



Antibiotic Classes and Usage Patterns

An antibiotic is defined as a microbial product or its derivative that kills susceptible microorganisms or inhibits their growth.¹ For the purposes of this 'Dairy Food Safety Note' the definition includes those products and derivatives that are made naturally (eg: penicillins) or synthetically (eg: sulfonamides).

All antibiotics registered for use in the Australian dairy industry are veterinary controlled, prescription medicines. One of the most common uses of antibiotics in the dairy industry is for the treatment of mastitis in milk producing animals. This 'Dairy Food Safety Note' gives an overview of the usage patterns of the different classes of antibiotics in the Australian dairy industry.

Antibiotic Classes

Antibiotics can be classified into various groups according to their chemical structures. Figure 1 shows an example of the chemical structure of an antibiotic.

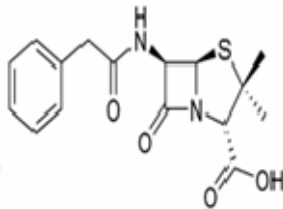


Figure 1 - Chemical structure of benzyl penicillin G

Table 1 shows examples of antibiotics that are registered for use in food producing animals in Australia and their corresponding antibiotic class. It is worth noting that Table 1 does not include examples of antibiotics that are not registered for use or those that have been deregistered for use in food producing animals.

There are a number of reasons why particular antibiotics or classes of antibiotics are not registered for use in food producing animals in Australia. In some instances it is because these antibiotics have the potential to cause unacceptable levels of residues, in other cases it includes concerns for the development of antimicrobial resistance or the potential for adverse impacts on human health.

To check whether or not an agricultural or veterinary chemical is registered for a particular use in Australia, contact the Australian Pesticides and Veterinary Medicines Authority (APVMA) or search their database of registered agricultural and

veterinary chemical products which is accessible via their website www.apvma.gov.au

Table 1. Examples of antibiotics that are registered for use in food producing animals in Australia and their corresponding class.

Antibiotic class	Examples of antibiotics
aminoglycosides	neomycin, dihydrostreptomycin
beta-lactams	cloxacillin, procaine penicillin
beta-lactam cephalosporins	ceftiofur, cefuroxime
lincosamides	lincomycin
macrolides	erythromycin, tylosin
polypeptides	bacitracin, polymyxin
sulfonamides	sulfadiazine, sulfadimidine
tetracyclines	chlortetracycline, oxytetracycline
miscellaneous	novobiocin

Antibiotic Usage Patterns

Antibiotics can be administered to dairy cattle in a variety of ways, including: intramammary (during lactation and drying off), via injection, topically, intrauterine and orally (directly or as feed supplements).

A 1999 survey that examined 145 Australian veterinary practices in relation to their antibiotic dispensing patterns for dairy cattle, found that beta-lactams were the most frequently dispensed class. This survey looked at intramammary use for lactating and dry cows, as well as injectable use. Table 2 shows the most frequently dispensed antibiotics and antibiotics classes for each type of administration route.²

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Table 2. Most frequently dispensed antibiotics

Administration type	Most frequently dispensed	
	Antibiotic class	Antibiotic
intramammary (lactating cow)	aminoglycosides	neomycin
intramammary (dry cow)	beta-lactams	cloxacillin
injectable	beta-lactams	penicillin G

Overall this survey showed that wide ranges of antibiotic classes are administered to dairy cattle, with the most predominant classes being beta-lactams and aminoglycosides. It is important for dairy manufacturers to have a good understanding of this type of information and furthermore, dairy manufacturers should know what antibiotics are in use at their supplying farms, so that they can design appropriate antibiotic residue screening programs. A better understanding of the use of antibiotics will also enable the most appropriate corrective actions to be immediately implemented when notified of a potential contamination.

In summary, the results of this survey have provided Australian (federal and state) government agencies, and the dairy industry, with a better understanding of antibiotic usage patterns, and this will assist in the future on-going management of antibiotic residue risks.

References

1. Prescott, L.M., Harley, J.P., and Klein, D. A., (1993) 'Microbiology, Second Edition,' Wm.C. Brown publishers.
2. Dairy Food Safety Victoria, (May 2001) 'A Survey of Antimicrobial Use in the Dairy Industry.'

Further information

For further information on agricultural and veterinary chemicals, please contact:

The Australian Pesticides and Veterinary Medicines Authority

contact@apvma.gov.au

(02) 6210 4700

PO Box E240

Kingston ACT 2604

www.apvma.gov.au

Or

Contact your relevant state/territory government primary industry/agriculture, health and environment agencies. For Victoria this is:

The Department of Primary Industries Victoria

Chemical Information Service

www.dpi.vic.gov.au/chemicalstandards

Tel (03) 9210 9379

chemical.information@dpi.vic.gov.au

Other Dairy Food Safety Notes on antibiotics and dairy food safety topics are available at www.dairysafe.vic.gov.au

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