Pasteurella multocida

Calibration of zone diameter breakpoints to MIC values

Version 1.7
January 2020
**Pasteurella multocida**

MIC and zone diameter correlates

- The following histograms present inhibition zone diameter distributions from EUCAST antimicrobial susceptibility testing. In most, the different colours of the bars indicate different MIC values. In some, the colours of the bars indicate a resistance gene or a resistance mechanism.

- The distributions include data for wild-type isolates and for isolates with acquired resistance mechanisms. A large number of isolates with MIC values close to the edge of the wild-type distribution and/or close to EUCAST clinical breakpoints were intentionally included. These distributions can not be used to infer resistance rates or the performance of the tests with routine isolates.

- For some agents, isolates were tested on more than one occasion, including parallel tests with disks and media from several manufacturers. When this is the case, data are presented as both the “number of isolates tested” and the “total number of MIC-zone diameter correlates”, including replicate tests and parallel tests with disks and media from different sources.
Antimicrobial susceptibility testing was performed on an internationally diverse collection of *Pasteurella multocida*, mostly human clinical isolates, but resistant isolates from pig and cattle were also included. Disk diffusion was performed on MH-F media according to EUCAST methodology and MICs were determined with gradient tests.

The distributions of MIC vs. zone diameter in this presentation are the result of a collaboration between EUCAST, Central Veterinary Institute (CVI, the Netherlands) and JMI Laboratories (US).

This presentation is based on EUCAST Clinical Breakpoint Tables v. 10.0.
Changes from previous version (1.6)

<table>
<thead>
<tr>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No changes. Breakpoints checked against latest version of EUCAST Clinical Breakpoint Tables.</td>
</tr>
</tbody>
</table>
Explanation of graphs:

- These graphs show zone diameter distributions with MIC values or resistance mechanisms as coloured bars. Colours are related to current EUCAST MIC breakpoints.

### Agent X

- **MIC (mg/L):**
  - ≥8: Resistant
  - 4: Resistant
  - 2: Susceptible, increased exposure
  - 1: Susceptible, standard dosing regimen
  - ≤0.25: Susceptible, standard dosing regimen

### Agent Y

- **MIC (mg/L):**
  - ≥64: Resistant
  - 32: Susceptible, increased exposure
  - 16: Susceptible, increased exposure
  - 8: Susceptible, increased exposure
  - 4: Susceptible, increased exposure
  - 2: Susceptible, increased exposure
  - 1: Susceptible, increased exposure
  - ≤0.25: Susceptible, increased exposure
**Benzylpenicillin 1 unit vs. MIC**

*Pasteurella multocida*, 131 isolates

(3 data sources)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥16</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td>0.25</td>
<td>2</td>
</tr>
<tr>
<td>0.125</td>
<td>2</td>
</tr>
<tr>
<td>0.06</td>
<td>2</td>
</tr>
</tbody>
</table>

**Breakpoints**

- MIC: S≤0.5, R>0.5 mg/L
- Zone diameter: S≥17, R<17 mm

**ECOFF**: 0.5 mg/L
Amoxicillin-clavulanic acid 2-1 µg vs. MIC
*Pasteurella multocida*, 128 isolates

(3 data sources)

Breakpoints
- MIC: $S \leq 1$, $R > 1$ mg/L
- Zone diameter: $S \geq 15$, $R < 15$ mm
Cefotaxime 5 µg vs. MIC
*Pasteurella multocida*, 131 isolates

(3 data sources)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>No of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.03</td>
<td>10</td>
</tr>
<tr>
<td>0.016</td>
<td>15</td>
</tr>
<tr>
<td>≤0.008</td>
<td>5</td>
</tr>
</tbody>
</table>

**Breakpoints**

- MIC: S\(\leq 0.03\), R\(> 0.03\) mg/L
- Zone diameter: S\(\geq 26\), R\(< 26\) mm

**ECOFF**: 0.03 mg/L
Ciprofloxacin 5 µg vs. MIC
*Pasteurella multocida*, 131 isolates

(3 data sources)

<table>
<thead>
<tr>
<th>MIC (mg/L)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.125</td>
<td>6</td>
</tr>
<tr>
<td>0.06</td>
<td>104</td>
</tr>
<tr>
<td>0.03</td>
<td>11</td>
</tr>
<tr>
<td>0.016</td>
<td>16</td>
</tr>
<tr>
<td>0.008</td>
<td>0</td>
</tr>
<tr>
<td>0.004</td>
<td>0</td>
</tr>
</tbody>
</table>

**Breakpoints**

- **MIC**: S≤0.06, R>0.06 mg/L  
  **ECOFF**: 0.06 mg/L
- **Zone diameter**: S≥27, R<27 mm
Nalidixic acid 30 µg vs. Ciprofloxacin MIC
*Pasteurella multocida*, 62 isolates

(2 data sources)

The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance.

Isolates categorised as susceptible to nalidixic acid can be reported susceptible to ciprofloxacin and levofloxacin. Isolates categorised as non-susceptible should be tested against the appropriate agent.

**Breakpoints**

<table>
<thead>
<tr>
<th>Ciprofloxacin MIC</th>
<th>Nalidixic acid zone diameter (screen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S≤0.06, R&gt;0.06 mg/L</td>
<td>S≥23 mm</td>
</tr>
</tbody>
</table>
Tetracycline 30 µg vs. Doxycycline MIC
*Pasteurella multocida*, 134 isolates

(3 data sources)

Doxycycline susceptibility inferred from tetracycline screen test.

**Breakpoints**

<table>
<thead>
<tr>
<th>Doxycycline MIC</th>
<th>S≤1, R&gt;1 mg/L</th>
<th>ECOFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracycline zone diameter (screen)</td>
<td>S≥24, R&lt;24 mm</td>
<td>1 mg/L</td>
</tr>
</tbody>
</table>
Trimethoprim-sulfamethoxazole 1.25-23.75 µg vs. MIC

*Pasteurella multocida*, 131 isolates

(3 data sources)

### MIC (mg/L)
- 0.5
- 0.25
- 0.125
- 0.06
- 0.03
- 0.016
- 0.008
- 0.004

### Breakpoints
- MIC
  - S≤0.25, R>0.25 mg/L
- Zone diameter
  - S≥23, R<23 mm