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SWINE

NETWORK REPORT

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HIGHLIGHTS

Porcine deltacoronavirus and porcine epidemic diarrhea

Quebec conserved its negative status for diarrhea caused by porcine deltacoronavirus (PDCoV) throughout 2021. However, two farms were reported positive for porcine epidemic diarrhea (PED). Both sites regained their negative status by early 2022 thanks to the concerted efforts of producers, their veterinarians, Quebec's hog health team and MAPAQ's hog network.

African swine fever

For the fourth consecutive year, governments and the hog industry in Canada rallied their efforts to improve African swine fever (ASF) prevention and surveillance and better prepare for its incursion into the country. In 2021, this disease continued to spread to many countries in Europe and Asia. It was also introduced into the Americas, especially in the Caribbean (Dominican Republic and Haiti), while Canada still has no documented cases. When ASF is introduced into a new ter-

ritory, it has serious consequences for animal health and the economy in the affected country. Developed in 2020, the nation-wide ASF surveillance system (CanSpotASF) was renewed in 2021 and will continue the risk-based surveillance program, which includes early detection testing in approved laboratories. This program's statistics for Quebec are discussed in a different section of this report. For more information about CanSpotASF, consult the following site: <https://animalhealthcanada.ca/pillar-2-preparedness-planning>.

Small-scale hog farmer veterinarian group launched

The [small-scale hog farmer veterinarian group](#), which is associated with the hog network, was officially launched in early May 2021. The purpose of this group is to help veterinarians develop specific expertise for Quebec's small hog farmers and increase their presence on these farms. The term "small-scale hog farmers" refers to pet pig owners, people who own a few pigs, and farms with up to one hundred hogs that are not members of Pork Producers of Quebec (Éleveurs de porcs du Québec). With this in mind, MAPAQ is setting up an online discussion forum for veterinarians. Furthermore, the Ministry would like to take advantage of this group's creation to compile a list of veterinary practitioners who wish to offer their services to small-scale hog farm owners in the various regions of Quebec. These practitioners are invited to register and share their knowledge with colleagues who know less than them about the hog sector and hogs.

Sequencing added to swine flu surveillance activities

Starting in May 2021, a sequencing component was added to the swine influenza surveillance program. Thus, PCR-based positive samples of some of the cases submitted as part of this program or for a necropsy



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to MAPAQ's Animal Health Laboratory (LSA) were forwarded to the Canadian Food Inspection Agency's National Centre for Foreign Animal Disease (NCFAD) located in Winnipeg. Virus isolation and sequencing are attempted on the samples received. These analyses are provided for free thanks to funding from the federal government. Their results are presented below, in the section concerning surveillance of this disease.

Quebec's integrated animal health program

As part of the "Awareness and Prevention" component of Quebec's comprehensive animal health program (PISAQ), campaigns are carried out to inform producers about an animal health issue and guide them toward best prevention and control practices. Campaign number 5, which was launched in 2019 and concerns wise antibiotic use at hog production facilities, continued throughout 2021. Its objective is to incite producers and veterinarians to commit to reducing antibiotic use and support them in their efforts. Their involvement should help advance reduction efforts in the entire hog industry, mainly through the adoption or modification of production practices that can optimize the overall health of animals. In 2021, 57 production sites completed the preparatory step for a farm visit, which provides an overview of the diseases present at the production sites and a report on antibiotic use in the last year. As for the second step, which involves a visit to the farm, all of the sites completed it. During the visit, a veterinarian discusses the production site's health profile and antibiotic use profile and suggests practices that should be implemented or adapted in order to improve overall health on the production site and reduce medication use. Finally, seven production sites received an additional follow-up visit. A laboratory surveillance program, which offers different testing options depending on the clinical description of the health problem observed at production sites, was also added to this campaign in June 2021 in an effort to identify the pathogens present at sites in anticipation of or following a reduction in antibiotic use. Only one farm took advantage of this program during the year. It requested an investigation on respiratory problems.

Campaign number 8 continued in 2021. This campaign is linked to the "Intervention" component and focuses on porcine reproductive and respiratory syndrome (PRRS) eradication efforts on farms within a control group. Thanks to this campaign, owners of production sites that have been reported positive for PRRS can obtain assistance from a veterinarian who will help them develop an eradication plan and then visit their

sites regularly to oversee its implementation and make any necessary corrections. The decrease in the number of farms that have been reported positive for PRRS has had a significant collective impact, as this disease is recognized as one that is transmitted regionally. For instance, in 2021, 22 livestock farms developed their eradication plan and 184 implementation visits were made, i.e. more than double the number in the previous year. The increase in the number of new cases of PRRS virus in farrowing houses during the fall of 2020 had repercussions throughout 2021, which may explain the higher rate of participation in this campaign. More information about PISAQ and its various campaigns is available in French at www.mapaq.gouv.qc.ca/PISAQ.



SURVEILLANCE OF MANDATORY REPORTABLE DISEASES

Under the Regulation to designate contagious or parasitic diseases, infectious agents and syndromes, veterinarians and laboratories must report certain diseases to MAPAQ whenever they suspect their presence or can confirm it. This requirement is meant to improve the speed of intervention whenever necessary and thus preserve the health status of the herd and public health. It also seeks to improve surveillance of endemic diseases that are of concern for the community. In the hog sector, the diseases specifically concerned by this requirement are porcine deltacoronavirus, porcine epidemic diarrhea, swine dysentery, transmissible gastroenteritis, swine influenza, salmonellosis and senecavirus A. Other diseases are also concerned, such as federally reportable and notifiable diseases, including African swine influenza. Detailed information about the reports received for some of these diseases is provided above, in the section discussing highlights, or below, in the section dedicated to surveillance of these agents.

SURVEILLANCE OF CERTAIN DISEASES

Porcine deltacoronavirus and porcine epidemic diarrhea surveillance

Porcine deltacoronavirus (PDCoV) and the virus responsible for the porcine epidemic diarrhea (PED) can cause digestive clinical signs in pigs of all ages, although the mortality rate is higher in piglets. These diseases do not pose any risk to human health or food safety. To promote rapid detection of these viruses in Quebec, veterinary practitioners can submit free samples to MAPAQ's LSA as part of a surveillance program for animals that present suspicious digestive signs, whether they come from an at-risk area or have been in contact with the virus. When a hog farm is contaminated, samples can also be submitted in conjunction with this program to monitor developments in the disease until a negative status is achieved again. In 2021, out of the 261 tests performed for PDCoV and PED, 43 (16%) were positive or involved a suspected case of PED. These tests had been requested during monitoring activities carried out on sites that were reported positive (detected in 2020 or 2021). As far as PDCoV is concerned, all test results were negative.

Surveillance of these regulated diseases is also performed by reporting positive results to MAPAQ based on samples submitted to external laboratories. It should be noted that a submission may include many samples that need to be tested. For instance, in the case of PED, 68 different submissions were sent to laboratories and had 135 positive results reported to MAPAQ. As for PDCoV, 22 different test requests were sent to laboratories and had 51 positive results. Some of the positive tests for both of these viruses were obtained from samples taken in the environments of slaughterhouses or trailers used to transport hogs. It is often possible to directly link positive samples to hog shipments from Ontario, where these diseases are currently present at production sites or assembly yards. Other positive results are instead linked to meat meal, which is then excluded from the pig feed.

African swine influenza surveillance

In Quebec, an ASF surveillance project was instituted in approved laboratories within CanSpotASF in August 2020. Approved laboratories in the Canadian Animal Health Surveillance Network can perform ASF exclusion tests in order to increase vigilance. These tests are aimed at herds infected with endemic diseases that could mask ASF and slow its detection. For instance, hog cases submitted for a necropsy to MAPAQ's LSA or the Université de Montréal's Veterinary Diagnostic Centre are likely to be tested at the request of the veterinary practitioner who submitted them or the veterinary pathologist in charge of the diagnostic process. To complete the process, appropriate tissue must be sent and accompanied by information about the geographic origin of the pigs. Cases must also meet the eligibility criteria (Table 1). To view the introductory webinar and obtain more information on CanSpotASF, please consult the following webpage: www.mapaq.gouv.qc.ca/PPA.

Table 1

Clinicopathological presentations eligible to ASF testing at approved laboratories

1. Septicemia and/or multiorgan hemorrhage such as those caused by <i>E. rhusiopathiae</i> , <i>S. suis</i> , <i>S. zooepidemicus</i> , <i>A. suis</i> , <i>S. Choleraesuis</i> or other bacteria
2. Porcine reproductive and respiratory syndrome, particularly if it causes cyanosis of the skin
3. Porcine dermatitis and nephropathy syndrome (PDNS) and vasculitis caused by type 2 porcine circovirus (PCV), PCV 3 or other pathogens
4. Bloody diarrhea and necrotizing enterocolitis such as those caused by <i>Salmonella</i> spp., <i>L. intracellularis</i> , <i>B. hyodysenteriae</i> or <i>B. hamptonii</i>
5. Fibrinous pleuritis, pericarditis or hydropericardium caused by <i>G. parasuis</i> or <i>S. suis</i>
6. Mulberry heart disease
7. Splenic torsion
8. Abortion rate above historical trend for herd
9. Mortality rate above historical trend for herd

Out of a total of 264 eligible cases obtained in 2021, 110 tested cases (42%) all turned out negative. Table 2 shows the details of the results obtained per quarter. We should mention that the number of eligible cases is a theoretical number calculated at the end of the quarter, based on the reasons for submission recorded in the anamnesis and final diagnoses of pathologists. In addition, some cases that met the eligibility criteria (Table 1) were not tested for various reasons, including the absence or autolysis of the appropriate tissue.

Table 2

Results of the ASF surveillance pilot project in approved laboratories for Quebec in 2021

Period	Total number of necropsies	Number of eligible cases	Number of tested cases	
			Negatives	Positive
Quarter 1 (January-March)	262	79	28	0
Quarter 2 (April-June)	262	64	21	0
Quarter 3 (July-September)	189	51	37	0
Quarter 4 (October-December)	225	70	24	0
Cumulative results (January-December 2021)	938	264	110	0

Senecavirus A surveillance

The senecavirus A (SVA) surveillance program was stopped in 2020 because it was not being used very much. However, it could be relaunched if warranted by the situation, such as if cases are detected at production sites in Quebec. This program could then be used to confirm the status of production sites that have an epidemiological link with a confirmed case and to support sites that produce a positive result in their efforts to return to a negative status. Furthermore, PCR tests for SVA are regularly performed during hog necropsies. Finally, 29 PCR tests were performed in the necropsies conducted in 2021 and their results all turned out to be negative.

Surveillance of this regulated disease is also performed by reporting positive results to MAPAQ based on samples submitted to external laboratories. In 2021, nine positive results were reported to the Ministry. They concerned samples taken in transport trailers or on unloading docks at slaughterhouses and were all linked to hog shipments from Ontario.



Porcine respiratory and reproductive syndrome (PRRS) surveillance in the context of provincial health monitoring

PRRS is causing major economic losses in Quebec's hog sector. Furthermore, collective and regional control strategies have been implemented for this disease over a number of years. In collaboration with Pork Producers of Quebec, MAPAQ provides free testing to determine the status of production sites run by producers who participate in the provincial health monitoring project. Based on the results of these tests, actions are undertaken to stabilize the health status of pigs and protect all producers. In 2021, 1,588 PCR tests, 692 ELISA tests and 115 ELISA tests on oral fluids were performed. At the end of the year, 2,260 commercial hog production sites (> 90%) had a valid status for PRRS. For more information about this topic, visit the following site: https://vsp.quebec/wiki/doku.php?id=statistiques_sur_les_statuts_sanitaires.

The swine network also collaborates with the Laboratoire d'épidémiologie et de médecine porcine (LEMP) of the Université de Montréal's Faculty of Veterinary Medicine in conducting surveillance of the virus caused by PRRS. Charts showing the new cases of this virus in farrowing houses in Quebec are provided each quarter in reports for veterinarians. 2021 is one of the worst years in terms of PRRS since this data began to be compiled. The numerous contaminations that occurred in the fall of 2020 probably contributed to this situation in 2021. It should be noted that given the large number of hog sites located in the regions of Montérégie and Chaudière-Appalaches, many contaminations were observed there. To obtain more information about LEMP and consult the data shown in the charts, visit the following web page: <https://lemp.ca/index.php/site/page/view/surveillance>.

Swine influenza surveillance

UA program was set up to strengthen swine influenza surveillance. When veterinary practitioners suspect cases of infection caused by the virus responsible for this disease, they can submit samples to laboratories so that the virus can be detected using a PCR test for free. This program can improve knowledge on the circulation of various sub-types and strains of influenza in Quebec. If the number of diagnoses rises or more new strains are identified, veterinarians in the hog sector will be notified, especially through quarterly reports from the hog network. In addition, public health authorities are notified if a new strain is identified or if human cases are associated with it. In 2021, 362 PCR tests for type A influenza and PCR tests that characterize “H” and “N” from positive samples were performed as part of this program. In addition to data from the program administered by MAPAQ, general surveillance of this virus includes data from hog cases submitted for a necropsy. As a result, 470 additional PCR tests were performed during a necropsy for a total of 834 PCR tests performed at the LSA in 2021, compared to 686 in 2020. Out of the 834 tests, 275 were positive (33%).

To provide a comprehensive overview of influenza in Quebec, laboratories that are not under the direction of MAPAQ share surveillance data with the swine network. These include the Université de Montréal’s veterinary diagnostic centre, Biovet and Demeter laboratory. If we include MAPAQ’s data, there were 1,272 test requests in 2021. 32% of these requests ended up with a positive result for type A influenza. Sub-type H3N2 was the most frequently detected in Quebec in 2021 (84 cases), followed by sub-types H1N2 (75 cases) and H1N1 (74 cases, all types of strains considered). Table 3 shows the complete results.

Table 3

Data on swine influenza surveillance from MAPAQ’s animal health laboratory, the Université de Montréal’s veterinary diagnostic centre, Biovet and Demeter laboratory for 2021

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL 2021	TOTAL 2020
Positive, influenza A*	31	35	39	64	48	18	17	14	36	32	60	16	410 (32%)	453 (36%)
Positive, H1N1 pandemic										2	3	0	5	4
Positive, H1N1 classic										2	1	0	3	30
Positive, H1N1	6	3	4	8	12	3	4	2	8	4	8	4	66	48
Positive, H1N2	5	7	6	4	6	0	4	2	13	14	13	1	75	47
Positive, H1**	2	5	2	2	1	1	0	0	1	5	9	0	28	83
Positive, H3N2	6	5	10	18	6	2	4	6	11	4	11	1	84	65
Positive, H3N1	0	1	0	1	0	0	0	0	0	0	0	0	2	0
Positive, H3**	6	2	3	6	2	1	2	2	1	2	9	1	37	43
Positive, N1	1	1	1	2	3	1	0	0	1	4	11	3	28	14
Positive, N2	1	0	3	1	2	1	0	1	1	4	8	1	23	13
Non-sub-typed	5	11	14	24	20	16	4	1	3	3	15	12	128	124
Negative, influenza A	66	74	108	85	81	80	47	37	67	72	80	65	862 (68%)	819 (64%)
Total number of test requests	97	109	147	149	129	98	64	51	103	104	140	81	1 272 (100%)	1 272 (100%)

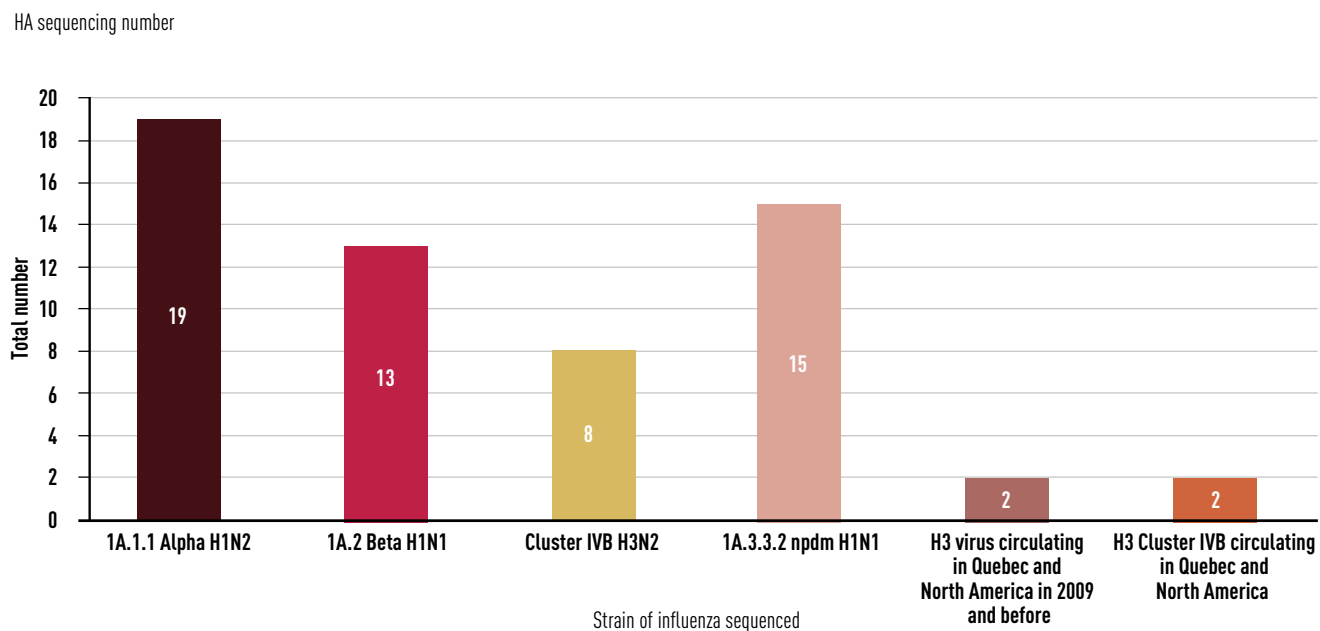
* It is possible for more than one type of influenza to be detected from the same submission.

** For certain positive submissions, only the test for the “H” type is performed.

Furthermore, a total of 59 viruses detected in 2021 were sequenced at the Canadian Food Inspection Agency's NCFAD located in Winnipeg. Figure 1 shows the total number for each identified group of strains, based on the sequence of the HA gene.

Figure 1

Total number of each strain sequenced for 2021



HA sequencing

SUMMARY RESULTS OF NECROPSIES AND BIOPSIES

This part of the report discusses the epidemiological surveillance data that was obtained following necropsies in MAPAQ's laboratories. Since submission-related practices vary particularly by region, year and disease, this data only partially reflects the health situation of the hog herd in Quebec. It concerns only submissions from veterinary practitioners who observe health problems at production sites.

For information purposes, we should mention that a submission consists in one or more tissues or animals of the same origin, collected on the same date. A submission can be subject to more than one diagnosis. In 2021, MAPAQ's animal pathology laboratories received 935 submissions for pigs. This is an increase compared to 2020 (839), but a similar number to the number in 2019 (916). In other words, activities in this sector seem to have resumed their pre-COVID-19 pandemic pace. However, it is worth mentioning that since April 1, 2021, the diagnoses established by pathologists who work for the Université de Montréal's Faculty of Veterinary Medicine in the necropsy room located in Saint-Hyacinthe are now included in the compilation of hog diagnoses. In the past, this data was not available for compilation. The number of necropsies has risen about 15% as a result. This difference in data interpretation and comparison with previous years should therefore be taken into account.

Necropsies are a heavily used diagnostic tool in the hog sector and can effectively characterize clinical problems. In this way, they contribute to an even more judicious use of medication and can help adapt prevention measures to the disease.

The following tables show the main diagnoses that were established for suckling piglets, nursery piglets and grower-finisher pigs following necropsies or biopsies performed at MAPAQ's laboratories as well as their changes since 2018. The percentages are calculated based on the number of submissions for the animal sub-category under review. The figures highlight the proportion of pathologies that were observed out of the number of submissions received by the laboratories.

Table 4

Main diagnoses of interest established based on a necropsy or biopsy, in MAPAQ's laboratories, for suckling piglets from 2018 to 2021 and percentage of the number of submissions for this animal sub-category

Number of submissions – Suckling piglets	179	139	183	182
Diagnosis	2021	2020	2019	2018
Diarrhea caused by rotavirus	69 (39%)	53 (38%)	69 (38%)	52 (29%)
Arthritis, polyarthritis and polysynovitis	39 (22%)	41 (29%)	37 (20%)	45 (25%)
Exudative epidermatitis	21 (12%)	16 (12%)	20 (11%)	31 (17%)
Porcine reproductive and respiratory syndrome	16 (9%)	10 (7%)	17 (9%)	10 (5%)
Other <i>E. coli</i> infections	11 (6%)	10 (7%)	9 (5%)	4 (2%)
<i>E. coli</i> diarrhea	11 (6%)	25 (18%)	25 (14%)	23 (13%)
Coccidiosis	8 (4%)	2 (1%)	4 (2%)	6 (3%)
<i>A. suis</i> infection	8 (4%)	6 (4%)	6 (3%)	7 (4%)
Rhinitis (other than that with inclusion bodies)	6 (3%)	2 (1%)	16 (9%)	5 (3%)
<i>S. suis</i> infection	6 (3%)	6 (4%)	9 (5%)	16 (9%)
Infection caused by atypical porcine pestivirus	2 (1%)	3 (2%)	2 (1%)	1 (0,6%)

Table 5

Main diagnoses of interest established based on a necropsy or biopsy, in MAPAQ's laboratories, for nursery piglets from 2018 to 2021 and percentage of the number of submissions for this animal sub-category

Number of submissions – Nursery piglets	349	345	349	341
Diagnostic	2021	2020	2019	2018
Porcine reproductive and respiratory syndrome	118 (34%)	86 (25%)	90 (26%)	80 (23%)
Diarrhea caused by rotavirus	81 (23%)	128 (37%)	97 (28%)	105 (31%)
Swine influenza	61 (18%)	58 (17%)	70 (20%)	64 (19%)
<i>E. coli</i> diarrhea	46 (13%)	70 (20%)	71 (20%)	75 (22%)
Arthritis, polyarthritis and polysynovitis	39 (11%)	31 (9%)	22 (6%)	16 (5%)
Rhinitis with inclusion bodies	38 (11%)	35 (10%)	37 (11%)	29 (9%)
<i>S. suis</i> infection	35 (10%)	55 (16%)	42 (12%)	56 (16%)
Rhinitis (other than that with inclusion bodies)	33 (10%)	33 (10%)	41 (12%)	27 (8%)
Salmonellosis	28 (8%)	47 (14%)	49 (14%)	39 (11%)
<i>M. hyorhinis</i> infection	28 (8%)	30 (9%)	26 (7%)	30 (9%)
Porcine circovirus	26 (8%)	25 (7%)	25 (7%)	15 (4%)

Table 6

Main diagnoses of interest established based on a necropsy or biopsy, in MAPAQ's laboratories, for grower-finisher pigs from 2018 to 2021 and percentage of the number of submissions for this animal sub-category

Number of submissions – Grower-finisher pigs	314	278	308	256
Diagnostic	2021	2020	2019	2018
Porcine reproductive and respiratory syndrome	109 (35%)	116 (42%)	96 (31%)	100 (39%)
Enzootic pneumonia (<i>M. hyopneumoniae</i>)	47 (13%)	53 (19%)	35 (11%)	34 (13%)
Swine influenza	47 (13%)	52 (19%)	49 (16%)	37 (14%)
Tracheitis	38 (12%)	49 (18%)	30 (10%)	23 (9%)
Porcine circovirus	36 (11%)	27 (10%)	15 (5%)	20 (8%)
Arthritis, polyarthritis and polysynovitis	25 (8%)	11 (4%)	25 (8%)	16 (6%)
<i>S. suis</i> infection	15 (5%)	17 (6%)	18 (6%)	18 (7%)
<i>A. suis</i> infection	15 (5%)	16 (6%)	17 (6%)	16 (6%)
Porcine pleuropneumonia (<i>A. pleuropneumoniae</i>)	13 (4%)	17 (6%)	7 (2%)	5 (2%)
Glasser's disease	12 (4%)	9 (3%)	10 (3%)	6 (2%)