



Antibiotic Residue Screening Test Methods

Antimicrobial residues, or antibiotic residues as they are more commonly referred to by the Australian dairy industry, are able to be detected in milk by a range of test methods.

Antibiotic residue testing of milk and dairy products can be split into two main categories: screening test methods (eg: qualitative and semi-quantitative test methods) and confirmatory test methods (i.e. quantitative test methods).

This Dairy Food Safety Note provides general details on the test methods used by the Australian dairy industry for the screening of antibiotic residues in milk and dairy products.

What are screening test methods?

Screening test methods are generally qualitative tests. Screening test methods are designed to give a positive or negative result to indicate that antibiotic residues may be present or absent in the milk or dairy product.

Screening test methods do not identify the specific antibiotic residue present, nor are screening test methods specifically designed to indicate whether or not a particular antibiotic residue is present at a level above the Maximum Residue Limit (MRL).

Benefits of screening test methods

Screening tests are a useful tool to indicate whether or not antibiotic residues are present and compared to confirmatory methods they are more rapid, easy to use and relatively inexpensive.

Screening test method types

Antibiotic residue screening test methods can be classified as either broad or narrow spectrum. A broad spectrum test detects several classes of antibiotic residues (beta-lactams, cephalosporins, aminoglycosides, tetracyclines, sulfonamides and macrolides). A narrow spectrum test analyses for a limited number of specific antibiotic residue classes. For example, a narrow spectrum test may only cover beta-lactams or it may cover both beta-lactams and aminoglycosides.

Commercial and non-commercial screening test methods

A wide range of commercial screening test kits for the detection of antibiotic residues in milk are available for use. The main antibiotic residue screening test methods currently used in the Australian dairy industry are listed in Table 1.

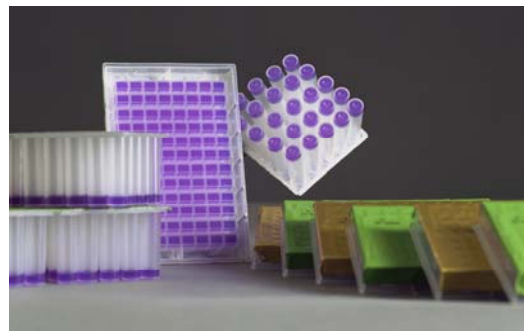


Photo courtesy of DSM Food Specialties.

A non-commercial antibiotic residue screening test is also listed in Table 1. This non-commercial test is known as the disc assay. In Australia, the most common type of disc assay method used is the AS 1766.3.11 method.¹

The AS 1766.3.11 disc assay method has been designed primarily as a screening test for beta-lactams, however it also has a degree of sensitivity to other antibiotic classes (aminoglycosides, macrolides, tetracyclines and sulfonamides). This disc assay method may also be used as a semi-quantitative test for penicillin G (also known as benzyl penicillin) since it is able to give an estimated quantity of this residue type if present in the milk.

What factors should be considered when choosing a screening test method?

Test Matrix

Most of the commercial antibiotic residue screening test kits have been designed for use in cow's milk. Some matrices, such as goat's milk, ewe's milk, buffalo's milk, highly viscous products (eg: cream) or high fat products (eg: butter) may not be suitable to test with some kits or may require variations to the standard kit instructions in order to achieve a valid result.

Prior to using a test kit on a matrix other than cow's milk you should always check with the test kit manufacturer or test kit distributor to make sure that it is suitable to use on that matrix, and whether or not variations in the standard test kit instructions are necessary.

Accreditations/Certifications/Approvals

Many of the commercial antibiotic residue screening test kits have been formally approved or certified by regulatory bodies or internationally recognised organisations that undertake evaluations, validations and/or performance testing of test kits.

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When choosing a commercial antibiotic residue screening test kit it is important to check that it has one of these types of accreditations, approvals and/or certifications.

For each of the antibiotic residue screening test kits shown in Table 1 their relevant accreditations/approvals/certifications are listed.

Sensitivities

There are varying sensitivities (also referred to as detection limits) between each of the commercial screening test kits for the different antibiotic residues. These different sensitivities should be considered carefully when deciding which test kit to use. For further details on the sensitivities of each of the kits listed in the table, refer to *Dairy Food Safety Note 2 – Detection Limits of Antibiotic Residue Screening Test Kits*.

Other factors

Three other important factors when choosing which commercial test kit to use are the time, ease of use and cost. For details on the cost, test time and other specifics contact your Australian test kit distributor.

References

1. Standards Australia (1991 & Amendment 1 –1993) 'AS 1766.3.11 Food microbiology – Examination of specific products – Dairy Products – Test for penicillin.'

Further Information

Other Dairy Food Safety Notes on antibiotics and dairy food safety topics are available.

For further food safety information, please contact:

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Notes

Antibiotic Residue Screening Test Methods

Table 1: Antibiotic Residue Screening Test Methods available for use in Australia

Test Method	Australian Distributor	Antibiotic Classes Detected	Current Certifications/Approvals	Suitable Matrices*
AIM BRT MRL	Australasian Medical & Scientific Ltd	Beta-lactams, Cephalosporins, Sulfa drugs, Tetracyclines, Macrolides, Aminoglycosides, Others (lincomycin & chloramphenicol)	NZFSA, Germany, Austria, Switzerland, Spain, Ireland, Poland & Ukraine.	Raw cows milk & liquid milk. Cream & dairy powders.
Beta-star	CHR Hansen Pty Ltd	Beta-lactams & Cephalosporins	AFNOR & AOAC.	Raw cow/goat/sheep milk.
Charm II ¹	Pacific Laboratory Products Pty Ltd and Nat-Tech	Beta-lactams, Cephalosporins, Sulfa drugs, Tetracyclines, Macrolides, Aminoglycosides, Others (lincomycin, novobiocin, chloramphenicol, thiamphenicol & dapsone)	NSW Food Authority, AOAC & USFDA.	Raw cows milk & liquid milk. Goat/sheep milk, cream, condensed milk, whey & dairy powders.
Charm ROSA MRL Beta-Lactam Test (& sister tests)	Pacific Laboratory Products Pty Ltd and Nat-Tech	Beta-lactams & Cephalosporins	AOAC, USFDA & NZFSA.	Raw cows milk & liquid milk. Goat/sheep milk, colostrum, cream & condensed milk.
Charm ROSA Tetracyclines Test (& sister tests)	Pacific Laboratory Products Pty Ltd and Nat-Tech	Tetracyclines	AOAC, USFDA & NZFSA.	Raw cows milk & liquid milk. Goat/sheep milk, colostrum, cream & condensed milk.
Charm ROSA MRL Beta-Lactam & Tetracyclines Combination Test	Pacific Laboratory Products Pty Ltd and Nat-Tech	Beta-lactams, Cephalosporins & Tetracyclines	AOAC & USFDA.	Raw cows milk & liquid milk. Goat/sheep milk, colostrum, cream & condensed milk.
Charm ROSA MRL Sulfamethoxine & Sulfamethazine ² (& sister tests)	Pacific Laboratory Products Pty Ltd and Nat-Tech	Sulfadimethoxine & Sulfamethazine	AOAC & USFDA.	Raw cows milk & liquid milk. Goat/sheep milk, colostrum, cream & condensed milk.
Copan	CHR Hansen Pty Ltd	Beta-lactams, Cephalosporins, Sulfa drugs, Tetracyclines, Macrolides, Aminoglycosides, Others (chloramphenicol, thiamphenicol, trimethoprim & dapsone)	NSW Food Authority & NZFSA.	Raw cows milk & liquid milk. Goat/sheep milk & dairy powders.
Delvotest SP-NIT	DSM Food Specialties	Beta-lactams, Cephalosporins, Sulfa drugs, Tetracyclines, Macrolides, Aminoglycosides, Others (chloramphenicol, trimethoprim & dapsone)	NZFSA, NSW Food Authority, Germany & UK.	Raw cows milk & liquid milk. Goat/sheep milk, whey, cream, yoghurt, custard, dairy powders & butter.
Disc Assay ³	Not Applicable	Penicillin and Non-specific for other beta-lactams and non-beta-lactams	Not applicable.	Raw cows milk. Goat/sheep milk & other dairy products.
Eclipse	Laboratory Diagnostics Pty Ltd	Beta-lactams, Cephalosporins, Sulfa drugs, Tetracyclines, Macrolides, Aminoglycosides, Others (lincomycin)	NZFSA, EU & Spain.	Raw cows milk & liquid milks. Goat/sheep milk & dairy powders.
IDEXX SNAP MRL Beta-lactam	IDEXX Laboratories	Beta-lactams & Cephalosporins	AOAC & USFDA.	Cows milk.
IDEXX SNAP Gentamicin	IDEXX Laboratories	Gentamicin	None.	Cows milk.
IDEXX SNAP Tetracycline	IDEXX Laboratories	Tetracyclines	None.	Cows milk.

Key

* - Matrices other than raw cows milk and liquid milks generally require pre-treatment of samples prior to testing. Refer to the test kit distributor for further details.

¹ - Charm II systems also allow for semi-quantitative analysis.

² - Charm has two ROSA sulfa drug test kits available, the SMZ and the SDSM. The SMZ test detects sulfamethazine only.

³ - Can be used as qualitative and quantitative methods for penicillin G.

AOAC – AOAC International, AFNOR – Association française de normalisation, EU – European Union, NSW – New South Wales, NZFSA – New Zealand Food Safety Authority, USFDA – The United States Food & Drug Administration.

n.b. All of the information provided in this table for 'antibiotic classes detected', 'current certifications/approvals' and 'suitable matrices' is based on the information provided by kit manufacturer/distributors Australian information brochures & correspondence 2005.

