Risk assessment of human trichinellosis

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Quantitative Microbial Risk Assessment for Trichinellosis

QMRA for Trichinella allows reliable quantification of the effect of interventions in the pork production chain on human trichinellosis cases.

Controlled housing is effective as preventive measure against trichinellosis, but how effective is it in quantitative terms?

EU-RM is the standard method for Trichinella detection; alternative tests are being offered in view of pepsin shortage, although these may be less sensitive.

But: what does ‘less sensitive’ mean exactly in terms of trichinellosis incidence? What is an acceptable threshold?

Introduction

Aim of the present study

Run scenarios to:

• Estimate and compare human trichinellosis risk from different housing systems with- and without Trichinella testing
• Explore effect of (slightly) decreased test sensitivity on human trichinellosis risk
Aim of the present study

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- Estimate and compare human trichinellosis risk from different housing systems with- and without Trichinella testing
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Test sensitivity EU-RM

EU-RM 100% sensitive for pos/neg identification (>1-3LPG), but not for Trichinella larvae detection
Aim of the present study
Run scenarios to:
• Estimate and compare human trichinellosis risk from different housing systems with- and without Trichinella testing
• Explore effect of (slightly) decreased test sensitivity on human trichinellosis risk

Test case alternative method to test for Trichinella

REPORT ON THE VALIDATION OF THE PrioCHECK® TRICHINELLA AAD KIT OF THE PRIONICS AG COMPANY

(EURL-P)

5 labs, 10 samples/lab/round, 3 larvae/sample, 4 rounds

Test sensitivity non-EU-RM

Results of 1-4 sample panel digestion by the PrioCHECK® Trichinella AAD KIT (three Trichinella larvae per sample)

<table>
<thead>
<tr>
<th>Panel of samples</th>
<th>Lab 1</th>
<th>Lab 2</th>
<th>Lab 3</th>
<th>Lab 4</th>
<th>Lab 5</th>
<th>Total</th>
<th>% of positive results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st panel</td>
<td>0/10</td>
<td>1/9</td>
<td>1/9</td>
<td>3/9</td>
<td>3/9</td>
<td>3/9</td>
<td>3/9</td>
</tr>
<tr>
<td>2nd panel</td>
<td>1/6</td>
<td>1/6</td>
<td>1/6</td>
<td>1/6</td>
<td>1/6</td>
<td>1/6</td>
<td>1/6</td>
</tr>
<tr>
<td>3rd panel</td>
<td>1/6</td>
<td>1/6</td>
<td>1/6</td>
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</tr>
</tbody>
</table>

% of positive results = 41%

F = false negative

5 labs, 10 samples/lab/round, 3 larvae/sample, 4 rounds
Test sensitivity

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Test sensitivity

Frequency of missed positive carcasses at increasing relative test sensitivity

Model scenario: pigs, non-controlled at variable test sensitivity (1–0, steps 0.1)

Larvae / 100g diaphragm

- 0-10
- 10-100
- 100-1000
- >1000

Richness of missed positive carcasses at increasing relative test sensitivity

Base: 504 cases / EU / year

Conclusions

QMRA for Trichinella shows that:

Controlled housing for pigs is highly effective to prevent human trichinellosis incidence as compared to non-controlled housing.

Under worst case scenario: not testing EU pigs from controlled housing could lead to on average 9 cases of human trichinellosis per year, against ~36,000 for the same number of pigs from non-controlled housing.

Testing of pigs from non-controlled housing is paramount, preferably using the EU-RM.

Already a slight decrease of Trichinella test sensitivity has a large impact on trichinellosis incidence.

That should be taken into consideration when evaluating new methods.
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Thank you for your attention!