The effect of temperature and host age on the infectivity and development of Angiostrongylus vasorum in the slug Arion lusitanicus

Ferdushy, Tania; Kapel, Christian Møllin Outzen; Webster, P.; Al-Sabi, Mohammad Nafi Solaiman; Grønvold, J.

Publication date:
2010

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
The effect of temperature and host age on the infectivity and development of *Angiostrongylus vasorum* in the slug *Arion lusitanicus*

T. Ferdushy¹, C. M. O Kapel¹, P. Webster², M.N.S. Al-Sabi¹ and J. Grønvold¹

¹Department of Agriculture and Ecology ²Danish Centre for Experimental Parasitology, Department of Veterinary Disease Biology, Faculty of Life Sciences, University of Copenhagen, Denmark

Introduction and Aim of study

*Angiostrongylus vasorum* invades the pulmonary artery of dogs and foxes which are definitive hosts and a range of gastropods are intermediate hosts (Please put only numbers and write the reference list at the end in a separate box Rosen et al. 1970; Guilhon and Cens 1973; Bolt et al. 1992; Ferdushy et al. 2009).

Transmission to the intermediate host is influenced by temperature conditions and age of both the larvae and the intermediate hosts (Wallace and Rosen 1969; Youul and Lammer 1975; Skorping 1982; Hori et al. 1985). As such, the time from excretion in faeces until exposure to the gastropod and the environmental temperature may determine the successful transmission. The present study was performed to evaluate the effect of these two factors on the infectivity and development of *A. vasorum* in the terrestrial slug *Arion lusitanicus*.

Method

- **Exp. 1: Effect of slug age/size and temperature on the infectivity and larval development**
  - Two different sizes (small >0.5 g & medium 0.5-1g) laboratory bred *Arion lusitanicus* were infected with freshly isolated 200 L1 of *A. vasorum* and subsequently kept at 5°C, 10°C and 15°C for 6 weeks.
  - Exposure of juvenile *A. lusitanicus* slugs (0.5-1g) were exposed to *A. vasorum* L1 incubated at 5°C, 10°C and 15°C for 3 days and 7 days prior to infection. The slugs were subsequently kept at 15°C for 6 weeks.
  - Isolation of larvae from the slugs: HCl- pepsin digestion method was used for isolation of larvae.

- **Exp. 2: Effect of storage conditions on the infectivity and larval development**
  - Small sized *A. lusitanicus* exposed to 200 freshly isolated *A. vasorum* L1 and kept at different temperature prior to infection. Slugs were subsequently kept at 15°C for 6 weeks.
  - Larval recovery was also lower for 7 days stored larvae compared to 3 days and non-stored larvae (Fig 2).

Results

- **Exp. 1: Effect of slug age/size and temperature on the infectivity and larval development**
  - Infection level was higher for the slugs kept at 10°C and 15°C (100%) but lower at 5°C 73% and 88% for small and medium sized slugs, respectively (Table 1).
  - Larval recovery was higher for the slugs kept at 15°C than those kept at 5°C and 10°C (Fig 1).
  - Only L1 stage were found at 5°C followed by L2 and L3 at 10°C and 15°C (Fig 1).

- **Exp. 2: Effect of storage conditions on the infectivity and larval development**
  - Infectivity of the larvae decrease with the storage time (92-100%) and (58-75%) for 3 days and 7 days stored larvae respectively.

Table 1. Exposure of A. Lusitanicus to 200 freshly isolated A. Vasorum L1 and stored individually at 5°C, 10°C and 15°C for 6 weeks.

<table>
<thead>
<tr>
<th>Temperature (ºC)</th>
<th>Small</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>15</td>
<td>73.3</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>86.7</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>Control</td>
<td>20</td>
<td>0</td>
</tr>
</tbody>
</table>

Conclusions

- Successful transmission of *A. vasorum* larvae increased with the higher temperature and with host size.
- *A. vasorum* infectivity declined significantly with the larval storage time prior to exposure.

Table 2. Exposure of medium sized A. Lusitanicus to 200 A. vasorum L1 kept at different temperature prior to infection. The slugs were subsequently kept at 15°C for 6 weeks.

<table>
<thead>
<tr>
<th>L1 storage</th>
<th>L1 storage period (days)</th>
<th>Number of infected slugs</th>
<th>Number of infected slugs 6 weeks post infection</th>
<th>Infection level (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>12</td>
<td>11</td>
<td>91.7</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>12</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>15</td>
<td>3</td>
<td>12</td>
<td>9</td>
<td>75</td>
</tr>
</tbody>
</table>

Fig. 1. Mean larval recovery from small and medium sized A. lusitanicus exposed to 200 freshly isolated A. vasorum L1 and kept at 5°C, 10°C and 15°C for 6 weeks.

Fig. 2. Mean larval recovery from medium sized A. lusitanicus exposed to 200 A. vasorum L1 stored at 5°C, 10°C and 15°C for 3 days and 7 days prior to infection. Slugs were subsequently kept at 15°C for 6 weeks. Non-stored refer to the freshly isolated larvae not stored prior to infection.