Mastitis pathogen test result interpretation

Bulk milk

This test by qPCR is designed to detect the presence of:
- 11 key mastitis pathogens (responsible for >95% of cases)
- Penicillin resistance in *Staphylococcus* species
Results are available through Micro Monitor on the Herd Companion website (via - www.nmr.co.uk). Please contact customer services for login details calling 03330 043 043.

### Result Interpretation - Mastitis Pathogens

<table>
<thead>
<tr>
<th>Result</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEG</td>
<td></td>
<td></td>
<td></td>
<td>Negative/not detected</td>
</tr>
<tr>
<td>POS</td>
<td></td>
<td></td>
<td></td>
<td>Present in low numbers</td>
</tr>
<tr>
<td>POS</td>
<td></td>
<td></td>
<td></td>
<td>Present in moderate numbers</td>
</tr>
<tr>
<td>POS</td>
<td></td>
<td></td>
<td></td>
<td>Present in high numbers</td>
</tr>
</tbody>
</table>

Where >90% or >99% of the bacterial load is attributed to one pathogen, this will appear in the report.

### Pathogens can be split roughly into two groups (though some can fit into both groups)

#### Contagious mastitis pathogens

*Staphylococcus aureus*, other *Staphylococcus* species, *Corynebacterium bovis*, *Streptococcus agalactiae* & *Streptococcus dysgalactiae*.

Contagious pathogens are well adapted to survival and growth in the mammary gland and frequently cause infections lasting weeks, months or years. The infected gland is the main source of these organisms in a dairy herd and transmission of contagious pathogens to uninfected quarters and cows occurs mainly during milking time via cloths, gloves and teat liners.

Abbreviated hereafter as C.

#### Environmental mastitis pathogens


The primary source of environmental pathogens are the surroundings in which a cow lives. Sources of environmental pathogens include manure, bedding, feedstuffs, dust, mud and water.

Please note that environmental pathogens in the bulk tank are less likely to have come from inside the mammary gland. Consider whether milking hygiene is satisfactory. *S.uberis* is the most likely exception to this as cow-adapted strains can be contagious.

Abbreviated hereafter as E.
Guidance Notes

**Staphylococcus aureus** - C Bacteria are shed from infected quarters in variable numbers. Damage to the udder tissue reduces milk yield significantly. It can be **resistant to treatment with common antibiotics** see note on penicillin resistance on page 4.

**Staphylococcus species (Coagulase Negative Staphylococci (CNS))** - C Sub-clinical mastitis caused by intramammary infections (IMI) with coagulase-negative staphylococci (CNS) is common in dairy cows and may cause herd problems. Control of CNS mastitis is complicated by the fact that the CNS group contains a large number of different species and so veterinary advice should be sought. CNS is of **low pathogenicity** and is unlikely to be the sole cause of infection. The most likely mastitis-causing bacteria should be ruled out before CNS is considered significant in suspected mastitis cases.

**Streptococcus agalactiae** - C Very high numbers of bacteria are shed and the cell counts can be as high as 10 million without any clinical signs. Bulk milk cell counts also increase considerably with this form of mastitis. Careful attention to pre-milking teat preparation (teat dipping) is essential to minimise transmission of this organism. Treatment success rates are usually good but infected cows should be identified. **If this pathogen is present, veterinary advice should be sought immediately.**

**Streptococcus dysgalactiae** - C Usually associated with teat injury, either hyper keratosis or physical damage that may be caused by **poor milking machine function.** It is essential to **assess teat condition** and consider having the **milking machine tested.** Infections tend to be subclinical.

**Corynebacterium bovis** - C Sources of **C. bovis** are infected udders and teat canal. Spread of **C. bovis** is from **cow to cow at milking.** Correct **pre and post-milking teat disinfection** may control the spread from cow to cow. Most cases are not clinical.

**Streptococcus uberis** - E/C A **common cause of new infection in the dry period.** It can produce mild to severe mastitis that may be difficult to treat. It can be shed in very high numbers by infected quarters. Sub-clinical infections may occur resulting in high cell count cows. Cow to cow transmission is also possible so good teat preparation and disinfection can be useful to minimise transmission. **S. uberis** can be found in bulk milk samples as a contaminant if milking hygiene processes are not maintained.

**Escherichia coli (E.coli)** - E **coli** rarely causes persistent sub-clinical mastitis and thus care must be taken when interpreting bulk milk results when **E. coli** is present. It can be found in bulk tank samples as a contaminant if milking hygiene processes are not maintained. Also **pre-dipping and drying teats** prior to milking may reduce levels in the bulk tank.

**Enterococcus faecalis and/or faecium** - E These bacteria are **found in the gut** and are an **indicator of faecal contamination.** Recommended control procedures include **effective milking hygiene** and pre and post-milking teat disinfection. Also consider dry cow and cubicle bedding hygiene.

**Klebsiella spp** - E This is a member of the **coliform** family and are **found in the faeces, in bedding and on wet, dirty udders.** If found in bulk milk samples, it is likely that contamination is the cause.

**Serratia marcescens** - E Infection can be sub-clinical or clinical. Transmission can be minimised by ensuring good bedding and teat hygiene. It is possible that this pathogen could be shed into the bulk milk from sub-clinical cows.

**Arcanobacterium pyogenes** - E Sources include wound infections, teat injuries, udder infections, abscesses and genital tracts. As **A. pyogenes** often cause an acute mastitis, cases are often clinical; resulting in milk withdrawal from the bulk tank, it is therefore unlikely to be found in bulk samples.
Penicillin Resistance: Staphylococcal beta-lactamase gene

If a positive Staph result is detected (this applies to both Staph aureus and Staph spp. results). A beta-lactamase gene may be present. This indicates a resistance of the staph bacteria to penicillin treatment.

This is reported as follows:

<table>
<thead>
<tr>
<th>Result</th>
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<th>Medium</th>
<th>High</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEG</td>
<td></td>
<td></td>
<td></td>
<td>Susceptible to penicillin; suitable for use in treatment</td>
</tr>
<tr>
<td>POS</td>
<td></td>
<td></td>
<td></td>
<td>Resistant to penicillin; do not use in treatment</td>
</tr>
<tr>
<td>POS</td>
<td></td>
<td></td>
<td></td>
<td>Resistant to penicillin; do not use in treatment</td>
</tr>
<tr>
<td>POS</td>
<td></td>
<td></td>
<td></td>
<td>Resistant to penicillin; do not use in treatment</td>
</tr>
</tbody>
</table>

Presence of the Staphylococcal beta-lactamase gene indicates there is likely to be some penicillin resistance in the herd. You should discuss further monitoring with your vet.

<table>
<thead>
<tr>
<th>Test</th>
<th>Indicated problem</th>
<th>Target levels</th>
<th>Recommended actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatic Cell Count (cells/ml)</td>
<td>Sub-clinical mastitis</td>
<td>Green &lt; 150,000</td>
<td>Review of mastitis management to prevent spread of infection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amber 150,000 - 250,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red &gt; 250,000</td>
<td></td>
</tr>
</tbody>
</table>

NEXT STEPS

- Identify ‘problem’ cows using NMR records and veterinary guidance.
- Discuss the need for further sampling with your vet. This may include samples from high SCC and clinical mastitis cases.
- Consider whether environmental pathogens are present due to poor hygiene and take relevant steps to improve this.
- Consider if contagious pathogens can spread due to a poor milking routine, and take relevant steps to improve this.

If you have any questions about the testing, please contact:

National Milk Laboratories
Tel: 01902 749920
Fax: 01902 749938
www.nationalmilklabs.co.uk