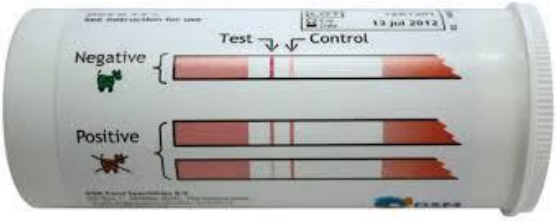
Technical Talk Newsletter – August 2014 # 4



Rapid versus Inhibition Test

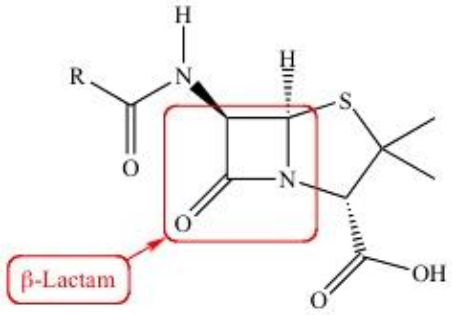
It's surprising that some people think a negative antibiotic test result on raw milk is clear for antibiotics if tested using a rapid test kit. The truth is - it's only clear for the antibiotic group "**B-Lactam**" as this is the most commonly used rapid test kit available. And what if other antibiotics such as sulphonamides are present in the milk?

In this newsletter, I will explain the differences between the two types of test method currently used for the detection of antibiotics in milk. Namely the rapid test (narrow spectrum) and the Inhibition test (broad spectrum).

Rapid Test

Rapid test uses a specific receptor to bind the antigen (antibiotic) before it can cause a colour change on the strip resulting in a positive or negative result.

Being specific, means it has a narrow spectrum for accuracy and hence only detects one group of antibiotic at a time. The most commonly used test targets the **B-lactam group of antibiotic** (see list on right) or more specifically, the B-lactam ring shown below.



Beta-lactams

Ampicillin
Amoxicillin
Benzyl penicillin G
Cloxacillin
Dicloxacillin
Oxacillin
Nafcillin

Beta-lactam cephalosporins

Cefacetrile
Cefalexin
Cephalonium
Ceftiofur
Cefazolin
Cefquinome
Cefoperazone
Cephapirin
Cefuroxime

B-lactam is the most widely used antibiotics within the Dairy Industry, however it's not the only one used. Due to antibiotic resistance and the fact that certain bovine diseases requires different treatments, other antibiotic groups are also used

Detecting various groups of antibiotics rapidly such as *Tetracyclines, Macrolides, Sufonamides, Aminoglycosides and others (see next page),* a separate test kit is normally required. Although there are combination test kits available, they are normally limited to 2 groups and adds considerably to the overall cost of each test.

The main **advantage** of these tests is the **quick time** it takes to get a result. Around 1 – 5 minutes meaning they are commonly used as fast screening test for clearing milk tankers. This allows raw milk to be unloaded quickly into the silo at a processing site, hence its popularity.

Microbial Inhibition Test

The microbial inhibition test is based on the principle that a very sensitive strain of bacterial spore (*Bacillus stearothermophilus var calidolactis*) is inhibited by the presence of antibiotics in milk when incubated at its optimum growth temperature of 64°C.

Unlike the rapid tests which can only detect one or 2 specific groups of antibiotics in a single test. The microbial inhibition test detects a broad range of antibiotics (such as ***B-Lactam***, ***Tetracyclines, Macrolides, Sufonamides, Aminoglycosides and others*** – *see list on right*) and thus provides better detection for the presence of inhibitors in milk.

In a single test, it will detect all six major groups of antibiotics used in the dairy industry and is commonly used as a confirmatory test in dairy processing plants.

In fact, it is so critical in plants that manufacture yogurt and cheese as very low levels of antibiotics in milk can inhibit the growth of starter cultures causing slow sets, runny yogurt and lead to defects resulting in downgrades and product losses.

The only disadvantage is the **long test time**.

Inhibition relies on the bacterial spore within the test medium to germinate and grow, generating acid which is indicated by a colour change to yellow. This test takes at least 2 – 3 hours which is not a problem in farms or small to medium size dairy processors, but an issue with the larger ones.

The advantages are the broad range as explained above, but also the **low cost per test**, generally 50% - 80% lower than a rapid test depending upon the volume used.

In summary – a rapid test kit targets a narrow group of antibiotics, whilst the microbial inhibition test targets a broad range of antibiotics. *And remember, a negative rapid test is not really negative for antibiotics – only B-lactam!*

Note: Testing milk for B-Lactam does not comply with Australian and New Zealand Food Standard Code 1.4.2.

Now that I have explained the difference between rapid and inhibition test, stay tuned for my next issue where I'll explain why all test kits are not the same and why validations and approvals are needed.

Tetracyclines
- Chlortetracycline
- Doxycycline
- Oxytetracycline
- Tetracycline

Macrolides
- Erythromycin
- Pirlimycin
- Spiramycin
- Tilmicosin
- Tylosin

Sulfonamides
- Sulfanilamide
- Sulfadimethoxine
- Sulfadimidine (Sulfamethazine)
- Sulfadiazine
- Sulfadoxine
- Sulfamerazine
- Sulfamethoxazole
- Sulfaquinoxaline (Sulfaquinoxazole)
- Sulfathiazole

Aminoglycosides
- Dihydrostreptomycin
- Streptomycin
- Gentamicin
- Kanamycin
- Neomycin
- Spectinomycin

Other
- Chloramphenicol
- Dapsone
- Lincomycin
- Novobiocin
- Thiamphenicol
- Trimethoprim

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