The Potential Role of Birds of Prey and hunting falcons in the epidemiology of avian influenza. Evidence and implications for The Middle Eastern Region.

• Ruth Manvell
• Avian Virology
• OIE Ref Lab for AI and NDV
INFLUENZA VIRUS - TYPES

• A  BIRDS, MAMMALS (including humans, pigs, horses, mink, sea mammals etc)
• B  HUMANS
• C  HUMANS, PIGS
# Type A Influenza Surface Antigens

## Surface Antigen Subtype

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<th>Human</th>
<th>Equine</th>
<th>Swine</th>
<th>Avian</th>
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HPAI

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## TWO PATHOTYPES OF INFLUENZA A

<table>
<thead>
<tr>
<th>Highly pathogenic</th>
<th>Low pathogenicity</th>
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<tr>
<td>• severe disease</td>
<td>• mild respiratory disease, depression, egg production problems</td>
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<tr>
<td>• high mortality up to 100%</td>
<td>• may exacerbate other infections/conditions</td>
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<tr>
<td>• to date only[but not all] viruses of H5 or H7 subtype</td>
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</table>
H5N1 HPAI detections and spread (2006-2008)
Limited Reports of isolations in Eastern and Western Hemisphere.

Raptors are confirmed to be susceptible to influenza viruses of more than one subtype.

Very important to get the correct diagnosis confirmed by laboratory tests not assume the cause of clinical signs.
Non notifiable influenza subtypes

• Many reports of H9N2 infections in falcon quarry i.e. houbara bustards, sandgrouse etc.

• Reports of multi-subtype influenza viruses isolated from waterfowl are numerous particularly in Anatidae species.
Surveillance – Birds of Prey 1

- European Surveillance 2007
- Total birds sampled 2696
  - Falconiformes – 2063
  - Strigiformes – 571
  - Accipitriformes – 62
- Found dead – 1103
- Clinical signs – 81
- No clinical signs – 1327
- Other - 217
EU Surveillance – Birds of Prey - 2

- EU 2007
  - Only two common buzzards from dead and sampled in Poland tested positive for H5N1.
  - No other influenzas were detected in raptors
## Initial Influenza Infections in Raptors

<table>
<thead>
<tr>
<th>Year</th>
<th>Species</th>
<th>Location</th>
<th>Case History</th>
<th>PM Findings</th>
<th>Virus Isolation Medium</th>
<th>Flu Subtype</th>
<th>IVPI Value</th>
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</thead>
<tbody>
<tr>
<td>2000</td>
<td>Peregrine Falcon</td>
<td>UAE</td>
<td>Weakness Depression</td>
<td>Swollen Liver &amp; Spleen</td>
<td>Chick Embryo Fibroblast Cultures</td>
<td>H7N3</td>
<td>1.46/2.71</td>
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<tr>
<td>2000</td>
<td>Saker Falcon</td>
<td>ITALY</td>
<td>Weakness Depression Anorexia</td>
<td>Congested Melena filled intestines</td>
<td>Allantoic Cavity Hens eggs</td>
<td>H7N1</td>
<td>3.00</td>
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</tbody>
</table>
Recent Raptor H5N1 Infections

- Peregrine Falcon  Falco peregrinus - Hong Kong – 2004
- Goshawk  Accipter gentiles – Germany – 2006
- Peregrine Falcon  Falco peregrinus – Slovak Republic – 2006
- Buzzard  Buteo buteo – Denmark – 2006
- Saker falcons  Falco Cherrug – Kuwait/S. Arabia – 2005/06

» 1st reported cases of HPAI H5N1 in Middle East
Risk factors to be taken into account

- Susceptibility of different species of raptors to H5N1 infection.
- Have hunting raptors been infected prior or during hunting expeditions not showing clinical signs.
- Spread of infection between birds at a gathering and on return.
- Spread of infection by human contact.
- Infection due to contact with wild birds during hunting activities or consumption of prey, particularly waterfowl.
Risk factors to be taken into account

- Contaminated food stuffs or water.
- Source of food stuff should be from a reputable source, a none infected country.
- Freezing of contaminated food preserves the presence of virus particles.
Risk of introduction
AI/ND

• Wild birds natural reservoir?
  – Outdoor housing, contact with wild birds

• Trade in live birds
  – Poultry
  – ‘Caged’ birds

• Agency of humans

• Imported products?
Illegal/Unrestricted/Legal Entry

- Transfer of potentially infected birds of prey from an infected area.
  - Hunting
  - Re-location
- Importation of infected game for hunting and/or feed for falcons or human consumption.
- ‘Legal’ importations of infected birds
  - i.e. caged birds into the UK from Far East (2005)
- Illegal importations of infected birds
  - Crested Eagles into Belgium from Thailand (2004)
The story

- Mon 18/10/2004: Thai man apprehended at Brussels airport by the anti-drug group
- 2 birds of prey (*Spizaetus Nipalensis*) in a hand luggage (sports bag) with open zipper
- Birds wrapped in a cotton cloth with head free and inserted in a wicker tube
Public health measures

• 25 people in direct or indirect contact with eagles (veterinarian, lab staff, Thai passenger & brother):
  - oseltamivir prophylaxis was given,
  - 2 nasal + 1 throat swab: all H5 negative (RT-PCR)

• The custom veterinarian who sacrificed the birds developed bilateral conjunctivitis 3 days after handling the birds: tear swab negative

• Tracing of passengers list:
Veterinary measures

• Following the tracing of birds that had passed through the customs inspection centre during the at-risk period, the Federal Agency for the Safety of the Food Chain euthanised several batches of birds, notably:
  - 2 parrots at the customs inspection centre,
  - 200 parrots in a quarantine centre,
  - 450 exotic passerine birds in another quarantine centre.

• The sacrificed birds were brought to the Belgian laboratory for further testing (RT-PCR and virus isolation on embryonated egg or cell culture).

• All the RT-PCR and isolation tests were negative for the H5N1 strain.
Discussion

• Although *S. Nipalensis*, a CITES-listed species, frequently occurs in H5N1 problem regions in Thailand, no details are currently available that may explain how the birds went infected.

• One possibility is that they have been fed with infected chicken carcasses shortly prior to their departure to Europe. This may explain why no clinical symptoms were observed.

• Back in Thailand, the smuggler was caught by the police and given a penalty of 5000 Bahts and waiting for punishment but maintained having bought the eagles in the Bangkok’s Sunday market.

• Alternatively, some avian wildlife may have a higher resistance to the disease.
Discussion

• The only other report of H5N1 in wild birds of prey previous to this finding was a single peregrine falcon found dead in Hong Kong (OIE 2004).
• There were also two reports of AI infections of falcons with H7 HPAI:
  - Magnino *et al.*, Veterinary Record, 2000: During the HPAI outbreaks in Italy in 2000, an H7N1 virus was isolated from a saker falcon that died three days after normal hunting activity. The raptor was presented with a sudden onset of depression, weakness and anorexia the day after normal hunting activity and died 2 days later without further clinical signs.
Conclusions

• A Belgian falconer who offered 7500 Euro for each bird had ordered the eagles & already owned birds of the same species.

• These two birds detected by customs may reflect a much larger underlying problem of bird smuggling intercontinentally.

• They easily remain undetected because airport scanners only detect metal objects.

• Specific methods for the systematic detection of live animals (e.g. dogs) should be considered at airports and borders. This is now under consideration in Belgium.
Bio-security

- Good hygiene.
- Minimise wild bird and small mammal contact.
- Food from reputable sources.
- Water supply
- Disease awareness.
BIO-SECURITY-2

- Reputable, non toxic virucidal disinfectants.
- Regular disinfection of utensils.
- Regular inspection of stock.
- Changes in faecal matter.
- Feed uptake and water consumption.
- Isolate/cull sick birds.
Quarantine

- Strongly recommend that new birds, including wild caught raptors introduced into a country undergo quarantine for several weeks to minimise risk of infection to susceptible stock.
- Birds exposed on hunting trips or gatherings should be isolated away from resident stock.
Vaccination

• Birds of Prey have been subjected to vaccination with no apparent ill effects.
• Even though a bird may be protected from clinical signs it may still excrete live virus capable of infecting susceptible birds.
• Several doses **MAY** reduce shedding of infectious particles.
Human Health Risks

- Confirmed H5N1 human cases >331
- H5N1 Fatalities 203
- Awareness not only of H5N1 but also H7 and H9N2 infections in humans.
Comment

Although dissemination of virus directly from falcons is questionable, spread from related activities of the sport pose a real threat to both captive bird and poultry populations.
Conclusions

- Wild birds of prey have never been demonstrated as being involved in the dissemination of HPAI viruses but are most likely dead-end (top of pyramid) hosts in the epidemiology of HPAI, eating infected carcases.

- Illegal movements of birds of prey represent a significant threat for the introduction of HPAI.

- Hunting with falcons is practiced in several countries around the world.
Comment

- It would be a great shame if this old and popular tradition were to be curtailed. Minimisation of the related risks involved in the sport will go a long way to preserving this way of life not only in the Middle East but in many countries around the world.
• If and when H5N1 is found in wild birds it is impractical to suggest culling of wild bird populations. Hunting of wild birds may disseminate the bird populations to another area.

• Instead enhance bio-security measures as high as possible.

• Protect falcons from outside intrusion of wild birds.
Acknowledgments

• Thierry van de Berg for slides.

• Thank you for the invitation to speak today.

• Special thanks to the interpreter for the excellent service
Thank you for your attention