



## OBSERVED CLINICAL SIGNS OF INFLUENZA

### Cases in Non-Poultry Animals

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#### References

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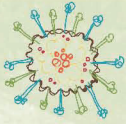


## Influenza of Non-Domestic Species

Supplemental Training Information

### **BIRDS**

- **Budgerigars (Parakeets)**
  - H5N1 – Experimentally infected (Perkins et al., 2003)
    - **Clinical Signs**
      - Moderate depression
      - Moribund
      - Neurological signs
      - Possible torticollis
      - Possible opisthotonus
      - Mortality
  
- **Canaries**
  - H7N1 – Natural exposure (Kaleta et al., 2005)
    - **Clinical Signs**
      - Conjunctivitis
      - Apathy
      - Anorexia
      - Mortality
  
- **Falcon, Contact**
  - H5N1 – Natural outbreak (Khan et al., 2009)
    - **Clinical Signs**
      - Nervous signs
      - Diarrhea
      - Mortality (62.5% in study)
  
- **Falcon, Saker**
  - H5N1 – Natural case (Marjuki et al., 2008)
    - **Clinical Signs**
      - Loss of appetite
      - Green feces
  
- **Finch, Zebra**
  - H5N1 – Experimentally infected (Perkins et al., 2003)
    - **Clinical Signs**
      - Moderate to severe depression
      - Possibility of mild neurological signs
      - Mortality (with or without clinical signs)



## Influenza of Non-Domestic Species

### Supplemental Training Information

- **Finch, House**
  - H5N1 – Experimentally infected (Perkins et al., 2003)
    - **Clinical Signs**
      - Mild depression
      - Ruffled feathers
      - Neurological signs
      - Incoordination
      - Tremors
      - Moribund (weak?)
      - Mortality
  
- **Flamingo, Greater**
  - High Path H5N1 – Natural Infection (Ellis et al., 2004)
    - **Clinical Signs**
      - Mortality
  
- **Geese, Bar-headed**
  - H5N1 – Experimentally infected (Brown et al., 2008)
    - **Clinical Signs**
      - In cases leading to death
        - Severe depression
        - Neurological signs
      - In cases of survival
        - Mild depression
        - Cloudy eyes
        - No neurological signs
  
- **Geese, Cackling**
  - H5N1 – Experimentally infected (Brown et al., 2008)
    - **Clinical Signs**
      - In cases leading to death
        - Severe listlessness
        - Seizures
        - Tremors
        - Incoordination
      - In cases of survival
        - Moderate listlessness
        - Ruffled feathers
        - Cloudy eyes
        - No neurological signs



## Influenza of Non-Domestic Species

### Supplemental Training Information

- **Gull, Herring**
  - H5N1- Experimentally infected (Brown et al., 2008)
    - **Clinical Signs**
      - Weakness
      - Lethargy
      - Seizures
      - Head-tilt
      - Head tremors
      - Torticollis
      - Severe imbalance
      - Mortality
- **Gull, Laughing**
  - H5N1 – Experimentally infected (Spickler et al., 2010)
    - **Clinical Signs**
      - Severe neurological disease
      - Weakness
      - Cloudy eyes
      - Ruffled feathers
      - Incoordination
      - Torticollis
- **Houbara**
  - H5N1 – Natural outbreak (Khan et al., 2009)
    - **Clinical Signs**
      - Torticollis
      - Paralysis of the leg
      - Imbalance
      - Swollen head
      - Nasal discharge
      - Greenish diarrhea
      - Cyanotic shanks
      - Loss of appetite
      - Death
- **Martin, Stone**
  - H5N1 – Natural Case (Klopfleisch et al., 2007)
    - **Clinical Signs**
      - Depression
      - Ataxia
      - Circling



## Influenza of Non-Domestic Species

### Supplemental Training Information

- **Partridge, Red-Legged**
  - HPAI H7N1 – Experimentally infected (Bertran et al., 2011)
    - **Clinical Signs**
      - Depression
      - Apathy
      - Ruffled Feathers
      - Impaired respiration
      - Diarrhea
      - Neurological Signs
      - Mortality
  
- **Peafowl**
  - H5N1 – Natural Outbreak (Ismail et al., 2010)
    - **Clinical Signs**
      - Whitish diarrhea
      - Depression
      - Anorexia
      - Convulsions
      - Death
  
- **Quails**
  - H5N1 – Experimentally infected (Isoda et al., 2006)
    - **Clinical Signs**
      - Severe nervous disorders
      - Mortality
  
- **Siskins**
  - H7N1 – (Spickler et al., 2010) (Kaleta et al., 2005)
    - **Clinical Signs**
      - Conjunctivitis
      - Apathy
      - Anorexia
      - Mortality
  
- **Sparrow**
  - H5N1 – Experimentally infected (Perkins et al., 2003)
    - **Clinical Signs**
      - Moderate depression
      - Anorexic
      - Ruffled feathers
      - Huddled at bottom of cage
      - No mortality
    - Note – Not all cases showed clinical signs. Two birds were euthanized for sampling while all others recovered, so mortality is unknown.



## Influenza of Non-Domestic Species

### Supplemental Training Information

- **Swan, Mute**
  - H5N1 – Natural case (Nagy et al., 2006)
    - **Clinical Signs**
      - Nervous signs
      - Somnolence
      - Incoordination
      - Ataxia
      - Mortality
  - H5N1 – Experimentally infected (Brown et al., 2008)
    - **Clinical Signs**
      - Moderate, progressing to severe listlessness
      - Seizures
      - Tremors
      - Incoordination
      - Mortality
    - Note – Clinical signs present for <24 hours before death
  
- **Swan, Black**
  - H5N1 – Experimentally infected (Brown et al., 2008)
    - **Clinical Signs**
      - Severe listlessness
      - Seizures
      - Tremors
      - Incoordination
    - Note – Death was common without showing any clinical signs. In existent cases, clinical signs exhibited <24 hours before death.
  
- **Swan, Trumpeter and Whooper**
  - H5N1 – Experimentally infected (Brown et al., 2008)
    - **Clinical Signs**
      - Moderate, progressing to severe listlessness
      - Seizures
      - Tremors
      - Incoordination



## Influenza of Non-Domestic Species

### Supplemental Training Information

#### **MAMMALS**

##### • **Domestic Dogs**

- H3N8 - racing greyhound dogs (Harder et al., 2010)
  - **Clinical Signs**
    - Fever
    - Coughing
- H5N1 – Dogs in Thailand, ate H5N1 positive chickens (Harder et al. 2010)
  - **Clinical Signs**
    - Conjunctivitis
    - Elevated body temperature
- H5N1 – Single case (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical Signs**
    - High fever
    - Panting
    - Lethargy
    - Mortality
- H5N1 – Experimentally infected dogs (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical Signs**
    - Fever
    - Conjunctivitis
  - Note – dogs were either asymptomatic, or clinical signs were transient

##### • **Domestic Cats**

- H3N2 – Experimental infection (Harder et al., 2010)
  - **Clinical Signs**
    - Slightly elevated body temperature
- H5N1 – Experimental infection (Harder et al., 2010)
  - **Clinical Signs**
    - Significant rise in body temperature
    - Decreased activity
    - Protrusion of nictitating membrane
    - Conjunctivitis
    - Labored breathing
  - Note – Shown to be dose dependent, with high dose being fatal, moderate dose developing no clinical signs, and low dose not causing infection.
- H5N1 – Natural cases (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical Signs**
    - Fever
    - Depression
    - Dyspnea
    - Convulsions
    - Ataxia
  - Note – Symptoms varies in these natural cases, with one cat showing these symptoms.



## Influenza of Non-Domestic Species

### Supplemental Training Information

- **Cattle**
  - H5N1 (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Asymptomatic, but could shed virus
  
- **Ferrets**
  - H6 viruses (Gillim-Ross et al., 2008)
    - **Clinical Signs**
      - Elevated body temperatures at or above 103.8 F
      - No weight loss or gain (control group did gain weight)
  - H5N1 – Experimental infections (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical signs**
      - High fever
      - Extreme lethargy
      - Anorexia
      - Weight loss
      - Diarrhea
      - Possible mortality
  
- **Fox**
  - H5N1 – Experimentally infected (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Fever (only in some cases)
  
- **Macaques**
  - H7N7 HPAI – Experimental infection (Miyake et al., 2009)
    - **Clinical Signs**
      - Elevated body temp for 6-13 days
      - Loss of appetite for 2 – 5 days
    - Note – there may have been other clinical signs, but the paper did not discuss, as it was a comparison of body temp, appetite, and weight loss of macaques infected only with H7N7 vs macaques coinfecting with H7N7 and s. pneumonia.
  
- **Mink**
  - H10N4 – natural cases from mink farms in Sweden (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Anorexia
      - Sneezing
      - Coughing
      - Nasal and ocular discharges
      - Mortality





## Influenza of Non-Domestic Species

### Supplemental Training Information

- **Pigs**
  - H9N2 (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Respiratory disease
      - Paralysis
- **Raccoons**
  - H4N8 LPAI – Experimentally infected (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Asymptomatic, but shed viruses
- **Seals**
  - Influenza A, appearing to be of avian origin (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Weakness
      - Incoordination
      - Dyspnea
      - Swelling of the neck
      - White or bloody nasal discharge in some cases
- **Tigers and Leopards**
  - H5N1 – Captive animals, ate H5N1 infected chickens (Keawcharoen et al., 2004)
    - **Clinical Signs**
      - High fever
      - Respiratory distress
      - Unexpected death
- **Whale**
  - Influenza A, appearing to be of avian origin (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Extreme emaciation
      - Difficulty maneuvering
      - Sloughing skin
    - Note – Clinical signs described as non-specific



## Influenza of Non-Domestic Species

Supplemental Training Information

### VIRUSES

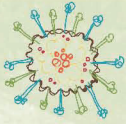
#### H5N1

##### Domestic Dogs

- Dogs in Thailand, ate H5N1 positive chickens (Harder et al. 2010)
  - **Clinical Signs**
    - Conjunctivitis
    - Elevated body temperature
- One dog case (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical Signs**
    - High fever
    - Panting
    - Lethargy
    - Mortality
- Experimentally infected dogs (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical Signs**
    - Fever
    - Conjunctivitis
  - Note – dogs were either asymptomatic, or clinical signs were transient

##### Domestic Cats

- Experimental infection (Harder et al., 2010)
  - **Clinical Signs**
    - Significant rise in body temperature
    - Decreased activity
    - Protrusion of nictitating membrane
    - Conjunctivitis
    - Labored breathing
  - Note – Shown to be dose dependent, with high dose being fatal, moderate dose developing no clinical signs, and low dose not causing infection.
- Natural cases (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical Signs**
    - Fever
    - Depression
    - Dyspnea
    - Convulsions
    - Ataxia
  - Note – Symptoms varies in these natural cases, with one cat showing these symptoms.



## Influenza of Non-Domestic Species

### Supplemental Training Information

#### **Cattle**

- (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical Signs**
    - Asymptomatic, but could shed virus

#### **Ferrets**

- Experimental infections (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical signs**
    - High fever
    - Extreme lethargy
    - Anorexia
    - Weight loss
    - Diarrhea
    - Possible mortality

#### **Flamingo, Greater**

- High Path H5N1 – Natural Infection (Ellis et al., 2004)
  - **Clinical Signs**
    - Mortality

#### **Fox**

- Experimentally infected (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
  - **Clinical Signs**
    - Fever (only in some cases)

#### **Tigers and Leopards**

- Captive animals, ate H5N1 infected chickens (Keawcharoen et al., 2004)
  - **Clinical Signs**
    - High fever
    - Respiratory distress
    - Unexpected death

#### **Budgerigars (Parakeets)**

- Experimentally infected (Perkins et al., 2003)
  - **Clinical Signs**
    - Moderate depression
    - Moribund
    - Neurological signs
    - Possible torticollis
    - Possible opisthotonus
    - Mortality



## Influenza of Non-Domestic Species

### Supplemental Training Information

#### **Falcon, Contact**

- Natural outbreak (Khan et al., 2009)
  - **Clinical Signs**
    - Nervous signs
    - Diarrhea
    - Mortality (62.5% in study)

#### **Falcon, Saker**

- Natural case (Marjuki et al., 2008)
  - **Clinical Signs**
    - Loss of appetite
    - Green feces

#### **Finch, Zebra**

- Experimentally infected (Perkins et al., 2003)
  - **Clinical Signs**
    - Moderate to severe depression
    - Possibility of mild neurological signs
    - Mortality (with or without clinical signs)

#### **Finch, House**

- Experimentally infected (Perkins et al., 2003)
  - **Clinical Signs**
    - Mild depression
    - Ruffled feathers
    - Neurological signs
    - Incoordination
    - Tremors
    - Moribund (weak?)
    - Mortality

#### **Geese, Bar-headed**

- Experimentally infected (Brown et al., 2008)
  - **Clinical Signs**
    - In cases leading to death
      - Severe depression
      - Neurological signs
    - In cases of survival
      - Mild depression
      - Cloudy eyes
      - No neurological signs



## Influenza of Non-Domestic Species

### Supplemental Training Information

#### Geese, Cackling

- Experimentally infected (Brown et al., 2008)
  - **Clinical Signs**
    - In cases leading to death
      - Severe listlessness
      - Seizures
      - Tremors
      - Incoordination
    - In cases of survival
      - Moderate listlessness
      - Ruffled feathers
      - Cloudy eyes
      - No neurological signs

#### Gull, Laughing

- Experimentally infected (Spickler et al., 2010)
  - **Clinical Signs**
    - Severe neurological disease
    - Weakness
    - Cloudy eyes
    - Ruffled feathers
    - Incoordination
    - Torticollis

#### Houbara

- Natural outbreak (Khan et al., 2009)
  - **Clinical Signs**
    - Torticollis
    - Paralysis of the leg
    - Imbalance
    - Swollen head
    - Nasal discharge
    - Greenish diarrhea
    - Cyanotic shanks
    - Loss of appetite
    - Mortality

#### Martin, Stone

- H5N1 – Natural Case (Klopfleisch et al., 2007)
  - **Clinical Signs**
    - Depression
    - Ataxia
    - Circling



## Influenza of Non-Domestic Species

### Supplemental Training Information

#### Peafowl

- H5N1 – Natural Outbreak (Ismail et al., 2010)
  - **Clinical Signs**
    - Whitish diarrhea
    - Depression
    - Anorexia
    - Convulsions
    - Death

#### Quails

- Experimentally infected (Isoda et al., 2006)
  - **Clinical Signs**
    - Severe nervous disorders
    - Mortality

#### Sparrow

- Experimentally infected (Perkins et al., 2003)
  - **Clinical Signs**
    - Moderate depression
    - Anorexic
    - Ruffled feathers
    - Huddled at bottom of cage
    - No mortality
  - Note – Not all cases showed clinical signs. Two birds were euthanized for sampling while all others recovered, so mortality is unknown.

#### Swan, Mute

- Natural case (Nagy et al., 2006)
  - **Clinical Signs**
    - Nervous signs
    - Somnolence
    - Incoordination
    - Ataxia
    - Mortality
- Experimentally infected (Brown et al., 2008)
  - **Clinical Signs**
    - Moderate, progressing to severe listlessness
    - Seizures
    - Tremors
    - Incoordination
    - Mortality
  - Note – Clinical signs present for <24 hours before death



## Influenza of Non-Domestic Species

### Supplemental Training Information

#### Swan, Black

- Experimentally infected (Brown et al., 2008)
  - **Clinical Signs**
    - Severe listlessness
    - Seizures
    - Tremors
    - Incoordination
  - Note – Death was common without showing any clinical signs. In existent cases, clinical signs exhibited <24 hours before death.

#### Swan, Trumpeter and Whooper

- Experimentally infected (Brown et al., 2008)
  - **Clinical Signs**
    - Moderate, progressing to severe listlessness
    - Seizures
    - Tremors
    - Incoordination

### H7N1

#### • Canaries

- Natural exposure (Kaleta et al., 2005)
  - **Clinical Signs**
    - Conjunctivitis
    - Apathy
    - Anorexia
    - Mortality

#### • Siskins

- (Spickler et al., 2010) (Kaleta et al., 2005)
  - **Clinical Signs**
    - Conjunctivitis
    - Apathy
    - Anorexia
    - Mortality

#### • Partridge, Red-Legged

- HPAI H7N1 – Experimentally infected (Bertran et al., 2011)
  - **Clinical Signs**
    - Depression
    - Apathy
    - Ruffled Feathers
    - Impaired respiration
    - Diarrhea
    - Neurological Signs
    - Mortality



## Influenza of Non-Domestic Species

### Supplemental Training Information

#### H3N8

- **Domestic Dogs**
  - Racing greyhound dogs (Harder et al., 2010)
    - **Clinical Signs**
      - Fever
      - Coughing

#### H3N2

- **Domestic Cats**
  - Experimental infection (Harder et al., 2010)
    - **Clinical Signs**
      - Slightly elevated body temperature

#### H7N7

- **Macaques**
  - HPAI – Experimental infection (Miyake et al., 2009)
    - **Clinical Signs**
      - Elevated body temp for 6-13 days
      - Loss of appetite for 2 – 5 days
      - Note – there may have been other clinical signs, but the paper did not discuss, as it was a comparison of body temp, appetite, and weight loss of macaques infected only with H7N7 vs macaques coinfecting with H7N7 and s. pneumonia.

#### H10N4

- **Mink**
  - H10N4 – natural cases from mink farms in Sweden (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Anorexia
      - Sneezing
      - Coughing
      - Nasal and ocular discharges
      - Mortality





## Influenza of Non-Domestic Species

Supplemental Training Information

### H9N2

- **Pigs**
  - H9N2 (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Respiratory disease
      - Paralysis

### H4N8

- **Raccoons**
  - H4N8 LPAI – Experimentally infected (Spickler et al., 2010)(Iowa EEDA 4<sup>th</sup> edition)
    - **Clinical Signs**
      - Asymptomatic, but shed viruses

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## Influenza of Non-Domestic Species

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