

# *Influenza A Virus in Swine - Brazil*

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- Partial and complete gene sequences were generated for 48 swIAVs from 2016 to 2018.
- Sequence analysis of gene segments H1s, H1pdm, H3, N1 and N2 (swIAVs from 2009-2018).
- All H1N2 and H3N2 viruses sequenced so far have the internal gene segments derived from H1N1pdm.
- Five co-circulating clades of viruses were identified within three subtypes.
- These particular H3N2 and H1N2 swIAV clades appear to be specific to Brazil.

# Research: Antigenic Cartography

## Production of hyperimmune serum in piglets

Sera were produced against 24 IAV strains:

- 2 H1N1 (1A.3.3.2/npdm)
  - 2 H1N1 (Other-Human-1B.2/ delta2)
  - 2 H1N2 (1B2.2/delta-like)
  - 1 H1N2 (1A.3.3.2/npdm)
  - 17 H3N2
- An HA1 amino acid consensus was determined for each identified clade, and representative strains were selected for antigenic characterization.
  - Antigenic maps were generated from the HI data, using a panel of porcine sera produced against major IAV cluster and sub-clusters (provided by the NADC / USDA).
  - Antigenic distances (1 AU equals a 2-fold loss in HI titer) demonstrated significant variability among IAV within each clade, and at least 4 AU distance from putative human-seasonal precursor viruses to representative circulating swine strains (Paper on cartography of samples sequenced at Embrapa Swine and Poultry to be submitted by Sara Lopes, University of Cambridge, UK).

## Reference viruses

A/Swine/Iowa/1973 (H1N1)  
A/Swine/Kentucky/02086/2008 (H1N1)  
A/Swine/Minnesota/02011/2008 (H1N2)  
A/Swine/Illinois/00685/2005 (H1N1)  
A/Swine/Ohio/511445/2007 (H1N1)  
A/California/04/2009 (H1N1)  
  
A/Swine/Texas/4199-1/1998 (H3N2)  
A/Swine/Colorado/23619/1999 (H3N2)  
A/Swine/Minnesota/01146/2006 (H3N2)  
A/Swine/New York/A01104005/2011 (H3N2)  
A/Swine/Iowa/A01480656/2014 (H3N2)

# Ongoing and Future Projects

- Embrapa and NADC/ARS cooperation agreement
  - Increase sequencing capabilities and the phylogenetic analysis of Brazilian swine influenza virus sequences.
  - Antigenic cartography.
- New sequencing carried out in 2020 (swIAVs isolated from 2018 to 2020).
- Genomic sequences deposited at Genbank: analysis and publication of results (2016-2020).
- Continue to monitor influenza in pigs.
  - Sampling IAVs from INATA Labs (autogenous vaccine company) – many Brazilian States
  - Sampling IAVs from BRF and JBS swine farms (Vendrusculo et al.; Santiago et. al.; M.Sc. Thesis, respectively).