# OBSERVED CLINICAL SIGNS OF INFLUENZA
## Cases in Non-Poultry Animals

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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)
• **Finch, House**
  o H5N1 – Experimentally infected (Perkins et al., 2003)
    ▪ **Clinical Signs**
      * Mild depression
      * Ruffled feathers
      * Neurological signs
      * Incoordination
      * Tremors
      * Moribund (weak?)
      * Mortality

• **Flamingo, Greater**
  o High Path H5N1 – Natural Infection (Ellis et al., 2004)
    ▪ **Clinical Signs**
      * Mortality

• **Geese, Bar-headed**
  o H5N1 – Experimentally infected (Brown et al., 2008)
    ▪ **Clinical Signs**
      * In cases leading to death
        o Severe depression
        o Neurological signs
      * In cases of survival
        o Mild depression
        o Cloudy eyes
        o No neurological signs

• **Geese, Cackling**
  o H5N1 – Experimentally infected (Brown et al., 2008)
    ▪ **Clinical Signs**
      * In cases leading to death
        o Severe listlessness
        o Seizures
        o Tremors
        o Incoordination
      * In cases of survival
        o Moderate listlessness
        o Ruffled feathers
        o Cloudy eyes
        o No neurological signs
- **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
- **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.
• **Swan, Mute**  
  o H5N1 – Natural case (Nagy et al., 2006)  
    ▪ **Clinical Signs**  
      - Nervous signs  
      - Somnolence  
      - Incoordination  
      - Ataxia  
      - Mortality  
  o 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**  
  o 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**  
  o H5N1 – Experimentally infected (Brown et al., 2008)  
    ▪ **Clinical Signs**  
      - Moderate, progressing to severe listlessness  
      - Seizures  
      - Tremors  
      - Incoordination
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 4th edition)
    - **Clinical Signs**
      - High fever
      - Panting
      - Lethargy
      - Mortality
  - H5N1 – Experimentally infected dogs (Spickler et al., 2010)(Iowa EEDA 4th 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 4th edition)
    - **Clinical Signs**
      - Fever
      - Depression
      - Dyspnea
      - Convulsions
      - Ataxia
    - Note – Symptoms varies in these natural cases, with one cat showing these symptoms.
• **Cattle**  
  o H5N1 (Spickler et al., 2010)(Iowa EEDA 4th edition)  
    ▪ **Clinical Signs**  
      • Asymptomatic, but could shed virus

• **Ferrets**  
  o 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)  
  o H5N1 – Experimental infections (Spickler et al., 2010)(Iowa EEDA 4th edition)  
    ▪ **Clinical signs**  
      • High fever  
      • Extreme lethargy  
      • Anorexia  
      • Weight loss  
      • Diarrhea  
      • Possible mortality

• **Fox**  
  o H5N1 – Experimentally infected (Spickler et al., 2010)(Iowa EEDA 4th edition)  
    ▪ **Clinical Signs**  
      • Fever (only in some cases)

• **Macaques**  
  o 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 coinfected with H7N7 and s. pneumonia.

• **Mink**  
  o H10N4 – natural cases from mink farms in Sweden (Spickler et al., 2010)(Iowa EEDA 4th edition)  
    ▪ **Clinical Signs**  
      • Anorexia  
      • Sneezing  
      • Coughing  
      • Nasal and ocular discharges  
      • Mortality
• **Pigs**  
  o H9N2 (Spickler et al., 2010)(Iowa EEDA 4th edition)  
    ▪ **Clinical Signs**  
      • Respiratory disease  
      • Paralysis

• **Raccoons**  
  o H4N8 LPAI – Experimentally infected (Spickler et al., 2010)(Iowa EEDA 4th edition)  
    ▪ **Clinical Signs**  
      • Asymptomatic, but shed viruses

• **Seals**  
  o Influenza A, appearing to be of avian origin (Spickler et al., 2010)(Iowa EEDA 4th edition)  
    ▪ **Clinical Signs**  
      • Weakness  
      • Incoordination  
      • Dyspnea  
      • Swelling of the neck  
      • White or bloody nasal discharge in some cases

• **Tigers and Leopards**  
  o H5N1 – Captive animals, ate H5N1 infected chickens (Keawcharoen et al., 2004)  
    ▪ **Clinical Signs**  
      • High fever  
      • Respiratory distress  
      • Unexpected death

• **Whale**  
  o Influenza A, appearing to be of avian origin (Spickler et al., 2010)(Iowa EEDA 4th edition)  
    ▪ **Clinical Signs**  
      • Extreme emaciation  
      • Difficulty maneuvering  
      • Sloughing skin  
    ▪ **Note** – Clinical signs described as non-specific
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 4th edition)
  - **Clinical Signs**
    - High fever
    - Panting
    - Lethargy
    - Mortality
- Experimentally infected dogs (Spickler et al., 2010)(Iowa EEDA 4th 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 4th edition)
  - **Clinical Signs**
    - Fever
    - Depression
    - Dyspnea
    - Convulsions
    - Ataxia
  - Note – Symptoms varies in these natural cases, with one cat showing these symptoms.
Cattle
  o (Spickler et al., 2010)(Iowa EEDA 4th edition)
    § Clinical Signs
      • Asymptomatic, but could shed virus

Ferrets
  o Experimental infections (Spickler et al., 2010)(Iowa EEDA 4th edition)
    § Clinical signs
      • High fever
      • Extreme lethargy
      • Anorexia
      • Weight loss
      • Diarrhea
      • Possible mortality

Flamingo, Greater
  o High Path H5N1 – Natural Infection (Ellis et al., 2004)
    § Clinical Signs
      • Mortality

Fox
  o Experimentally infected (Spickler et al., 2010)(Iowa EEDA 4th edition)
    § Clinical Signs
      • Fever (only in some cases)

Tigers and Leopards
  o Captive animals, ate H5N1 infected chickens (Keawcharoen et al., 2004)
    § Clinical Signs
      • High fever
      • Respiratory distress
      • Unexpected death

Budgerigars (Parakeets)
  o Experimentally infected (Perkins et al., 2003)
    § Clinical Signs
      • Moderate depression
      • Moribund
      • Neurological signs
      • Possible torticollis
      • Possible opisthotonus
      • Mortality
**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
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
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
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
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 coinfected with H7N7 and s. pneumonia.

H10N4

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

**References**