An assessment on the risk of hypodermosis introduction into Switzerland via imported game

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Abstract

A qualitative risk assessment was undertaken to analyze the likelihood of hypodermosis incursion into Switzerland via imported game from Hungary and the potential impacts on disease control in deer and cattle. The assessment considered the role of disease in the exporting and importing country, trade, possible exposure ways and training of Swiss hunters and deer farmers in disease detection. It was concluded that the risk of hypodermosis incursion into Switzerland can be considered negligible and no impact on disease control is given. The risk of introducing other diseases i.e. tuberculosis via game meat posed the highest risk.

1. Introduction

Bovine hypodermosis is a controlled disease in Switzerland. The disease is considered eradicated since 2002, although single case reports were notified in the years after (FSVO, 2015)\textsuperscript{1}. At present all bovine species in endemic areas and on pasture all summer have to undergo mandatory anti-parasitic treatment in autumn. In farmed and wild deer no national control, monitoring or surveillance program exists for deer hypodermosis, but so far no evidence

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for action is given (personal communication M.P. Ryser; Sieber et al. 2010). An emergence or re-emergence of hypodermosis would lead to increased costs for disease control and surveillance and possible barriers in trade.

Imported live game and game meat can play a role in transmitting disease (Coburn et al., 2005). On the basis of bilateral agreements, the same veterinary rules apply to the crossing of borders between Switzerland and EU Member States as to “movements within the EU”. The importer carries the risk associated with the import. As long as an official veterinary certificate and TRACES document is given and Council Directive 2002/99/EC, Regulation (EC) No. 853/2004 and Regulation (EC) No. 854/2004 are fulfilled, no border inspection is mandatory. Whether the import of game plays a role in hypodermosis introduction into Switzerland was aim of the study.

2. Materials and methods

The qualitative risk assessment examined the likelihood of introducing hypodermosis via imported game into the Swiss deer and cattle population. The risk analysis was conducted after an imported female deer calf (36kg) from Hungary was slaughtered in the eastern part of Switzerland in canton Glarus in November 2013 and was found positive for hypodermosis. It was hypothesized that in cases of legal import of live game and private or possible illegal import of hunted game from abroad, untreated infested hides, carcasses and game meat might provide a reservoir for warble fly larvae to develop into infectious stages, transmit disease, and thus become endemic. The risk analysis was closely aligned with the OIE Risk Assessment framework, in particular the guidelines for import risk analysis (OIE, 2004). In addition, the Defra risk estimation on calculating the risk of an exotic disease being introduced in the UK was taken into account (Roberts et al., 2011). The risk terminology used in the risk assessment is based on the EFSA risk level classification (2006).

2.1. Data

Data were collected for the year 2013 for all Swiss cantons. Data on cattle holdings and on farmed fallow deer holdings are kept in the national registry (AGIS) run by the Food Safety and Veterinary Office (FSVO). Data on hunted roe deer and red deer are collected by the Federal Office for Agriculture and Environment (BAFU). Import notifications on the import of wild game and game meat from Hungary were collected via TRACES (Trade Control and Expert System).

2.2. Hazard identification

2.2.1. Hypodermosis and population at risk

The Swiss “population at risk” for hypodermosis is wild and farmed deer, roe deer and cattle. An estimate on the susceptible Swiss deer and cattle population in 2013 is presented in Table 1. In Switzerland the majority of farmed deer is fallow deer, and the minority (<8%) are red deer, sika deer and wapiti. Warble fly is known to be rather host specific. Hypoderma actaeon is a parasite of red deer and strictly host specific. Hypoderma diana is also adapted to other hosts than roe deer, such as red and fallow deer. Single cases of infestation of non-specific hosts such as horses and people with Hypoderma diana larvae were reported in literature. Tarry observed no evidence of cross-infestation between cow and deer warble species.

Table 1. Overview on numbers of cattle, farmed fallow deer and hunted red and roe deer in the 26 cantons of Switzerland in 2013.

<table>
<thead>
<tr>
<th>Species</th>
<th>Total sum</th>
<th>Min</th>
<th>Q25</th>
<th>Median</th>
<th>Q75</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red deer</td>
<td>10482</td>
<td>0</td>
<td>0.25</td>
<td>48.5</td>
<td>221.75</td>
<td>4485</td>
</tr>
<tr>
<td>Roe deer</td>
<td>41973</td>
<td>0</td>
<td>421.25</td>
<td>1128.5</td>
<td>1964.5</td>
<td>6030</td>
</tr>
<tr>
<td>Fallow deer</td>
<td>11312</td>
<td>0</td>
<td>51.5</td>
<td>186</td>
<td>593.5</td>
<td>2006</td>
</tr>
<tr>
<td>Cattle</td>
<td>1560293</td>
<td>0</td>
<td>14651</td>
<td>36125</td>
<td>83864.25</td>
<td>312798</td>
</tr>
</tbody>
</table>
2.2.2. Life cycle of the warble fly

Adult warble flies are hairy and about the size of small bees with yellow-orange abdomens. The fly lays eggs on the hair of cattle during summer (May to August). After about 4 days, larvae hatch and migrate into the skin. The larvae move between muscle layers to either the oesophagus or the spinal canal where the larvae stay dormant during winter. In late winter (November/December) or early spring the larvae migrate to the tissue under the skin on the back where they mature for about 30 days. The larvae then drop off the host animal and pupate in soil. The fly emerges after about 36 days according to Defra\textsuperscript{16}.

2.2.3. Other hazards

Nonetheless, also other diseases such as foot and mouth disease, brucellosis, rabies, tuberculosis, leptospirosis, salmonellosis, cryptosporidiosis, hemorrhagic disease in deer, paratuberculosis, toxoplasmosis, TSE, fasciolosis and tetanus should to be taken into consideration in the introduction of disease to the Swiss cattle and deer population via game import.

2.3. Release assessment

Trade in live deer, hunted game and game meat might provide a risk of introducing hypodermodosis or other diseases into Switzerland. In 2013, approximately 27,000 kg of deer meat were imported from Hungary to Switzerland. In contrast only two live animals belonging to the species \textit{Dama} spp. and \textit{Elaphurus} spp. were imported from Hungary to Switzerland. The likelihood of introduction of hypodermodosis also depends on its prevalence in the exporting country. Kovács et al.\textsuperscript{17} report a prevalence of 67.9\% in red deer and 18.8\% in fallow deer assessed in two hunting seasons. In comparison in Spain the prevalence in red deer infested by \textit{Hypoderma actaeon} was found to be 92\% by Perez et al.\textsuperscript{10}. In the Czech republic Salaba et al.\textsuperscript{18} reported the prevalence to range from 18.8 to 50\% per year in roe deer infested by \textit{Hypoderma diana}. For Switzerland no estimation on hypodermodosis prevalence in deer can be given (personal communication M.P. Ryser). In 2010 the causes of mortality and diseases in farmed deer in Switzerland were assessed by Sieber et al.\textsuperscript{3}, and 162 animals (86\% fallow deer, 7\% red deer, 7\% other) from 24 cantons were examined. Among causes bacterial infections (68.3\%) ranked top. necrobacillosis (17.7\%) was found to be the most common bacterial infection. No case of hypodermodosis was reported in the study.

2.4. Exposure assessment

Due to its host specificity, the risk of transmission of warble fly between livestock/cattle and deer is negligible. The likelihood that untreated infested hides, carcasses and game meat might provide a reservoir for warble fly larvae to develop into infectious stages and transm it disease is also considered negligible. Adult fly stages will not appear during the hunting season and larvae will not develop into infectious stages in the dead animal (personal communication S. Rehbein). The import of live deer from Hungary to Switzerland is in low demand. Therefore, the risk of hypodermodosis introduction via import of live deer is considered low as well. How far Hungarian hunters and official veterinarians are trained in hypodermodosis detection is not known. Swiss hunters have to undergo training in food hygiene and disease detection, although not specifically for hypodermodosis. The latter is also true for Swiss deer farmers. Since October 2008, a 12 months mandatory training of inexperienced farmers by experienced deer farmers (mentorship) has been established. Deer infested with hypodermodosis show behavioral symptoms, likely to be recognized by the experienced farmer. Early detection of hypodermodosis in meat inspection was given in the case of imported meat in the canton Glarus. Guidelines on game meat inspection are provided by the FSVO, but meat inspection practices of imported game and Swiss farmed deer might vary between Swiss cantons. The risk of not detecting disease in imported or farmed deer is considered very low to low, based on the experience of the person. The likelihood of not detecting hypodermodosis in meat inspection by Swiss hunters or meat inspectors is considered negligible. Infested hides and condemned parts should be treated (incinerated, scalded). Private or illegal import of
hunted game might pose the highest risk of introducing other diseases with zoonotic potential i.e. tuberculosis into Switzerland. Whether food safety standards are intended for long transports of hunted game is debatable.

2.5. Risk estimation

The overall risk of hypodermosis incursion into Switzerland can be considered negligible and no impact on bovine disease control is given or has to be established in Swiss farmed and wild deer or roe deer. The incursion of diseases i.e. tuberculosis into Switzerland via private or illegal game (meat) import pose a high risk and disease awareness among Swiss hunters must be raised for this prospect. The Swiss domestic farm animal population is considered free of major reportable diseases and the good health status should be maintained. In a first step, since August 2014 it has become mandatory for Swiss hunters to notify lesions thought to be suspicious for tuberculosis to the official veterinarian.

3. Conclusion

Qualitative risk assessment provides a beneficial tool for decision makers who often have to work without statistically powerful data and incomplete evidence base in wildlife disease. Moreover, Swiss official veterinarians and hunters who work in wildlife disease detection could be motivated to provide new evidence and information on hypodermosis to the risk assessment, so it can be updated and revised in case the disease becomes a future concern.

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References