Prevalence of zoonotic pathogens and epidemiological role of hunted alpine wild ruminants

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WILDLIFE: BACKGROUND AND NEW PERSPECTIVES

- Monitoring diseases in wildlife:
  - Zoonotic
  - Zooeconomic
  - Ecological value

- Increase of wild ungulates populations in the latest years (Carnevali et al., 2009)

<table>
<thead>
<tr>
<th>Specie</th>
<th>Area (Km²)</th>
<th>N. di province in cui è presente</th>
<th>N. di province in cui è oggetto di prelievo</th>
<th>Consistenza (2010)</th>
<th>Tendenza rispetto al 2000</th>
<th>Carniere (2009-2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capriolo</td>
<td>145.000</td>
<td>71</td>
<td>45</td>
<td>457.794</td>
<td>+35%</td>
<td>70.170</td>
</tr>
<tr>
<td>Cervo</td>
<td>54.000</td>
<td>58</td>
<td>22</td>
<td>67.788</td>
<td>+54%</td>
<td>10.032</td>
</tr>
<tr>
<td>Daino</td>
<td>5.000</td>
<td>60</td>
<td>23</td>
<td>17.697</td>
<td>-18%</td>
<td>3.770</td>
</tr>
<tr>
<td>Camoscio</td>
<td>42.000</td>
<td>23</td>
<td>19</td>
<td>131.714</td>
<td>+7%</td>
<td>12.889</td>
</tr>
<tr>
<td>Muflone</td>
<td>8.500</td>
<td>42</td>
<td>23</td>
<td>19.670</td>
<td>+92%</td>
<td>1.913</td>
</tr>
<tr>
<td>Stambecco</td>
<td>5.000</td>
<td>16</td>
<td>-</td>
<td>15.780</td>
<td>+21%</td>
<td>-</td>
</tr>
</tbody>
</table>

(Raganella Pelliccioni et al., 2013)

- Hunters as primary producers (Reg. CE 852-853/2004)
- Strong interactions among humans, livestock and wild populations
Aim of the study

Investigation about prevalence of
- Hepatitis E virus (HEV)
- *Toxoplasma gondii*
- *Cryptosporidium* spp.
- *Giardia duodenalis*

Emerging zoonotic pathogens
- Usually not monitored in wild ruminants

Study area

1.328 chamois (6.7 subjects/sq. km)
574 red deer (2 subjects/sq. km)
655 roe deer (2.5 subjects/sq. km)

5,045 cattle
9,117 sheep
11,261 goats

Over 3 million visitors/year

Hunting district
Verbano-Cusio-Ossola (VCO2)
Lepontine Alps
Results and Discussion

Sampling of sera
From 2013 to 2015

Hepatitis E virus

- Low prevalence of HEV
- Roe deer negative
  limited sampling (n=32).

Toxoplasma gondii

Foodborne zoonoses:
- Zoonotic risk → +++ T. gondii
- → +++ cervids
Results and Discussion

Sampling of sera
From 2013 to 2015

Hepatitis E virus

Toxoplasma gondii

Results and Discussion

Prevalence of *T. gondii* affected by anthropization (presence of definitive hosts) and environmental contamination

!!! Low parasite prevalence recorded in chamois

Prevalence of HEV is consistent with the low frequency observed in alpine wild boar (Boadella et al., 2015)
Sampling of faeces
From 2013 to 2015

**Cryptosporidium spp.**

- **PCR → C. ubiquitum**
- **Zoonotic !!!**
  - Roe deer

!!! Detection of **C. ubiquitum** in chamois in contiguous Alpe Veglia – Alpe Devero Natural Park

Results and Discussion
Giardia duodenalis

Sampling of faeces

RIDASCREEN® Giardia

PCR → Assemblage A
Zoonotic !!!
Chamois and red deer

→ Assemblage E
Chamois

De Liberato et al., 2015
Conclusions

• **Chamois**: new host of HEV, *Cryptosporidium* and *Giardia*!

• All wild ruminants studied are involved in target pathogens spread

• Roe deer resulted negative to HEV, but their susceptibility have been demonstrated (Reuter et al., 2009; Neumann et al., 2016)

• Roe deer show the highest prevalence for the other pathogens → Their habitat overlap with more anthropized areas with higher risk of contamination
Conclusions

- Low prevalences of pathogens investigated

**However....**

- Detection of **zoonotic pathogens**
- Their strong environmental survival
  - Pollution of soil and water
- Intensification of outdoor activities
- Increase of wild populations
  - Number of culled animals during every hunting season

<table>
<thead>
<tr>
<th>Species</th>
<th>Num. consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red deer</td>
<td>265</td>
</tr>
<tr>
<td>Roe deer</td>
<td>37</td>
</tr>
</tbody>
</table>

(Winkelmayer, 2010)

Zoonotic risk associated with wild ruminants cannot be ruled-out
Thanks for your attention!