Samantha Lawton1, Lkhagvatar Sukhdavaa2, Heather Fritz3, Patricia Conrad1, Sophia Papageorgiou
1UC Davis School of Veterinary Medicine 2Mongolia Institute of Veterinary Medicine 3Washington State University College of Veterinary Medicine

Introduction

- One-third of Mongolia’s three million people are subsistence semi-pastoral herders that rely on sheep and goats for food and fiber.1
- Domestic dogs guard livestock and households.2
- Herders have limited access to veterinary care, so few animals are on regular parasite prevention programs.3
- Livestock and herding dogs may have parasites that limit productivity or survival, or can be potential zoonotic agents.4
- Dogs that ingest sheep, goats or rodents with Echinococcus spp. cysts may fecally shed eggs that are infective to humans.5,6

Life Cycle:

- Understanding how these parasites are affected by herd composition and distribution in diverse landscapes (e.g., mixed grassland forest and arid desert) can contribute to targeted intervention efforts in Mongolia.

Hypothesis

Parasite levels and diversity will vary based on herd composition and landscape type.

Materials and methods

Sample Collection

- Convenience samples of dog, sheep, and goat feces were collected from two different aimags (provinces) with distinct landscape types.
- Samples were stored in a car-powered cooler until they could be tested in Ulaan Baatar.

Sample processing

- Dog feces underwent sedimentation to assess for presence of parasite eggs with the aid of a parasitologist.
- Livestock fecal samples were floated using a Modified Wisconsin Sugar method; eggs were counted.
- PCR was performed on the dog feces to identify presence of Echinococcus and Taenia spp. using the protocol from Trachte et al.1 with one modification: BSA was added to the PCR master mix.

Statistical analysis

- Excel and R programs were used to perform chi-squared and Mann-Whitney U tests.

Conclusions

- In this study, Taenid eggs were most commonly shed by Mongolian livestock in the two aimags sampled.
- The amount and species of parasites in livestock and dogs did not vary between aimags despite landscape differences or herd composition.
- Presence of Taenia spp. eggs in dog feces did not vary by % of sheep in herd.
- Dog parasite levels did not differ between dogs known to be dewormed and those with limited access to anthelmintics.
- Based on these findings, dog parasite control did not appear to be effective.

Limitations

- Small sample sizes and convenience sampling limit generalizability of results.

Impact and future directions

- Livestock parasite prevention programs in this area of Mongolia should focus on Taenid control.
- Dog and livestock parasite prevention protocols do not need to be tailored to landscape or herd composition.
- Further evaluate if the number of dogs in a family affects the prevalence of dog parasitosis, specifically Echinococcus spp.
- For dogs with Echinococcus spp. infections use sequence analysis to determine source of infection.

Results

Table 1. Total helminth eggs found in feces of small ruminants from two landscape types in Mongolia.

<table>
<thead>
<tr>
<th>Landscape Type</th>
<th>Goat</th>
<th>Sheep</th>
<th>Dog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gobi Aimag</td>
<td>120</td>
<td>230</td>
<td>250</td>
</tr>
<tr>
<td>Arkhangai Aimag</td>
<td>180</td>
<td>220</td>
<td>230</td>
</tr>
</tbody>
</table>

Table 2. Parasite eggs found in domestic dogs feces from two landscapes and one dog breeding facility in Mongolia.

<table>
<thead>
<tr>
<th>Landscape Type</th>
<th>Goats</th>
<th>Sheep</th>
<th>Dogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grassland</td>
<td>120</td>
<td>230</td>
<td>250</td>
</tr>
<tr>
<td>Forest</td>
<td>180</td>
<td>220</td>
<td>230</td>
</tr>
<tr>
<td>Arid Desert</td>
<td>140</td>
<td>210</td>
<td>200</td>
</tr>
</tbody>
</table>

Acknowledgments

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Figure 1. Lifecycle of Echinococcus granulosis

Figure 2. Goat herd being gathered to begin sampling in Gobi desert

Figure 3. Percentage of each parasite genus identified in small ruminants from two different aimags in Mongolia.

Figure 4. Images of Taenia spp (left) eggs and Thiostrongyle eggs (right) in feces from small ruminants

Figure 5. Images of Trichonargo eggs, Necator eggs, Strongyloide eggs, and Trichostrongyle eggs (clockwise from top left) collected from small ruminants.

Figure 6. A Mongolian Barid dog from Gobi Desert National Park

Figure 7. A Mongolian Barid dog from Gobi Desert National Park

Figure 8. Taenia spp. egg prevalence in fecal samples collected from two different landscapes and one dog breeding facility in Mongolia.

Figure 9. Livestock grazing within Gobi Desert National Park

Figure 10. Livestock grazing within Gobi Desert National Park

Figure 11. Livestock grazing within Gobi Desert National Park

Literature cited


Figure 12. Distribution of Cryptosporidium spp. and Giardia spp. in Mussels (Mytilus californianus) and California Sea Lions (Zalophus californianus) from Central California.