Canadian Swine Health Intelligence Network

Réseau canadien de surveillance de la santé porcine

Canadian Animal Health Surveillance System

CAHSS

DIVISION OF ANIMAL HEALTH CANADA

CROSS-CANADA REPORT

INFLUENZA IN SWINE: JULY-DECEMBER 2023

This work is a joint initiative of the Canadian Swine Health Information Network and the Canadian Animal Health Surveillance System. Funding for this work has been provided through the AgriAssurance Program under the Sustainable Canadian Agricultural Partnership, a federal-provincial-territorial initiative.

CROSS-CANADA REPORT
INFLUENZA IN SWINE: JULY-DECEMBER 2023

EXECUTIVE SUMMARY

This report provides a summary of available information about Influenza A virus detected in swine (IAV-S) in Canada from July to December of 2023. The purpose is to monitor for changes in swine influenza strains and clades across Canada to outmaneuver any antigenic shifts that have the potential to be highly pathogenic and disruptive to the swine industry and public health.

Based on provincial laboratory testing data, H3N2 was the most common subtype detected (97 cases, 37%), followed by H1N2 (66 cases, 25%), and then H1N1 (25 cases, 10%). For the remainder of the cases, the subtype was inconclusive, mixed, partial, or not determined (72 cases, 28%).

Based on data from the Public Health Agency of Canada's Respiratory Virus Detection Surveillance System, human cases of IAV were low for the first part of the period, then increased from the end of October onwards. The primary subtype identified in humans from July to December 2023 was H1, though subtype was not identified for most human cases.

NATIONAL IAV-S DATA: JULY-DECEMBER 2023

Consolidated national IAV-S testing data for July-December 2023, using reports from Quebec, Ontario, and Western Canada, is presented in Figure 1.

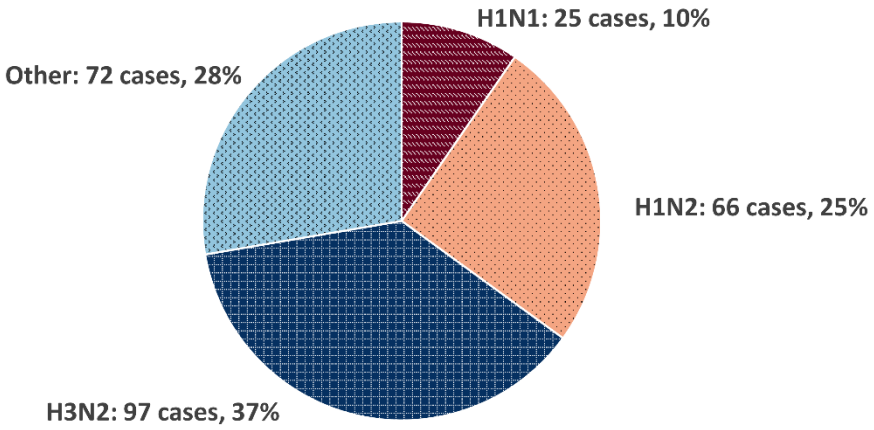


Figure 1. The consolidated laboratory reported IAV-S positive cases in Canadian swine from July to December 2023. "Other" includes cases where the subtype was inconclusive, mixed, partial, and undetermined, as these are reported differently between regions.

REGIONAL IAV-S DATA: ATLANTIC CANADA JULY-DECEMBER 2023

Atlantic Canada is a low pig density area with no federal slaughter plant. The industry exports weaned and finishing pigs primarily to Quebec and Ontario. Breeding stock comes mostly from a closed multiplication system, and PEI's import regulations require IAV-S testing and a negative result before arrival to the province. The provincial veterinary laboratories test pigs for Influenza A. In the second half of 2023, no positive animals were found clinically or through PCR. There do not appear to be any clinically active IAV-S cases in Atlantic Canada.

REGIONAL IAV-S DATA: QUEBEC JULY-DECEMBER 2023

The Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ) compiles and reports data from veterinary laboratories quarterly. IAV-S is provincially notifiable, so any positive case from a pig in Quebec is reported by the laboratories to MAPAQ. Information from sequencing data is provided by the MAPAQ animal health laboratory, the BioVet accredited laboratory, and the Centre de diagnostic vétérinaire de l'Université de Montréal (CDVUM).

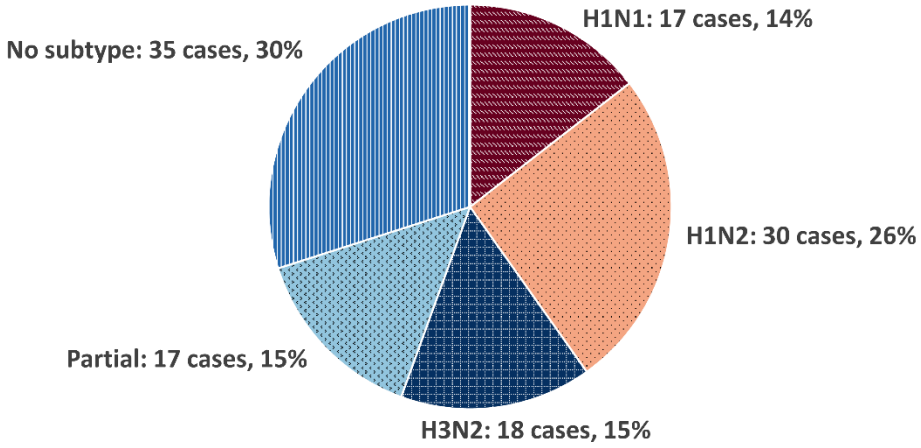


Figure 2. The laboratory reported IAV-S positive cases for Quebec swine reported by MAPAQ, BioVet, and CDVUM laboratories from July to December 2023.

REGIONAL IAV-S DATA: ONTARIO JULY-DECEMBER 2023

The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) compiles and reports IAV-S data from veterinary laboratories twice yearly. IAV-S is provincially notifiable, so any positive case from a pig in Ontario is reported by the laboratory to OMAFRA. The Animal Health Laboratory (AHL) and Ceva (Gallant Custom Laboratories) provide sequencing analysis of any positive IAV-S sample. Of note, a new clade of subtype H3N2, designated clade 2010.1, was detected in Ontario pigs for the first time in April 2023, and it remained present in detections for the July-December 2023 period.

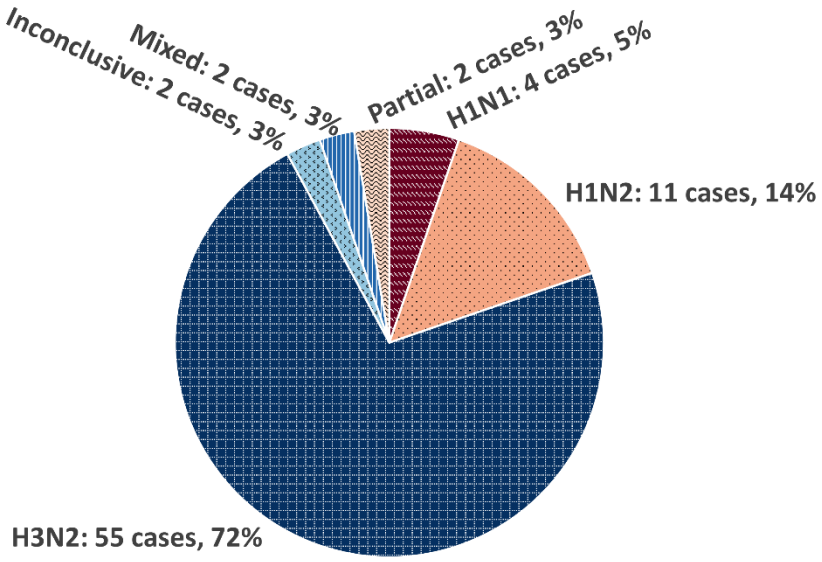


Figure 3. The laboratory reported IAV-S positive cases for Ontario swine, as reported by the AHL and Ceva laboratories, from July to December 2023.

REGIONAL IAV-S DATA: WESTERN CANADA JULY-DECEMBER 2023

The Canada West Swine Health Intelligence Network (CWSHIN) reports data from Western provincial veterinary laboratories twice yearly. IAV-S is provincially notifiable; a positive case (one premise per date) in Western Canada is captured by the provincial veterinary laboratories and shared with CWSHIN.

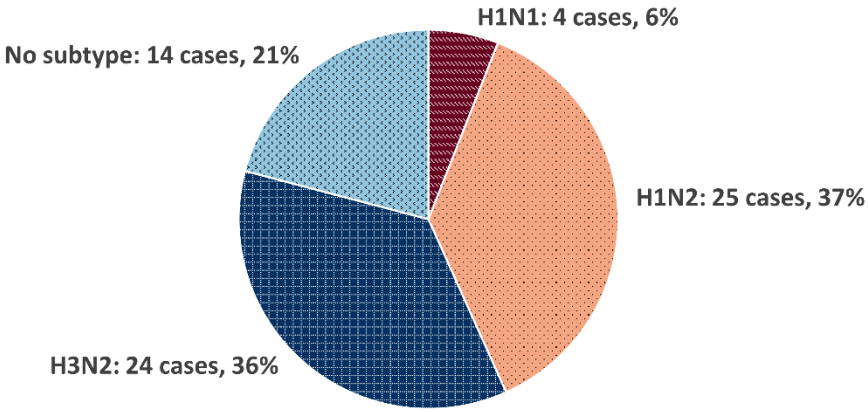


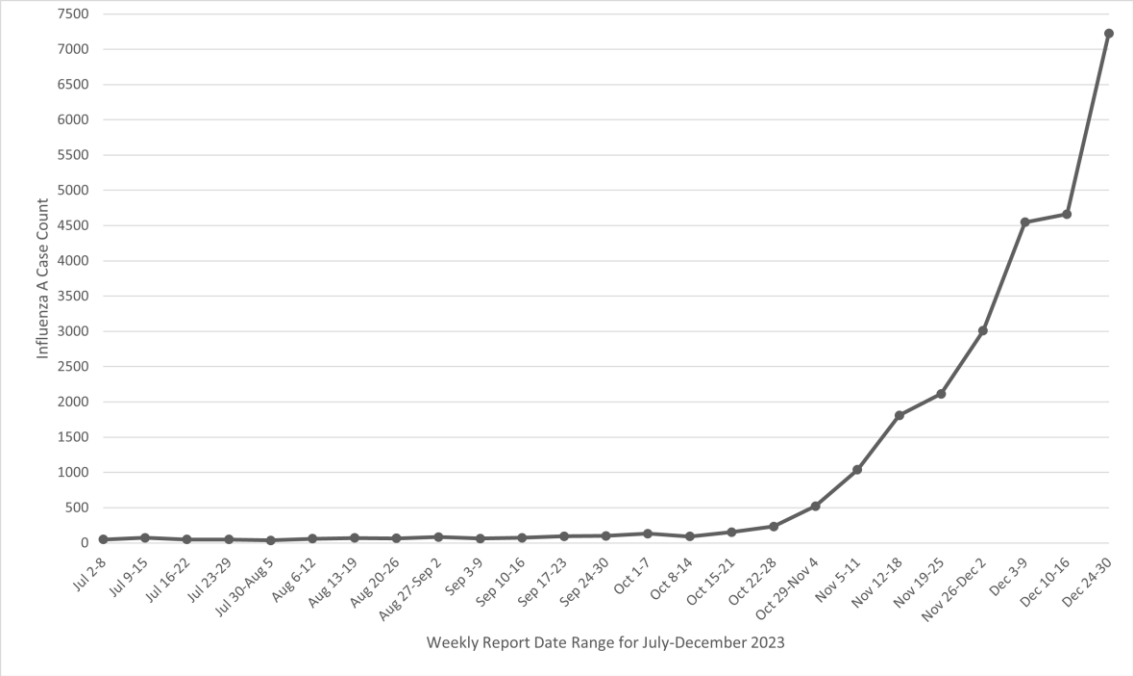
Figure 4. The laboratory reported IAV-S positive cases for Western Canadian swine reported by CWSHIN from July to December 2023.

OFFLU: IAV-S CLADES CIRCULATING IN CANADA JULY-DECEMBER 2023

The Joint World Organisation for Animal Health (WOAH)-Food and Agriculture Organization of the United Nations (FAO) Scientific Network on Animal Influenza (OFFLU) monitors IAV-S internationally. OFFLU reports detailed phylogenetic and clade analyses of the hemagglutinin (H) subtypes for IAV-S from Canada. Three IAV-S H1 clades and four IAV-S H3 clades were identified in Canada in the second half of 2023. The H1 subtype clades detected were from the 1A classical swine lineage. The H3 subtype clades detected were from human H3 seasonal virus spillover lineages 1990.4 and 2010.1. All of the H1 clades and three H3 clades are endemic in Canada. H3 clade 2010.1 was a novel detection in Canada in January-June 2023 and was detected again in July-December 2023.

IAV IN HUMANS JULY-DECEMBER 2023

Human cases of IAV remained low until the end of October 2023 and then increased for the remainder of the period, consistent with expected seasonal patterns, based on the Public Health Agency of Canada (PHAC)'s Respiratory Virus Detection Surveillance System Weekly Reports.



*Note: Data for Dec 17-23, 2023, was unavailable

Figure 5: Human IAV weekly case counts from PHAC Respiratory Virus Detection Surveillance System Weekly Reports from July to December 2023.

H1 was the predominant subtype in human IAV cases, though the subtype was not determined for most samples. A substantially larger proportion of human IAV cases were H3 in Ontario compared to other regions. H3N2 also represented a greater percentage of swine cases in Ontario compared to other regions.

Those that work directly with swine should be encouraged to stay home whenever possible if sick or experiencing clinical symptoms of Influenza. People working with infected pigs need to ensure they follow good biosecurity practices and whenever possible, wear an N95 mask, and wash their hands frequently. Any personnel that work with swine should be encouraged to get the "flu" shot for influenza yearly.

DATA SOURCES AND RESOURCES

- The Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ) summary of provincial laboratory influenza testing for July to December 2023.
- The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) Ontario Industry Update Influenza A in Swine from July to December 2023.
- The Canada West Swine Health Intelligence Network (CWSHIN) Influenza A Data for July to December 2023.
- The Joint WOAH-FAO Scientific Network on Animal Influenza (OFFLU) Swine Influenza Report July 2023 to December 2023.
- The Public Health Agency of Canada's Respiratory Virus Detection Surveillance System Weekly Reports – 2022-2023 and 2023-2024 seasons.
- Swine Health Intelligence Center

APPENDIX A: OFFLU EXPANDED INFORMATION

The OFFLU results for Canada are derived from a convenience subset of isolates from regional and academic animal health laboratories submitted to the National Microbiology Laboratory for characterization (OFFLU Jul-Dec 2023). OFFLU reports detailed phylogenetic analysis and clade analysis on the hemagglutinin (H) subtypes for IAV-S from Canada. Hemagglutinin binds viral particles to host cells, and numbers are used to differentiate subtypes (e.g., H1). Hemagglutinin subtypes are further separated into clades, designated by a sequence of numbers and letters, in order to further map influenza evolution. Three IAV-S H1 clades and four IAV-S H3 clades were identified in Canada in the second half of 2023 (table 1).

Table 1: IAV-S H1 and H3 clade case counts in Canada for July to December 2023 reported by OFFLU.

H1 Clade	Case Count
1A.1.1.3	4
1A.2	1
1A.3.3.2	3

H3 Clade	Case Count
1990.4.b2	2
1990.4.c	1
1990.4.i	3
2010.1	12

APPENDIX B: IAV IN HUMANS EXPANDED INFORMATION

Based on the Public Health Agency of Canada (PHAC)'s Respiratory Virus Detection Surveillance System Weekly Reports, H1 was the predominant subtype in human IAV cases, though the subtype was not determined for most samples. In Atlantic Canada, 18% (337/1913 IAV positive tests) of cases were H1, and <1% (5/1913 IAV positive tests) were H3. In Quebec, subtype was determined for an insufficient number of samples for meaningful analysis. In Ontario, 34% (1507/4421 IAV positive tests) of cases were H1, and 16% (711/4421 IAV positive tests) were H3. In Western Canada, 50% (6359/12692 IAV positive tests) of cases were H1, and 4% (465/12692 IAV positive tests) were H3. Of note, a substantially larger proportion of human IAV cases were H3 in Ontario compared to other regions. H3N2 also represented a greater percentage of swine cases in Ontario compared to other regions.

The relative proportion of subtypes in samples taken from July to December 2023 was comparable to that of January to June 2023, where 13% (720 tests) were H1 and 11% (594 tests) were H3.