

The 3W Strategy for Avian Influenza Surveillance in Mallards: Water, Wheat & Wait – Optimization through Virus Recovery Methods

Monday, September 14, 2026 5:10 PM (20 minutes)

Low Pathogenicity Avian Influenza (LPAI) viruses may serve as precursors and reassortment partners of High Pathogenicity Avian Influenza (HPAI) viruses, highlighting the importance of LPAI surveillance.

We developed a non-invasive “3W” approach, in which mallards (*Anas platyrhynchos*) are attracted to baited water bins, allowing collection of water samples potentially containing avian influenza viruses (AIV).

Between June 2022 and December 2023, 243 Virocult® swab samples collected from feed-baited bins in the Greifswalder Bodden area (Germany) were analyzed by generic and subtype-specific Influenza A RT-qPCR. Twelve samples (5%) tested positive, yielding subtypes H3N8, H11N9 and H5Nx. However, viral loads were insufficient for sequencing or virus isolation.

To improve sensitivity and increase virus loads for diagnosis, five virus recovery methods were compared experimentally using series of each 40 mL H4N6-spiked (10^2 , 10^3 , 10^4 TCID₅₀) tap and Bodden water samples, with and without wheat to mimic field sampling conditions. Across all conditions, activated carbon/polyethylene glycol precipitation (ACPEG) and electronegative membrane adsorption (EM) yielded the lowest Ct values, whereas simple swab samples performed worst.

These findings demonstrate the potential of the 3W strategy to non-invasively detect AIV from wild waterfowl in water samples. Enrichment methods, in particular ACPEG and EM, may improve detection sensitivity and facilitate virus characterization.

Keywords

Avian influenza virus; environmental surveillance; mallard (*Anas platyrhynchos*); virus concentration methods

Professional status of the speaker

PhD student

Junior scientist status

Yes, I am a junior scientist.

Registration ID

Inf26-0040

Author: NEUMANN-HEISE, Joaquin (Institute of International Animal Health/One Health, Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany)

Co-authors: HOLZER, Chiara (Department of Water Microbiology, DVGW-Technologiezentrum Wasser, Karlsruhe, Germany); PERLAS, Albert (Helmholtz AI, Helmholtz Zentrum München, Neuherberg, Germany; Helmholtz Pioneer Campus, Helmholtz Zentrum München, Neuherberg, Germany); URBAN, Lara (Helmholtz AI, Helmholtz Zentrum München, Neuherberg, Germany; Helmholtz Pioneer Campus, Helmholtz Zentrum München, Neuherberg, Germany; School of Life Sciences, Technical University of Munich, Freising, Germany; Institute for Food Safety and Hygiene, University of Zurich, Zürich, Switzerland); HARDER, Timm (Institute of Diagnostic Virology, Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany); RONDÌ, Francesca Isabel (Scienze Biotechnologiche

Veterinarie, Università degli Studi di Milano, Milano, Italy); KNAUF, Sascha (Institute of International Animal Health/One Health, Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany; Faculty of Veterinary Medicine, Justus Liebig University, Giessen, Germany); GLOBIG, Anja (Institute of International Animal Health/One Health, Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany)

Presenter: NEUMANN-HEISE, Joaquin (Institute of International Animal Health/One Health, Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany)

Session Classification: Session 4: Epidemiology and emerging viruses

Track Classification: Epidemiology and emerging viruses