE, IDENTIFIED AS PROCAINE PENICILLIN	
MILKS	*0.0025
PROCYMIDONE PROCYMIDONE	
MILKS	0.02
PROFENOFOS PROFENOFOS	
CATTLE MILK	*0.01

PROMETRYN PROMETRYN	
CATTLE MILK	*0.05
PROPANIL PROPANIL	
MILKS	*0.01
PROPAQUIZAFOP PROPAQUIZAFOP AND ACID AND OXOPHENOXY METABOLITES, MEASURED AS 6-CHLORO-2- METHOXYQUINOXALINE, EXPRESSED AS PROPAQUIZAFOP	
MILKS	*0.01
PROPARGITE	
MILKS	*0.1
PROPICONAZOLE PROPICONAZOLE	
MILKS	*0.01
PROPYZAMIDE PROPYZAMIDE	
MILKS	*0.01
PYMETROZINE PYMETROZINE	
MILKS	*0.01
PYRIDATE SUM OF PYRIDATE AND METABOLITES CONTAINING 6 CHLORO-4-HYDORXYL-3-PHENYL PYRIDAZINE, EXPRESSED AS PYRIDATE	
MILKS	*0.2
PYRIMETHANIL PYRIMETHANIL	
MILKS	*0.01
PYRIPROXYFEN PYRIPROXYFEN	
MILKS	T*0.02
PYRITHIOBAC SODIUM PYRITHIOBAC SODIUM	
MILKS	*0.02
QUINOXYFEN QUINOXYFEN	
MILKS	0.01
QUINZALOFOP-ETHYL SUM OF QUIZALOFOP-ETHYL AND QUIZALOFOP ID ACID AND OTHER ESTERS, EXPRESSED AS QUIXZALOFOP-ETHYL	
MILKS	0.1

QUIZALOFOP-P-TEFURYL SUM OF QUIZALOFOP-P-TEFURYL AND QUIZALOFOP ACID, EXPRESSED AS QUIZALOFOP-P-TEFURYL	
MILKS	0.1
SETHOXYDIM SUM OF SETHOXYDIM AND METABOLITES CONTAINING THE 5-(2- ETHYLTHIOPROPYL)CYCLOHEXENE-3-ONE AND 5-HYDROXYCYCLOHEXENE-3-ONE MOETIES AND THEIR SULFOXIDES AND SULFOXIDES AND SULFONES, EXPRESSED AS SETHOXYDIM	
MILKS	*0.05
SIMAZINE SIMAZINE	
MILKS	*0.01
SPECTINOMYCIN INHIBITORY SUBSTANCE, IDENTIFIED AS SPECTINOMYCIN	
GOAT MILK	*2
SPINOSAD SUM OF SPINOSYN A AND SPINOSYN D	
MILKS	0.02
SPIROXAMINE <i>COMMODITIES OF PLANT ORIGIN:</i> SPIROXAMINE <i>COMMODITIES OF ANIMAL ORIGIN:</i> SPIROXAMINE CARBOXYLIC ACID, EXPRESSED AS SPIROXAMINE	
MILKS	0.05
STREPTOMYCIN AND DIHYDROSTREPTOMYCIN INHIBITORY SUBSTANCE, IDENTIFIED AS STREPTOMYCIN OR DIHYDROSTREPTOMYCIN	
MILKS	*0.2
SULFOSULFURON SUM OF SULFOSULFURON AND ITS METABOLITES WHICH CAN BE HYDROLYSED TO 2- (ETHYLSULFONYL)IMIDAZO[1,2-A]PYRIDINE, EXPRESSED AS SULFOSULFURON	
MILKS	*0.005
SULPHADIAZINE SULPHADIAZINE	
CATTLE MILK	0.1
SULPHADOXINE SULPHADOXINE	
CATTLE MILK	*0.1
SULPHATROXOZOLE SULPHATROXOZOLE	
CATTLE MILK	0.1
TEBUCONAZOLE TEBUCONAZOLE	
MILKS	0.05

TEBUFENOZIDE TEBUFENOZIDE	
MILKS	*0.01
TEBUTHIURON SUM OF TEBUTHIURON, AND HYDROXYDIMETHYLETHYL, N-DIMETHYL AND HYDROXY METHYLAMINE METABOLITES, EXPRESSED AS TEBUTHIURON	
MILKS	0.2
TEPRALOXYDIM SUM OF TEPRALOXYDIM AND METABOLITES CONVERTED TO 3-(TETRAHYDRO-PYRAN-4-YL) GLUTARIC AND 3-HYDROXY-3-(TETRAHYDRO- PYRAN-4-YL)-GLUTARIC ACID, EXPRESSED AS TEPRALOXYDIM	
MILKS	*0.02
TERBUFOS SUM OF TERBUFOS, ITS OXYGEN ANALOGUE AND THEIR SULFOXIDES AND SULFONES, EXPRESSED AS TERBUFOS	
CATTLE MILK	*0.01
TERBUTRYN TERBUTRYN	
MILKS	0.1
TETRACHLORVINPHOS TETRACHLORVINPHOS	
MILKS (IN THE FAT)	0.05
TETRACYCLINE INHIBITORY SUBSTANCE, IDENTIFIED AS TETRACYCLINE	
MILKS	*0.1
THIABENDAZOLE THIABENDAZOLE OR, IN THE CASE OF ANIMAL PRODUCTS, SUM OF THIABENDAZOLE AND 5- HYDROXYTHIABENDAZOLE, EXPRESSED AS THIABENDAZOLE	
MILKS	0.05
THIACLOPRID THIACLOPRID	
MILKS	*0.01
THIDIAZURON THIDIAZURON	
MILKS	*0.01
THIFENSULFURON THIFENSULFURON	
MILKS	0.01

THIODICARB SUM OF THIODICARB, METHOMYL AND METHOMYLOXIME, EXPRESSED AS THIODICARB <i>SEE</i> ALSO METHOMYL	
MILKS	*0.05
THIOMETON SUM OF THIOMETON, ITS SULFOXIDE AND SULFONE, EXPRESSED AS THIOMETON	
MILKS	*0.05
TILMICOSIN TILMICOSIN	
CATTLE MILK	T*0.025
TOLFENAMIC ACID TOLFENAMIC ACID	
CATTLE MILK	0.05
TRIADIMEFON SUM OF TRIADIMEFON AND TRIADIMENOL, EXPRESSED AS TRIADIMEFON <i>SEE ALSO</i> TRIADIMENOL	
MILKS	*0.1
TRIADIMENOL TRIADIMENOL <i>SEE ALSO</i> TRIADIMEFON	
MILKS	*0.01
TRIALATE TRIALATE	
MILKS	*0.1
TRIASULFURON TRIASULFURON	
MILKS	*0.01
TRIBENURON-METHYL TRIBENURON-METHYL	
MILKS	*0.01
TRICHLORFON TRICHLORFON	
MILKS	0.05

TRICLOPYR TRICLOPYR	
MILKS (IN THE FAT)	0.1
TRIFLOXYSTROBIN SUM OF TRIFLOXYSTROBIN AND ITS ACID METABOLITE ((E,E)-METHOXYIMINO-[2-[1-(3- TRIFLUOROMETHYLPHENYL)- ETHYLIDENEAMINOXYMETHYL]PHENYL] ACETIC ACID), EXPRESSED AS TRIFLOXYSTROBIN EQUIVALENTS	
MILKS	*0.02
TRIFLOXYSULFURON SODIUM TRIFLOXYSULFURON	
MILKS	*0.01
TRIFLUMURON TRIFLUMURON	
MILKS	*0.05
TRIFLURALIN TRIFLURALIN	
MILKS	*0.05
TRITICONAZOLE TRITICONAZOLE	
MILKS	*0.01
TRIMETHOPRIM TRIMETHOPRIM	
CATTLE MILK	0.05
TYLOSIN TYLOSIN	
MILKS	*0.05
VIRGINIAMYCIN INHIBITORY SUBSTANCE, IDENTIFIED AS VIRGINIAMYCIN	
CATTLE MILK	0.1

Schedule 2 – Extraneous Residue Limits

ALDRIN AND DIELDRIN SUM OF HHDN AND HEOD	
MILKS (IN THE FAT)	E0.1
BHC (OTHER THAN THE GAMMA ISOMER, LINDANE) SUM OF ISOMERS OF 1,2,3,4,5,6- HEXACHLOROCYCLOHEXANE, OTHER THAN LINDANE	
MILKS (IN THE FAT)	E0.1

CHLORDANE	
SUM OF CIS- AND TRANS-CHLORDANE AND IN THE CASE OF ANIMAL PRODUCTS ALSO INCLUDES 'OXYCHLORDANE'	
MILKS (IN THE FAT)	E0.05
DDT	
SUM OF P,P'-DDT; O,P'-DDT; P,P'-DDE AND P,P'- TDE (DDD)	
MILKS (IN THE FAT)	E1.25
HCB	
HEXACHLOROBENZENE	
MILKS (IN THE FAT)	E0.5
HEPTACHLOR	
SUM OF HEPTACHLOR AND HEPTACHLOR EPOXIDE	
MILKS (IN THE FAT)	E0.15
LINDANE	
LINDANE	
MILKS (IN THE FAT)	E0.2

Appendix 10

Chemical residues measured in bovine dairy products (ADASC, 2004)

Maximum residue limits, maximum levels and extraneous levels for milk.

Residue	MRL, ML or ERL for Milk		
	AUS ¹	EU ²	Codex ³
(expressed as mg/Kg in milk unless stated otherwise)			
<i>Antimicrobials</i>			
<i>β-lactams</i>			
Penicillin G	0.0015	0.004	0.004
Cloxacillin	0.01	0.03	-
Ampicillin	0.01	0.004	-
Amoxicillin	0.01	0.004	-
<i>Cephalosporins</i>			
Ceftiofur	0.1	0.1	0.1
Cefuroxime	0.1	-	-
Cephalonium	0.02	0.02	-
<i>Tetracyclines</i>			
Tetracycline	0.1	0.1	-
Oxytetracycline	0.1	0.1	0.1
Chlortetracycline	-	0.1	-
<i>Sulfonamides</i>			
Sulfadiazine	0.1	0.1	-
Sulfadimidine	-	0.1	0.025
Sulfadoxine	0.1	0.1	-
Sulfatroxazole	0.1	0.1	-
<i>Macrolides</i>			
Erythromycin	0.04	0.04	-
Lincomycin	0.02	0.15	-
Oleandomycin	-	-	-
Tylosin	0.05	0.05	-
Tilmicosin	-	0.05	-
<i>Aminoglycosides</i>			
Streptomycin	0.2	0.2	0.2
Dihydrostreptomycin	0.2	0.2	0.2
Neomycin	T1.5	1.5	0.5 ^{##}
Gentamicin	-	0.1	-
<i>Anthelmintics</i>			
<i>Benzimidazoles</i>			
Triclabendazole	-	-	-

Residue	MRL, ML or ERL for Milk		
	AUS ¹	EU ²	Codex ³
(expressed as mg/Kg in milk unless stated otherwise)			
Albendazole	-	0.1	0.1
Fenbendazole	0.1	0.01	0.1
Oxfendazole	0.1	0.01	0.1
Febantel	-	0.01	0.1
Thiabendazole	0.05	0.1	0.1
<i>Levamisole</i>	0.3	-	-
<i>Macrocyclic Lactones</i>			
Ivermectin	0.05	-	0.01
Abamectin	0.02	0.005	0.005
Moxidectin	0.08	0.04	-
Eprinomectin	0.03	0.02	0.02
MRL, ML or ERL for Milk (expressed as mg/kg in fat)			
<i>Organochlorines</i>			
Aldrin & Dieldrin	E 0.1 (in the fat)	0.006	0.006
BHC (α , β)	E 0.1 (in the fat)	-	-
Chlordane/Oxychlordane	E 0.05 (in the fat)	0.002	0.002
Lindane	-	0.001	-
DDT (sum of DDT, DDE, DDD)	E 1.25 (in the fat)	0.04	0.02
Heptachlor/Heptachlor Epoxide	E 0.15 (in the fat)	0.004	0.006
HCB	E 0.5 (in the fat)	0.01	-
Endosulfan (α , β ,sulfate)	T0.5 (in the fat)	0.004	0.004
<i>Organophosphates</i>			
Bromophos-ethyl	-	-	-
Chlorpyrifos	T0.2 (in the fat)	0.01	0.02
Chlorpyrifos-methyl	T0.05 (in the fat)	0.01	0.01
Chlorfenvinphos	T0.2 (in the fat)	-	-
Coumaphos	0.1 (in the fat)	-	-
Dichlorvos	0.02	-	0.02
Diazinon	0.5 (in the fat)	0.01	0.02
Ethion	0.5 (in the fat)	-	-
Fenchlorphos	-	-	-
Fenitrothion	T0.05 (in the fat)	-	0.002
Fenthion	0.2	-	-
Malathion	1.0 (in the fat)	-	-
Parathion methyl	0.05	-	-
Pirimiphos methyl	0.05	0.05	0.05
<i>Synthetic Pyrethroids</i>			
Deltamethrin	0.5 (in the fat)	0.02	0.02
Flumethrin	0.05	0.03	0.05
Cypermethrin	1.0 (in the fat)	0.02	0.05

Residue	MRL, ML or ERL for Milk		
	AUS ¹	EU ²	Codex ³
(expressed as mg/Kg in milk unless stated otherwise)			
Fenvalerate/Esfenvalerate	0.2 (in the fat)	0.02	0.1
Cyfluthrin	0.1	0.02	0.01
Cyhalothrin	0.5 (in the fat)	0.05	-
Permethrin	0.05	0.05	0.1
<i>Aflatoxins</i>			
Aflatoxin M1	*	0.05 (µg/kg in whole milk)	0.5 (µg/kg in whole milk)
<i>Heavy Metals</i>			
Arsenic	-	-	-
Cadmium	-	-	-
Lead	-	-	-
Mercury	-	-	-

Key: ¹ Australian MRLs, MLs & ERLs from ANZFA Food Standards Code⁽⁵⁾

² EU MRLs are listed in the EMEA Maximum Residues Limits⁽¹¹⁾

³ Codex MRLs for veterinary drugs and pesticides are listed in the Food and Agriculture Organisation of the United Nations Codex Alimentarius Maximum Residue Limits⁽¹²⁾

T Temporary MRL

- No MRL/ML/ERL is specified

* ML for sum of all PCBs;

ERLs only for Organochlorines

JECFA has recently recommended an MRL of 1.5 mg/kg for milk and is under consideration by Codex (FSANZ Application A535).

Registered Antimicrobial Agents

Registered antimicrobial agents for use in the Australian Dairy cattle industry (JETACAR, 1999). The shaded rows in the table indicate the groups of antimicrobial agents that belong to families used in human medicine, but only those antibiotics with a category² listing are used therapeutically for both Dairy cattle and humans.

Antimicrobial Agent (group)	Category ¹	Category ²	Treatment (individual)	Treatment (in feed/water)
Penicillins amoxicillin procaine penicillin ampicillin cloxacillin	A	C C C C B	Mastitis	-
Cephalosporins cetiofur cephalonium cefuroxime	C	B	Respiratory disease, footrot, mastitis	-
Macrolides Erythromycin, tylosin, oleandomycin	C	C	Various infections	-
Lincosamide lincomycin	C	B	Mastitis	-
Tetracyclines oxytetracycline, chlortetracycline	C		Various infections, including mastitis	-
Aminoglycosides neomycin, apramycin, streptomycin	C	C	Various infections	-
Sulfonamides many agents	C	C	Various infections	-
Streptogramins Virginiamycin ⁴ (B		-	Lactic Acidosis
Polyethers (ionophores) monensin	B		Bloat prevention ³	
Others novobiocin	C		Mastitis	

¹ Categories for antibiotic use in Dairy animals; the letter designation holds for all antibiotics in each respective group.

Category A: essential antibiotics for treatment or prevention of animal infections where there are few or no alternatives for many infections.

Category B: other alternatives are available but fewer than for category C.

Category C: a reasonable number of alternative agents in different classes are available to treat most infections.

² Categories for antibiotic use in humans (category description as above)

³ Monensin is a rumen modifier and improves the efficiency of ruminant digestion and has a registered claim for improved milk production (i.e it is not strictly a growth promotant).

⁴ Note that virginiamycin has recently undergone revised labelling restrictions in dairy cattle (APVMA, 2003).

Review of antibiotics and antimicrobial resistance in Australia

Significance of transfer of Antimicrobial Resistance from Animals to Humans

The extent of harm to human health from the transference of AMR bacteria from animals is uncertain. Many studies have found that the use of antibiotics in animals poses significant risks for human health, and some researchers contend that the potential risk of the transference is great for vulnerable populations. However, a small number of studies contend that the health risks of the transference are minimal.

A recent FAO/OIE and WHO workshop sought to determine the human health impacts of the transference of AMR from animal to humans (OIE, 2003a; OIE, 2003b). The workshop stated that the use of antibiotics in humans and animals alters the composition of microorganism populations in the intestinal tract, thereby placing individuals at increased risk for infections that would otherwise not have occurred. The report also states that use of antibiotics in humans and animals can also lead to increases in treatment failures and in the severity of infection.

Review of Antimicrobial Resistance in Australia

To address issues surrounding AMR, the Government established the Joint Expert Advisory Committee on Antibiotic Resistance (JETACAR) in 1999. This group prepared a report giving independent expert advice on the threat posed by AMR (JETACAR, 1999). An outcome of the JETACAR process was the formation of the Commonwealth Interdepartmental JETACAR Implementation Group (CIJIG) comprising technical experts and senior representatives from government agencies. CIJIG is responsible for implementing the recommendations of the JETACAR report (DoHA, 2004).

In Recommendation 1 of its report (September 1999), the JETACAR recommended that Australia adopt a conservative approach to minimise the use of antibiotics in humans and animals and, to further this policy, that in-feed antibiotics used in food-producing animals for growth promotant purposes, or other routine uses where the duration and dose level are the same, or very similar, should not be used unless they are:

- of demonstrable efficacy in livestock production under Australian farming conditions;
- rarely or never used as systemic therapeutic agents in humans or animals, or are not considered critical therapy for human use; and
- not likely to impair the efficacy of any other prescribed therapeutic antibiotic or antibiotics for animal or human infections through the development of resistant strains of organisms.

In Recommendation 2 of their report, the JETACAR recommended that the National Registration Authority (NRA) review the use of antibiotic growth promotants currently registered in Australia that do not appear to fulfil the above criteria in terms of their impact on human and animal health, using a risk analysis approach and including a cost-benefit analysis. The JETACAR also recommended that the NRA review the prophylactic use of these antibiotics in animals and the possible public health impact of this use.

In addition, there are two other taskforces established to ensure effective implementation and to provide policy advice to CIJIG. These are the Australian Health Ministers Conference

(AHMC) JETACAR taskforce and the Primary Industries Standing Committee (PISC) JETACAR taskforce. FSANZ is represented on CIJIG and the AHMC JETACAR taskforce by the Chief Scientist.

The first annual report of the national Antimicrobial Resistance Central Coordinating Unit (CCU) should be available by the end of 2005 on the JETACAR Implementation website (DoHA 2004).

Expert Advisory Group on Antimicrobial Resistance

The Government through the National Health and Medical Research Council has also established the Expert Advisory Group on Antimicrobial Resistance (EAGAR) to provide advice to government and regulatory agencies on AMR and especially measures to reduce the risks it poses.

As part of any Application on antimicrobial agents used for veterinary purposes, EAGAR undertakes a risk assessment on the antimicrobial agent. This includes evaluation of the mode of action, use of related antimicrobial agents (both human and animal), proposed usage pattern, potential for cross-resistance to other animal and human agents, potential for co-selection for unrelated resistance in animal bacteria, importance of disease if transmitted to humans, the benefit of the agent to animal health and the impact of failure of antibiotic treatment in humans. Based on this process EAGAR informs the APVMA whether an antimicrobial agent represents an unacceptable risk to public health and safety when used for veterinary purposes.

Antibiotics under review

Through the activities of JETACAR and EAGAR, the registration of several antibiotics, have been withdrawn, or are under Review. The streptogramin, virginiamycin was used prophylactically as a growth promotant in feed premix for various animals, including cattle. However, the labelling instructions have recently been revised for dairy cattle usage by the APVMA (APVMA 2003), as it became evident that there was an unacceptable risk that use of virginiamycin for undefined periods of time will induce AMR in *Enterococcus faecium* in some animals and poultry. Virgiamycin-containing products can now only be used specifically for use in cattle diets at times of increased risk of acidosis during adaptation to high grain diets, and cannot be used continuously for a period of more than one month, or for repeated treatment in the same lactation period in dairy cattle.

Avoparcin was used in Australian livestock feeds since 1978 for growth promotion and improved animal feed conversion efficiency. Specific concerns were raised regarding possible links between the emergence in Australia of Vancomycin Resistant Enterococci (VRE) in humans and the use of avoparcin (a related antibiotic). A Special Review of avoparcin was undertaken in 1998, however several studies revealed that there were no detectable residues of avoparcin or its metabolites in cattle milk (i.e. < 0.01 mg/kg) and that the potential for human dietary exposure should be negligible. Although these studies concluded that avoparcin residues were highly unlikely to enter the human food chain and to play a role in the emergence of VRE in human, the manufacturing companies withdrew avoparcin from the market for commercial reasons (APVMA, 2001).

The NRA, in accordance with Division 4, Part 2 of the Agricultural and Veterinary Chemicals Code Act, 1994, is also reconsidering the registration of products containing the active constituents kitasamycin, oleandomycin and tylosin, and associated label approvals

(APVMA 2001). The basis for this action is that the NRA is no longer satisfied that the use of products containing these antibiotics would not be likely to have an effect that is harmful to human beings.

Feeds and Feed Commodities for cattle

(includes lotfed, grazing and dairy cattle) (APVMA, 2002)

Note that the assumed maximum percentage of a commodity in the animal diet is presented, this is for modeling purposes in the determination of the MRL, and is not indicative of the percentage of the feed in the actual diet. For example, it is highly unlikely that grain would exceed 80% of the total diet, and cattle would only be fed at this level for a limited period of time.

A. Feeding percentages

Commodity	Assumed maximum percentage of diet %dry matter intake
pasture ¹	100
grain	100
pulses/legumes	100
fodder and forage	100
processed grain fractions ²	40
molasses	40
fruit by-products	20
oilseeds	30
plant protein meals	30
other ³	5

¹ Where pasture has been spot sprayed for weed control, it is assumed for MRL purposes and estimation of exposure, that the animal's diet is not expected to contain more than 20% of treated pasture.

² If the MRL for a chemical in a processed grain fraction (as given by a separate entry in Table 1 of the MRL Standard) is greater than that seen in the primary cereal grain, then the maximum percentage for the processed grain fraction in the livestock diet is assumed to be 20-40%. When there are no separate MRLs for a chemical in processed grain fractions, then the maximum percentage that can be fed in a livestock diet is assumed to be 100%, because the residue situation becomes identical to feeding the raw grain.

B. Commodity Description – examples of feed in the different commodity groups listed in part A; it may be altered as feeding patterns change over time.

Grains

wheat, oats, barley, triticale, rice, maize/corn, millet, sorghum, rye

Processed grain fractions (excluding grain dust)

pollard, bran, millrun, wheat germ, brewers grain, malt combings, biscuits, bread, hominy, semolina

Pulses/legumes

succulent or mature dried seed and immature pods of leguminous plants

peas (eg field pea, chick pea, cow pea, pigeon pea), beans (eg adzuki, faba, kudzu, mung, navy, winged), lentils, soya beans, lupins

Oilseeds

cotton seed, sunflower seed, safflower seed, rape/canola seed, linseed, sesame seed

Plant protein meals

oilseed meals, peanut meal, soya bean meal, copra meal, palm kernel meal

Molasses/sugar

raw or processed sugar, molasses

Fruit by-products (does not include cannery wastes)

citrus pulp, pineapple pulp, pome fruit pomace, grape marc, grape pomace

Pasture

grass and legume pastures and mixed grass/legume pastures

Fodder

hay, silage and straw of legumes, grasses and cereals, sugar cane tops

Forage (not including cotton forage)

cereal forage, oilseed forage, legume forage etc.

Fodder vegetables

field turnips, kale, beets

“Other”

Vegetables (not including vegetables grown specifically for grazing or fodder)

Vegetable by-products (eg. potato peels)

Cannery waste and by-products

Oils/fats (eg. vegetable oils, tallow)

Appendix 14

Therapeutic products used in goat production and registration status for use in goats (POINTON *ET AL.*, 2004)

Product Name	Active	Registered for goat?	Registered species
Alamycin	Oxytetracycline dihydrate	N	Cattle, pig, sheep
Amoxycillin	Amoxycillin	N	Cattle, pig, sheep, cat, dog
Bivatop	Oxytetracycline dihydrate	N	Cattle, pig, sheep
Cepravin LC	Cefuroxime	N	Cattle
Clavulox	Clavulanic acid, amoxycillin	N	Cattle (intramammary), cat, dog
Cortisone	Cortisone	N	Cattle, horse, pig, sheep, cat, dog
Cydectin	Moxidectin	N	Sheep, cattle, deer
Flunixin	Flunixin	N	Cattle, horse, pig, dog
Gallimycin	Erythromycin	N	Cattle, pig, sheep
Glanvac 3	Clostridium etc vaccine	Y	
Glanvac 6	Clostridium etc vaccine	Y	
Illium Xylazil-20 Analgesic	Xylazine	Y	
Ivomec Epronex	Eprinomectin	N	Cattle, deer
Ivomec pour-on	Ivermectin	N	Cattle, deer
Ketol	B hydroxybutyrate	?	
Leotrox	Sulfatroxazole, trimethoprim	Y	
Levamisole		N (Except Nufarm drench resistance test kit)	Cattle, pig, poultry, sheep, bird, dog, cat
Mastalone	Oxytetracycline, neomycin	N	Cattle
Noromectin Pour-on	Ivermectin	N	Cattle, Dairy cattle
Orbenin LC	Cloxacillin	N	Cattle
Panacur 25	Fenbendazole	Y	
Parnell ketamine	Ketamine	Y	
Procaine penicillin	Procaine penicillin	N	Cattle, horse, pig, sheep, cat, dog
Scourban	Sulfadimidine, sulfadiazine	N	Cattle, horse, cat, dog
Sedaject acepromazine	Acepromazine	N	Cattle, horse, pig, sheep
Seponver	Selenium, closantel	N	Sheep
Special Formula 17900 Forte V	Neomycin, novobiocin, dihydrostreptomycin	N	Cattle
Tribactral	Sulfadiazine, trimethoprim	N	Cattle, horse, pig, sheep, cat, dog
Trisoprim 480 antibacterial injection	Sulfadiazine, trimethoprim	N	Cattle, horse, pig, sheep
Utoztme	Oxytetracycline hydrochloride	Y	
White drenches/Benzimidazoles	Fenbendazole (3 products)	Y	
	Oxfendazole ((5 products, but <u>not</u> milking goats)	Y	
	Albendazole (4 products but <u>not</u> milking goats)	Y	