Managing antibiotics within the supply chain – policy change

Milk Links record for antibiotic failures recorded in the supply chain is very good and this reflects the good procedures most Members have in this area. However there is always room for improvement with such a sensitive quality criteria and so Milk Link regularly reviews its policy and procedures for antibiotic management.

At the last review some areas were identified that would benefit from some enhancement and in response some changes have been made to the policy and procedures. These come into effect from 1st October 2011. The details of these changes were communicated to all farms earlier in the year and the key points for Pricing Procedure and pre-samples are summarised below:

- First failure, milk consigned is paid at 1ppl and a pre-sample taken and tested before the next collection.
- Second antibiotic failure within 18 months, as above plus an additional deduction of 1ppl is applied for all the milk consigned within that calendar month.
- Third or more antibiotic failures within 18 months, as above plus the farm is pre-sampled and tested for antibiotics before collection for the subsequent 28 days.

Within the Antibiotic Insurance Scheme there are two changes to the terms and conditions:

- The rate for a successful claim will change from the current fixed 13p per litre to 55% of the net milk price for that month.
- Farms being pre-sampled for the 28 period following a third failure within 18 months, do not qualify for the scheme during this period.

All other terms and conditions remain unchanged and details are available on the WEB or via the Link Line 0845 300 3123.

To help minimise the risk of costly contaminations on the farm a regular review of procedures is recommended. Although most farms have excellent records it is best not to be complacent and look for weak points in the system.

In future the aim is to investigate all antibiotic breakdowns and categorize the most common causes of failure. This information will then be communicated to the Membership. To assist Members in their review a self assessment form is available via Link Line (0845 300 3123). In addition David Barker of the Membership Support Team is available for free consultation on your systems so please do not hesitate to contact him through the Linkline.

Antibiotic failures – how to avoid them

Andrew Biggs BVSc MRCVS The Vale Veterinary Group Tiverton Devon

All authorised medicines for use in food producing animals (ie those with a marketing authority (MA), or what used to be described as a licence) have appropriate withhold periods to ensure there are no residue violations above a given level (the MRL or Maximum Residue Level) These levels are set in Europe and is a requirement for the MA to be granted.

Medicines are categorised according to how and by who they can be prescribed and administered. The names and differences between these categories are not relevant here but suffice it to say we are talking about POM-V.

Once your vet has prescribed a dry cow tube - do you know how to use it to minimise all the risks of antibiotic failure – and I don’t just mean how to infuse it! Many failures are linked to intramammary antibiotic therapy of which Dry Cow Therapy (DCT) is the most common. Often the cow under suspicion is not the cow causing the milk failure. For example it may be thought to be a fresh calved cow when in fact milk from a cow under treatment has been inadvertently let in to the tank.
So what are the most common ways farms end up with an antibiotic failure?

1. Milking at incorrect time due to
   a) The wrong withhold the usual problem here is that there has been a miscalculation of time to return milk to tank or possibly that the cow calved early.
   b) Or the wrong cow – cow a dry cow or cow under treatment milked in error; possibly where the relief milk has not had the cows identified properly and always beware the the bought in cow.

2. Faulty equipment.

3. “Off label” use
   a) In some cases this can be intentional, where the treatment is under direct veterinary supervision and where violations are avoided by stipulation of specific withholds or advice to test milk prior to inclusion in bulk tank.
   b) It can also be unintentional – easy to do by mistake. Typically this is where more than the label number (usually two or three) tubes of intramammary milking cow therapy are used; or where a once a day (24 hourly) tube is used twice daily (every 12 hours) or through simultaneously double tubing.

In the author’s experience, if products are used as per data sheet, violations, where they do occur, are generally linked to the factors listed above.

What can cause an antibiotic failure?
   This does depend on the test used. Some test what are called inhibitory substance tests whilst others are true antibiotic tests. The inhibitory substance tests rely on the growth of a specific (very sensitive) bacterium to get a pass. So anything that stops that bug growing will be classed as a failure. Cows produce natural inhibitory substances which can fail one of these inhibitory substance tests particularly if they are fighting an infection (and say have a high SCC - well they are trying to fight an infection). This is even more likely in cows that are in early lactation or in particular have not started their lactation well when there is less dilution by lots of milk.

So ... most bulk failures are due to the presence of an antibiotic ... (but which one?).

Due to factors of dilution inhibitory substances are not nearly as likely to be an issue with bulk milk tests. Individual cow failures are still most often antibiotic but inhibitory substances can cause false positives with some tests particularly with an improperly started lactation, where the calf has been left to suck, in cows with milk fever etc which may also impair DCT excretion and prolong withhold times. Some cases have been seen in high SCC cows in early lactation, and can be compounded by incomplete milking.

Recording Treatments
   It is also part of the Red Tractor Dairy farm Assurance and legislation that all treatments must be recorded in the medicines book. This should include the following:

   **Cow (or group) identity**
   **Date**
   **Name of medicine**
   **Batch number**
   **Expiry date**
   **Size of dose**
   **Numbers of doses to be given (and time-span)**
   **Total quantity of medicine used**
   **Method of administration**
   **Withdrawal period**
   **Date milk can re-enter bulk supply**
   **Identity of person responsible for giving the medicine and name and address of supplier**

So what should you do? Use this checklist as a guide:

<table>
<thead>
<tr>
<th>Each farm should:</th>
<th>Tick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare a written plan</td>
<td>☑</td>
</tr>
<tr>
<td>Make sure everybody knows what is happening</td>
<td></td>
</tr>
<tr>
<td>Which cows are treated when and with what</td>
<td></td>
</tr>
<tr>
<td>Are all cows in the herd clearly identified?</td>
<td></td>
</tr>
<tr>
<td>All medicines should be administered under veterinary instruction.</td>
<td></td>
</tr>
<tr>
<td>Label or off-label use of drugs</td>
<td></td>
</tr>
<tr>
<td>Right drug for right condition</td>
<td></td>
</tr>
<tr>
<td>Right dose</td>
<td></td>
</tr>
<tr>
<td>Right route</td>
<td></td>
</tr>
<tr>
<td>Combination?</td>
<td></td>
</tr>
<tr>
<td>Clearly mark cow(s) under treatment and ideally keep them separate from the main herd to stop them being accidentally milked into the tank.</td>
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</tr>
<tr>
<td>tape or spray applied to the legs or udder</td>
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<tr>
<td>an up to date reminder list on the parlour wall (e.g. blackboard) of treated cows is also useful.</td>
<td></td>
</tr>
<tr>
<td>Observe withdrawal time and be careful in the milking parlour</td>
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<tr>
<td>This applies to milk from all quarters.</td>
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<tr>
<td>Separate cluster and dump bucket</td>
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<tr>
<td>Milk treated cows last with milk pipe removed from bulk tank, followed by full wash of plant with hot water and detergent to remove residues on surface which later will come in to contact with milk for the bulk supply - butterfat on jars from treated cows is a particular problem because it often contains traces of antibiotic.</td>
<td></td>
</tr>
<tr>
<td>Ensure no cross contamination in parlour.</td>
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</tr>
<tr>
<td>This could be caused by faulty valves or accidental transfer of milk for example.</td>
<td></td>
</tr>
<tr>
<td>Milking into recorder jars or through milk meters runs the risk of either leaking, residual contaminated milk being left in the plant or being accidentally transferred to the bulk supply.</td>
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</tr>
<tr>
<td>Store medicines in a locked cabinet</td>
<td></td>
</tr>
<tr>
<td>Avoid possible mis-use of medicines that could be a threaten milk supply.</td>
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</tr>
<tr>
<td>Dry Cows</td>
<td></td>
</tr>
<tr>
<td>Do not dry off during milking – dry them off as a separate group</td>
<td></td>
</tr>
<tr>
<td>Hygiene is essential or you may cause mastitis rather than cure it</td>
<td></td>
</tr>
<tr>
<td>Do it is a specific order – depends on if you milk between or in front of the legs</td>
<td></td>
</tr>
<tr>
<td>Clean the furthest quarters first and the nearest next</td>
<td></td>
</tr>
<tr>
<td>Infuse in the opposite order</td>
<td></td>
</tr>
<tr>
<td>Infuse the nearest first and the furthest after</td>
<td></td>
</tr>
<tr>
<td>Minimum dry period</td>
<td></td>
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<tr>
<td>If calve early test milk.</td>
<td></td>
</tr>
<tr>
<td>Separate and identify so not milked accidentally.</td>
<td></td>
</tr>
<tr>
<td>Take care with 'off-label' use</td>
<td></td>
</tr>
<tr>
<td>MINIMUM 7 days milk and 28 days meat</td>
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</tbody>
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Antibiotic treatment of mastitis – why a diagnosis is important

Matthew C Dobbs BVM&S, Cert CHIR, MRCVS Director Westpoint Veterinary Group

In dairy herds throughout the UK, mastitis continues to be the most common infectious disease, likely to be costing the industry over £190 million each year in lost production and decreased quality of milk. It has been demonstrated that early detection procedures can enhance cure rates when coupled with appropriate treatment and can also reduce the time required to return to normal milk leading to both financial benefits for producers and improvement in cow welfare.

Antibiotics are the most commonly prescribed treatment for mastitis and in recent years, there has been an increase in the number of injectable antibiotics prescribed to treat cases. This combination therapy has demonstrated some additional success in the UK in treating certain types of infection, for example the more persistent or chronic infections caused by strep uberis. Combination treatments may be licensed for concurrent administration, with a shorter withdrawal period (cows treated with unlicensed combinations should have the milk discarded for 7 days after the course of treatment has finished). In the USA, combination treatment is rarely used.

Antibiotics used in intra-mammary tubes fall into one of two broad categories. Some intramammary tubes contain one antibiotic, which is broad spectrum in its nature, meaning that it is likely to be effective against a range of mastitis pathogens. Other intramammary treatments contain a mix of different classes of antibiotic, which together provide the broad spectrum of activity necessary when treating an unknown infection. In addition some mastitis tubes may contain steroid to help reduce any swelling in the udder.

Less than four tons of antibiotic are used in intramammary products in the UK (about half is used in dry cow treatments and half in lactating cow treatments). This may appear to be a small amount in relation to the 380 tons of antibiotic that are used in all livestock species in the UK on an annual basis.

Despite the relatively small percentage of antibiotics used in the dairy industry, it is still appropriate where ever possible to identify the pathogen causing the problem and therefore administer the appropriate treatment on each occasion.

Also recent research has highlighted the potential risk of the use of antibiotics in livestock leading to the development of resistance in humans. The use of antibiotics in food producing animals is therefore an important matter and new EU rules, due to be published later this year, are expected to enforce more targeted use of antibiotics and to encourage producers using antibiotics to identify the bacteria causing the infections, wherever possible.

In addition in recent months, some major retailers have responded to consumer concerns and those expressed by the medical profession, that antibiotics are used responsibly on farm. They have highlighted the importance of identifying the bacteria of concern and then treating appropriately according to the results of the tests.

The economic and welfare importance of treating clinical mastitis in dairy cows with the appropriate treatment following appropriate testing is high and the need for a fast, accurate and convenient method of mastitis detection is therefore vital.

**Mastitis detection with real-time PCR technology**

Identifying the pathogens in milk that are causing a case of mastitis is traditionally undertaken through bacteriology, where the sample is grown in the lab, and through visual identification and additional tests. Bacteriology is still an important tool, especially in looking for the potential mastitis pathogens in a bulk tank milk sample.

Recently however a new system of identifying the bacteria present in milk has become available. This is called real time PCR (Polymerase Chain Reaction) and uses the latest diagnostic equipment to look for bacterial DNA in the milk sample. With these advances, dairy producers now have the latest technology available to them when addressing milk hygiene problems.

**What are the challenges with normal culture?**

Normal bacteriological culturing takes a minimum of 2-3 days, the samples must be sent to the lab either frozen or chilled and in approximately 25-40% of bovine milk samples taken from animals with clinical mastitis, no bacterial growth can be detected in conventional culturing.

**So why do bacteria fail to grow from milk samples?**

Many inhibitor substances are present in the milk. These may be naturally occurring inhibitors such as cells from the cow’s immune system or antibiotics from cows previously or currently under treatment. Also the bacteria in the milk samples may already be non viable especially in the cases of a toxic mastitis and not able to grow in the lab.

**What is Real time PCR?**

PCR uses state of the art molecular diagnostics to provide a more rapid diagnostics and the ability to get a result from the test within four hours. It is a technique to amplify a single or a few copies of a piece of DNA across several orders of magnitude, generating millions of copies of a particular DNA sequence.

**What is the advantage of PCR over culturing?**

1. The most significant advantage of the system allows us to decrease the number of “no growth” results. This is a problem occurring with the conventional bacterial culture method where the bacteria in the milk must be viable to grow in the lab.

2. Using PCR technology, bacteria in milk are identified by amplifying the bacterial DNA and this does not require culturing bacteria on plates. This allows us to provide more rapid diagnostics within four hours rather than 48 hours by culturing.

3. While culturing methods can reveal the presence of viable bacteria only, the DNA amplification technology allows identification of viable, dead, and also growth-inhibited bacteria, e.g. in samples from cows under antibiotic treatment.

4. PCR also identifies the pathogen quickly, allowing the appropriate therapy to be instigated quickly.

5. The samples can be posted to the lab without the need for them to be frozen or chilled.
Continued from page 3

6. Cows can be tested with high cell counts (subclinical infection), clinical mastitis and even while on antibiotic treatment.

Which mastitis pathogens does PCR identify?

Samples will be tested using PCR technology enabling it to identify 12 different mastitis pathogens, more than 95% of the pathogens that regularly cause mastitis on UK dairy farms. It also identifies one important gene responsible for penicillin resistance in staphylococcal species.

How do a milk sample taken for PCR analysis?

The PCR procedure is performed directly from milk samples and samples must be taken aseptically. Samples should therefore be collected in a similar way to samples taken for conventional bacteriology. The procedure for milk sampling can be found on the web at: http://www.youtube.com/watch?v=77lJzCuh5Ao

Milk testing labs, including www.farmlab.co.uk, now offer PCR technology, alongside the traditional bacteriology service for culturing milk samples from individual cows and from bulk milk tanks.

How can PCR help to manage milk quality in the dairy?

PCR is a real advance in mastitis pathogen identification and not only helps producers identify problems more accurately but can also lead to more effective treatments:

1. The use of PCR allows more targeted use of antibiotics by more reliably identifying pathogens that may not be identified using traditional culture methods

2. Detecting subclinical cases of mastitis before they become clinical or chronic

3. Decreasing test time from 3–10 days (for conventional culturing) to four hours from when sample is received at the lab. (i.e. PCR does not rely on the ability of bacteria to grow in the laboratory).

4. Identifies coliform pathogens that may not be detected using culture methods

5. Can be used to detect mastitis pathogens in cows currently on antibiotic treatment

Where can I get more information?

To ensure the highest level of milk hygiene, UK dairy farmers now have available the latest technology that can quickly and accurately identify the causes of mastitis and help them instigate the necessary treatment and control programmes.

Dairy producers have traditionally relied on bacteriological culture to identify pathogens, and, bulk tank culture in particular continues to provide the producer with valuable information on dairy farm management and husbandry practices. However with the advent of PCR technology, dairy farmers have a tool that can more quickly and accurately identify the causes of mastitis, even in cows under antibiotic treatment, reducing the costs of mastitis in the herd.

In all circumstances we would recommend you make your choice in consultation with your vet.

For further information please go to: www.farmlab.co.uk or www.mastikit.co.uk or contact your milk recording organization

Will they pass their antibiotic test?

Today, many dairy farmers routinely test cows before their milk goes back in the tank after antibiotic treatment. Fresh calvers, especially any with a short dry period and also cows which have received ‘off-label’ antibiotic treatments, all pose a potentially high risk of contaminating a bulk tank. Some farmers also want to check tanks where accidental contamination is suspected.

There are a number of antibiotic tests available, with Delvotest® and BetaStar® now much the most widely used in the UK. Delvotest® is the antibiotic test used by NML (National Milk Laboratories) for all weekly milk quality analysis, while milk tankers are often screened using the Betastar® test. So, dairymen wishing to test for antibiotics on the farm or sample must be taken aseptically. Samples should therefore be collected in a similar way to samples taken for conventional bacteriology. The procedure for milk sampling can be found on the web at: http://www.youtube.com/watch?v=77lJzCuh5Ao

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