Table 2: Sampled parameters incorporated into the model via LHS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
<th>Distribution</th>
<th>Derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n )</td>
<td>Maximum lactation number in cattle herd, after which all surviving animals are culled.</td>
<td>( U(5, 12) )</td>
<td>Lower limit from [1], upper limit from equation (1) together with the assumption of demographic equilibrium.</td>
</tr>
<tr>
<td>( p_{\text{max}} )</td>
<td>In utero probability of dam to calf infection for animals in the high shedding state, with low shedding animals in utero rate being adjusted according to equation 4.</td>
<td>( N(0.27, 0.004) )</td>
<td>Analysis of data from [2–5]. Uncertainty around mean reduced following trial runs.</td>
</tr>
<tr>
<td>( u )</td>
<td>Extent to which post partum infection is present in the model. Appears in equation (5)</td>
<td>( U(0, 1) )</td>
<td>This choice explores the full support of this parameter.</td>
</tr>
<tr>
<td>( \alpha_{\text{max}} )</td>
<td>Maximum shedding rate, as shed by a clinical animal.</td>
<td>( e^x ), where ( x \sim N(13.7, 5.76) )</td>
<td>Mean derived from [6] and standard deviation derived from [7] by assuming that the level reported there represents a 97.5th percentile of the distribution.</td>
</tr>
</tbody>
</table>
| \( \delta \) | Decay rate for bacteria in the environment. | \( e^x \), where \( x \sim N(-4.47, 0.16) \) | Analysis of the data presented in [8].

\(^1\) See footnote 2.

\(^2\) See footnote 2.

\(^3\) See footnote 3.

\(^4\) See footnote 3.

\(^5\) Based on data from [10] and [11].
References

1 Analysis carried out by assuming an average output of bacteria per day in line with that specified by \( \alpha_{\text{max}} \) suggests that the log of the decay rate per day has a mean value of -4.47, with a standard error of 0.095. The uncertainty around the mean is increased to allow for uncertainty in the nuisance parameters used in the analysis and to allow for between farm variability. The decay rates presented in [12] are all much higher than this value. This difference may reflect a greater impact on bacteria from the Australian climate.

2 There are no data to inform the choice of these parameters. These options were chosen to give a wide range of possible scenario outcomes.

3 Chosen in the absence of data to be as broad a range as possible under the constraint that the force of infection for adult cattle is less than that for calves.

4 Analysis of data from [10] suggests that \( \beta_{ci} = 2.75 \) (per month). This may be an underestimate of the true figure. The model in [11] has typical incidences in the calf population consistent with values of \( \beta_{ci} \) in the range 0.68 to 1000, although the most typical model used there was consistent with values of \( \beta_{ci} \) in the range 367 to 384 (per month). The range of the distribution was initially chosen to encompass all of these values, but the upper limit was reduced following trial runs.