

# SWINE NETWORK

## REPORT

2020



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## Highlights

### COVID-19 and Swine Health

It goes without saying that 2020 was deeply affected by COVID-19. This human disease, caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2), was fraught with consequences as it plunged the world into a pandemic requiring extensive health measures. One of these consequences relates to food self-sufficiency, including animal farming, to compensate for disruptions in a variety of food supply chains. A growing popularity of small backyard pig farms has been observed. These animals remain susceptible to major diseases however, increasing risks to public health and the pork industry. In addition, veterinary services are ill prepared for this practice. As a result, various tools have been developed in 2020 and will be implemented in 2021 to ensure swine health surveillance and to provide better support to these small swine farmers.

COVID-19 has also had a direct impact on swine health. Human outbreaks of COVID-19 in slaughterhouses forced companies to implement health measures that slowed the rate of slaughter. Some even had to stop all activities for varying stretches of time to curb viral transmission among workers. Measures that reduced the province's slaughter capacity increased animal density in finishing units. In some farms, this may have compromised proper cleanout and appropriate hygiene measures. As batches of pigs entering finishing units crossed paths with batches heading to slaughter, washing and disinfection sometimes proved impossible. This prevented a break in disease transmission and increased the risk of infection on the farms. Veterinary practitioners reported problems in controlling several conditions, as well as an increase in mortality, particularly in the fourth quarter of 2020.





## Porcine Epidemic Diarrhea and Porcine Deltacoronavirus (PEDV & PDCoV)

In 2019, Québec experienced its first cases of porcine deltacoronavirus diarrhea (PDCoV), but by March 2020, the province had regained its negative status. During the year, porcine epidemic diarrhea (PED) was the more prevalent of the two on Québec farms. A total of nine farms were found to be positive for PED. However, seven regained their negative status before the beginning of 2021, thanks to the concerted efforts of farmers and their veterinarians, the *Équipe québécoise de santé porcine* and the MAPAQ swine network. The surveillance section provides more details on the clinical situation on these farms.

## Swine Dysentery

Swine dysentery is considered rare these days. Its transmission is highly undesirable: cases detected are carefully investigated to ensure the implementation of appropriate control measures. In February, a case of *Brachyspira hyodysenteriae* dysentery was confirmed in a self-renewing farrow-to-finish operation in Chaudière-Appalaches. Approximately 70% of the pigs suffered from diarrhea, which was mostly yellow. However, in about 20% of animals, the diarrhea was red. Several animals were submitted for necropsy, and gross, histological and PCR examinations confirmed the diagnosis. An antibiotic treatment stabilized the herd.

The same month, two cases of *Brachyspira hamptonii* dysentery were detected in feedlots in the Eastern Townships. There was an epidemiological link between the two cases. Grey, pink or red diarrhea was observed; the pigs were minimally affected and no deaths ensued. In both cases, faeces were submitted for PCR analysis and the results were positive for *Brachyspira* spp. Sequencing confirmed it was *B. hamptonii*. Measures were implemented to eradicate the bacteria, but despite intensive washing, disinfection, drying and heating of the buildings, the process could not be successfully completed in 2020. While several cases of *B. hamptonii* have been detected in the past in Western Canada, this is only the second occurrence in Québec.



## African Swine Fever

For three years running, Canadian governments and the swine industry have mobilized to improve prevention and surveillance of African swine fever (ASF) and to be prepared should it surface in the country. The ASF threat has been intensifying globally since 2018 and has serious animal health and economic consequences in affected countries. Canada has escaped it so far. The swine surveillance network developed CanSpotASF, in 2020, a cross-country surveillance system for ASF. Its primary objective is to strengthen our detection capacity should the disease enter Canada. The secondary objective is to reinforce the fact that Canada has a negative status for ASF. This enhanced surveillance will ultimately target three broad categories of swine populations:

1. commercial indoor swine operations;
2. smallholder, organic and captive wild boar;
3. wild pigs.

CanSpotASF is designed as a toolbox containing several measures that can be implemented depending on the region and swine population. Implemented in a progressive and prioritized manner, the system will be based on risk and logistical feasibility. Regulatory passive surveillance is already in place, with mandatory notification of any suspicion or confirmation of ASF cases to the Canadian Food Inspection Agency (CFIA) in Canada and MAPAQ in Québec. The first tool consists of risk-based early detection tests performed in approved laboratories. More details on the implementation of this pilot project are provided in the ASF surveillance section.

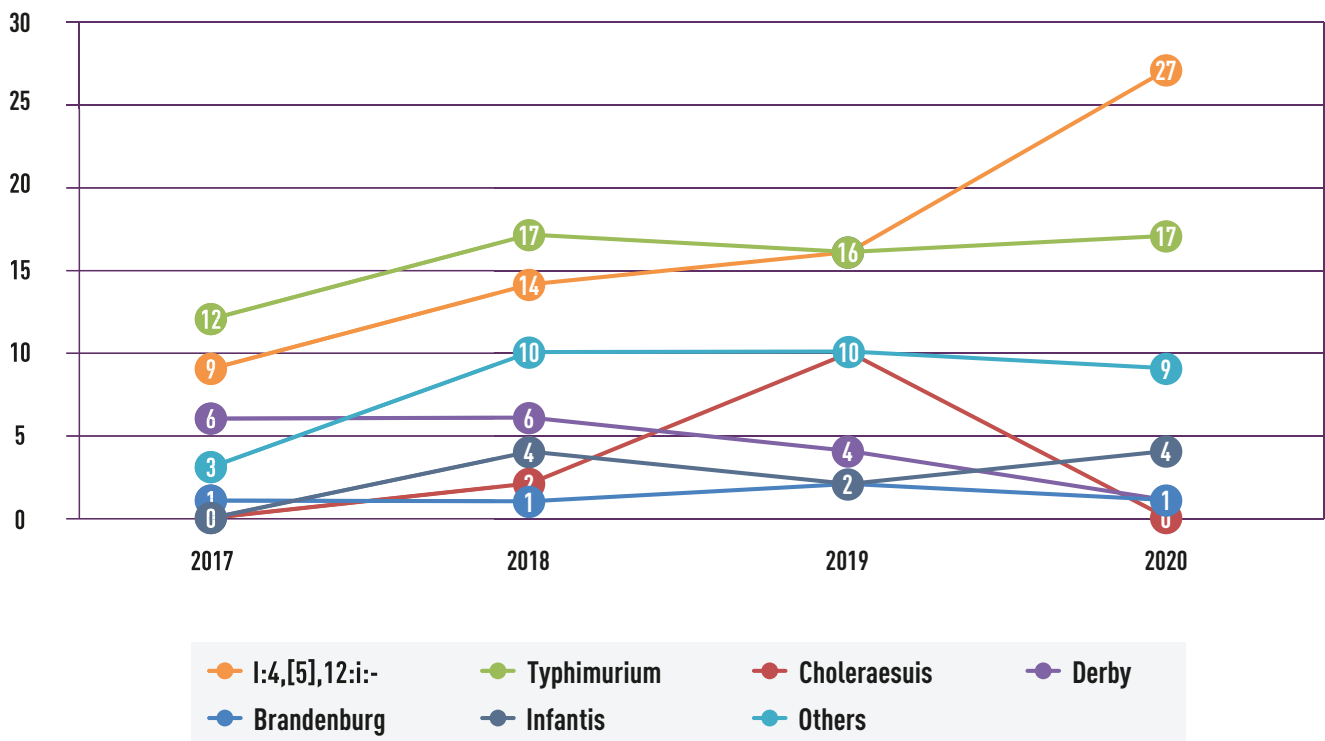


## Salmonellosis

Throughout the year, the swine network compiles the number of cases for each Salmonella serotypes diagnosed by laboratory necropsy. In 2020, serotype Typhimurium and the monophasic variant of Typhimurium (1:4,[5],12:1:-) were the dominant ones, as illustrated in chart 1 next page. The monophasic variant causes less severe lesions, but is of particular concern to swine and public health because of its multiple antibiotic resistance.

Chart 1

Salmonella serotypes identified in salmonellosis cases diagnosed by the Québec Animal Health Laboratory each year.



## Teschovirus

Porcine teschovirus can cause a highly virulent neurologic disease (teschen disease) or a milder form (talfan disease). The former is a notifiable disease and must be immediately reported to the CFIA and MAPAQ. In October 2020, a necropsy diagnosed a case of teschovirus and sapelovirus encephalomyelitis in nursery piglets. The history indicated a staggering gait. PCR tests were positive for both viruses, and compatible lesions were observed. Pathologically, teschovirus tends to affect the lumbar regions while sapelovirus tends to attack the cranial regions, which would be consistent with clinical signs observed in the forelimbs for the latter. The case was reported to the CFIA, and a risk assessment was conducted to determine whether it was Teschen disease. Given the clinical presentation, this diagnosis was ruled out. The previous detection of teschovirus in Québec was in 2015.

## Québec's Integrated Animal Health Program

The Québec Integrated Animal Health Program (PISAQ) runs awareness and prevention campaigns to inform farmers about key animal health topics and to convey the importance of good prevention and control practices. A campaign on the judicious use of antibiotics in pigs was launched in May 2019. It encouraged farmers and veterinarians to reduce antibiotic usage and assisted them in doing so, an effort that should benefit the entire swine industry, by specifically adopting or modifying production practices that optimize the overall health of the animals. In 2020, 73 sites completed the farm visit preparations, examining farm diseases and antibiotic use over the past year. All but one of them have completed the second step, the veterinarian visit, and 16 sites have benefited from an additional follow-up visit.

A new PISAQ campaign was launched in 2020. Part of the intervention program component, it focuses on the eradication of porcine respiratory and reproductive syndrome (PRRS) in select control group farms. Hence, a producer whose farm is positive for PRRS gets veterinary support to develop an eradication plan, including regular implementation monitoring visits to highlight corrections as needed. The decrease of PRRS positive farms has a significant overall impact since the disease is known for its regional transmissions. In 2020, 24 sites registered to be part of this PISAQ process. They developed their eradication plans during the year, and 79 implementation visits were carried out. In the fall, new infections of PRRS increased in maternity wards, which resulted in further program uptake. Visit [www.mapaq.gouv.qc.ca/PISAQ](http://www.mapaq.gouv.qc.ca/PISAQ) for more information about the program and the campaigns.





## Surveillance of Mandatory Reportable Diseases

Under a [provincial regulation](#), veterinarians and laboratories must report certain diseases to MAPAQ when their presence is suspected or confirmed. This mandatory reporting contributes to a speedy intervention, if required, and helps avoid issues with the herd's sanitary status and public health. It is also intended to improve the surveillance of endemic diseases of concern to the community. For the swine industry, they include porcine deltacoronavirus, porcine epidemic diarrhea, swine dysentery, transmissible gastro-enteritis, influenza, salmonellosis and senecavirus A. The highlights or the surveillance sections contain more information on reported cases.

### Surveillance of Specific Diseases

#### Porcine Epidemic Diarrhea and Porcine Deltacoronavirus (PEDV & PDCoV)

Porcine epidemic diarrhea and porcine deltacoronavirus viruses can cause clinical digestive signs in pigs of all ages, although the mortality rate is higher in piglets. These diseases do not pose a risk to human health or food safety. To promote rapid detection of the virus, veterinary practitioners can submit samples at no charge to MAPAQ's Animal Health Laboratory (LSA) as part of a surveillance program. Veterinarians can submit samples when animals present with suspect digestive signs, if they come from a risk zone or if they may have been in contact with the virus. Samples from contaminated production sites may also be submitted under this program to follow the evolution of the disease until it returns to a negative status. In addition, weekly environmental monitoring for PEDV and PDCoV is conducted in the Complexe de diagnostic et d'épidémiologie vétérinaires du Québec and the Québec LSA's sample reception area and necropsy landing room. Samples collected are also analyzed as part of the program. In 2020, 1,010 PEDV tests (56 positive) and 995 PDCoV tests (all negative) were conducted. In comparison, only 195 tests for each virus were performed in 2019. This increase comes from the large number of tests performed as part of epidemiological investigations and case follow-ups associated with the two outbreaks described below.

On March 12, a Québec slaughterhouse detected PEDV in a transport trailer. Trace back activities identified three positive sites. Two other slaughterhouses also received animals from these sites. As a result, dozens of shipments of pigs possibly exposed to the virus from deliveries to the slaughterhouse were identified and the industry contacted those involved asking them to increase surveillance. As a result, some farms conducted tests, all of which were negative. Of the three contaminated sites – one nursery and two finishing units – only the nursery showed mild signs of diarrhea. Pork producers need to be particularly cautious when diarrhea appears on their farms; they should also pay attention to pigs arriving from provinces where this virus is present. This case reiterates the importance of surveillance at the slaughterhouse. In the end, tests were conducted at nearly 100 sites that had an epidemiological link to the three positive farms and the results were all negative.

A second outbreak of PEDV began with the detection of a case in an Eastern Townships finishing site on April 29. Three other cases were subsequently detected in a Montérégie nursery and a finishing unit, as well as in another Eastern Townships finishing unit. Animal transport linked all these cases. Two other Eastern Townships feedlots were declared positive as a result of a shipment of pigs from the contaminated nursery.



External laboratories contribute to the monitoring of regulated diseases by reporting positive results to MAPAQ. In the case of PEDV, these laboratories reported 242 positive results from 120 different submissions. As for PDCoV, 10 submissions generated 14 positive results. In both cases, some of the positive tests were obtained from environmental samples taken in slaughterhouses or in trailers used in transport. Positive samples are often directly linked to shipments of pigs from Ontario, as the diseases are currently present on farms or in assembly yards. Other positive results are linked to animal bone meal, which is then excluded from feed preparation. Other results came from farms contaminated in 2019. In all cases, MAPAQ ensures the producer, with the *Équipe québécoise de santé porcine*, take actions to eradicate the virus and reduce the risk of further contamination in Québec.

## African Swine Fever

In Québec, the pilot project for African swine fever surveillance in approved laboratories of CanSpotASF began on August 10, 2020. Approved laboratories that are part of the Canadian Animal Health Surveillance Network can perform ASF rule-out tests. These tests are aimed at herds with endemic diseases that can mask ASF and delay its detection. Cases submitted to MAPAQ's LSA or to the Centre de diagnostic vétérinaire de l'Université de Montréal for necropsy are likely to be analyzed at the request of the submitting veterinary practitioner or of the veterinary pathologist responsible for the diagnostic process. However, submissions must include appropriate tissue samples, have information on the pig's origin and meet the eligibility criteria (Table 1). On October 28, 2020, a French webinar was held to explain how CanSpotASF works and to launch the first tool. To view the webinar or for more information on CanSpotASF, please visit: [www.mapaq.gouv.qc.ca/PPA](http://www.mapaq.gouv.qc.ca/PPA).



**Table 1****Clinicopathological presentations eligible for additional 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> and other bacteria
2	Porcine respiratory and reproductive syndrome, especially if it causes cyanosis of the skin
3	Porcine dermatitis and nephropathy syndrome (PDNS) and vasculitis caused by porcine circovirus (PCV) type 2, PCV 3 or other pathogens
4	Hemorrhagic diarrhea and necrotizing enterocolitis such as those caused by <i>Salmonella spp.</i> , <i>L. intracellularis</i> , <i>B. hyodysenteriae</i> or <i>B. hampsonii</i>
5	Fibrinous pleuritis, pericarditis or hydropericardium caused by <i>H. 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

As part of this pilot project, 23 cases were tested in 2020, all of which were negative. Table 2 breaks the results down by quarter. It should be noted that the number of eligible cases is a theoretical number calculated at the end of the quarter based on submission reasons recorded in the history and the pathologist's final diagnosis. In addition, there are a number of reasons why a seemingly eligible case may not be tested, such as absence or autolysis of appropriate tissue.

**Table 2****ASF surveillance pilot project results from Québec's approved laboratories in 2020**

Period	Total number of necropsies	Number of eligible cases	Number of cases tested	
			Negatives	Positive
Quarter 3 (August-September)	130	42	8	0
Quarter 4 (October-December)	262	143	15	0
<b>Cumulative (August 2020-December 2020)</b>	<b>392</b>	<b>185</b>	<b>23</b>	<b>0</b>

**Senecavirus A**

The Senecavirus A (SVA) surveillance program was discontinued in 2020 due to low usage. However, it could resume if warranted, should cases be detected in Québec, for instance. It would then be used to confirm the status of farms with an epidemiological link to a confirmed case and to help positive farms regain a negative status. PCR tests for SVA are regularly performed during pig necropsies. In 2020, 28 PCR tests were performed and the results were all negative.

## Provincial Health Surveillance for Porcine Respiratory and Reproductive Syndrome (PRRS)

Porcine respiratory and reproductive syndrome (PRRS) causes significant economic losses in Québec's hog industry. Joint and regional control strategies have been in place for several years. Working with Les Éleveurs de porcs du Québec, MAPAQ offers free testing to determine the status of production sites participating in the provincial health surveillance project. In 2020, 1,079 PCR tests, 548 ELISA tests and 120 ELISA tests on oral fluids were conducted. The program was interrupted from March 17 to June 22 because of the COVID 19 pandemic. At the end of the year, 2,351 swine sites had a valid PRRS status.

The swine network also works with the Laboratoire d'épidémiologie et de médecine porcine (LEMP) of the Veterinary Medicine Faculty for PRRS virus surveillance. Charts describing new infections in Québec's sow farrowing sites are published quarterly in the veterinarian's reports. After a fairly stable start to 2020, the second half of the year was quite eventful. (The PRRS "year" runs from July through June.) The beginning of 2020-2021 compares to the worst year (2015-2016) since PRRS data gathering began. Numerous infections were recorded from September to November in Montérégie and Chaudière-Appalaches, two high density pig farming regions. At least five different groups of strains were involved in these infections. These had already been detected in Québec in the recent past. For more information on LEMP or to consult the data charts:

<https://www.medvet.umontreal.ca/lemp/index.php/site/index>.

## Swine Influenza

Geared toward enhanced surveillance, the Swine Influenza Surveillance Program invites veterinary practitioners who suspect cases of infection caused by this virus to submit samples to laboratories for free PCR testing. This data improves knowledge regarding the various subtypes and strains of influenza circulating in Québec. The swine network then reports on the identification of new strains or the increase in cases, namely in its quarterly veterinarian report. This information also serves to notify public health authorities in the event of a new strain or if there are any associated human cases. In 2020, 230 type A influenza PCR tests were conducted under this program, as well as PCR tests for H and N characterization from positive samples. In addition to the data from the surveillance program administered by MAPAQ, overall surveillance of this virus includes data from swine cases submitted for necropsy, which accounts for another 456 for a total of 686 PCR tests performed in 2020. Of these, 211 were positive (31%).

To gather an overall influenza picture in the province, laboratories outside of MAPAQ responsibility share surveillance data with the swine network. They are the Centre de diagnostic vétérinaire de l'Université de Montréal, Biovet and the Demeter Laboratory. Combined with the MAPAQ data, there were 1,272 requests for tests in 2020. Of these, 36% were positive for type A influenza. The H1N2 subtype, which is regularly detected in Western Canada, became more prevalent in 2020 (47 detections), while there were only four detections of this subtype in 2019. Table 3 presents the complete results.

**Table 3**

**2020 Swine Influenza Surveillance Data  
(MAPAQ Animal Health Laboratory, University of Montréal Veterinary Diagnostic Centre, Biovet and Demeter Laboratory)**

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
<b>Positive for influenza A*</b>	<b>49</b>	<b>38</b>	<b>55</b>	<b>39</b>	<b>46</b>	<b>34</b>	<b>20</b>	<b>10</b>	<b>31</b>	<b>44</b>	<b>53</b>	<b>34</b>	<b>453 (36 %)</b>
Positive pandemic H1N1	1	2	1	-	-	-	-	-	-	-	-	-	4
Positive classical H1N1	11	11	8	-	-	-	-	-	-	-	-	-	30
Positive H1N1	-	-	-	8	9	4	4	3	5	5	10	0	48
Positive H1N2	3	2	8	7	7	5	2	3	2	1	3	4	47
Positive H1**	13	3	10	5	7	6	0	1	7	8	13	10	83
Positive H3N2	8	3	5	5	7	9	4	2	3	10	5	4	65
Positive H3**	5	1	6	2	5	4	0	2	3	6	4	5	43
Positive N1	1	0	1	0	2	1	0	0	0	4	4	1	14
Positive N2	1	0	1	0	0	2	0	1	0	3	1	4	13
No subtype	9	16	18	13	9	8	2	0	9	15	13	12	124
<b>Negative for influenza A</b>	<b>115</b>	<b>88</b>	<b>95</b>	<b>96</b>	<b>46</b>	<b>57</b>	<b>31</b>	<b>26</b>	<b>48</b>	<b>72</b>	<b>80</b>	<b>65</b>	<b>819 (64 %)</b>
<b>Total number of tests</b>	<b>164</b>	<b>126</b>	<b>150</b>	<b>135</b>	<b>92</b>	<b>91</b>	<b>51</b>	<b>36</b>	<b>79</b>	<b>116</b>	<b>133</b>	<b>99</b>	<b>1 272 (100 %)</b>

\* One request can generate more than one influenza type.

\*\* For some positive submissions, only the analysis to determine the H is performed.

### Pathogenic *Escherichia coli*

The swine network also works with the OIE Reference Laboratory for *Escherichia coli* located at the Veterinary Medicine Faculty (EcL) to monitor pathogenic *E. coli* strains in swine in Québec. A quarterly report outlines the presence of different pathotypes and virotypes as well as antibiotic resistance. This year, new antibiotic resistance information was added to the surveillance table: in addition to enrofloxacin, there is now susceptibility data for trimethoprim-sulfamethoxazole (TMS), neomycin, gentamicin, spectinomycin, ceftiofur, florfenicol and apramycin. The team also produces an annual report to track the evolution of *E. coli* and its antibiotic resistance year over year. The document is distributed to veterinarian members of the Association des vétérinaires en industrie animale du Québec.



## Necropsy and Biopsy Review

This section presents necropsy epidemiological surveillance data from MAPAQ laboratories. Since submission practices vary according to region, year and disease, the data only partially reflect Québec's swine herd health status. The data only include submissions from practising veterinarians confronted with health problems on farms.

A submission consists of one or more tissues or animals from the same source, collected on the same date. A submission may generate more than one diagnosis. In 2020, MAPAQ animal pathology laboratories received 839 swine submissions. This is a decrease compared to 2019 (916), but this number is similar to the 2018 (841) and 2017 (802) data. The observed decrease may be partly due to the COVID-19 pandemic response when some activities slowed down because of lockdowns. Necropsy is a widely used diagnostic tool in the swine industry, one that allows for the proper characterization of clinical problems. It also contributes to the judicious use of drugs and a disease-based adaptation of preventive measures.

The following tables show the main diagnosis made in suckling piglets, nursery piglets and finishers as a result of necropsies or biopsies in MAPAQ laboratories, and trends since 2018. The percentages are based on the number of submissions for the animal subcategory under study. These calculations make it possible to highlight the importance of the pathologies that were observed based on the number of submissions that the laboratory received.

**Table 4**

**Main diagnosis of interest from necropsy or biopsy conducted in MAPAQ laboratories in suckling piglets from 2018 to 2020 and submission percentage for this animal subcategory**

Number of Submissions – Suckling Piglets	139	183	182
Diagnosis	2020	2019	2018
Rotavirus diarrhea	53 (38 %)	69 (38 %)	52 (29 %)
Arthritis, polyarthritis and polysynovitis	41 (29 %)	37 (20 %)	45 (25 %)
<i>E. coli</i> diarrhea	25 (18 %)	25 (14 %)	23 (13 %)
Exudative epidermatitis (greasy pig disease)	16 (12 %)	20 (11 %)	31 (17 %)
Other <i>Escherichia coli</i> infections	10 (7 %)	9 (5 %)	4 (2 %)
Porcine reproductive and respiratory syndrome	10 (7 %)	17 (9 %)	10 (5 %)
Swine Influenza	7 (5 %)	13 (7 %)	5 (3 %)
<i>Actinobacillus suis</i> infection	6 (4 %)	6 (3 %)	7 (4 %)
<i>Streptococcus suis</i> infection	6 (4 %)	9 (5 %)	16 (9 %)
Glasser's disease	4 (3 %)	4 (2 %)	4 (2 %)
Atypical swine pestivirus infection	3 (2 %)	2 (1 %)	1 (0,6 %)
Rhinitis (including inclusion body rhinitis)	3 (2 %)	19 (10 %)	10 (5 %)



**Table 5**

Main diagnosis of interest from necropsy or biopsy conducted in MAPAQ laboratories in nursery piglets from 2018 to 2020 and submission percentage for this animal subcategory

Number of submissions – Nursery piglets	345	349	341
Diagnosis	2020	2019	2018
Rotavirus diarrhea	128 (37 %)	97 (28 %)	105 (31 %)
Rhinitis (including inclusion body rhinitis)	88 (26 %)	78 (22 %)	60 (18 %)
Porcine reproductive and respiratory syndrome	86 (25 %)	90 (26 %)	80 (23 %)
<i>E. coli</i> diarrhea	70 (20 %)	71 (20 %)	75 (22 %)
Swine Influenza	58 (17 %)	70 (20 %)	64 (19 %)
<i>Streptococcus suis</i> infection	55 (16 %)	42 (12 %)	56 (16 %)
Salmonellosis	47 (14 %)	49 (14 %)	39 (11 %)
Arthritis, polyarthritis and polysynovitis	31 (9 %)	22 (6 %)	16 (5 %)
<i>Mycoplasma hyorhinis</i> infection	30 (9 %)	26 (7 %)	30 (9 %)
Swine Circovirus	25 (7 %)	25 (7 %)	15 (4 %)
Coccidiosis	19 (6 %)	13 (4 %)	10 (3 %)
Sapelovirus encephalomyelitis	1 (0,3 %)	–	1 (0,3 %)

**Table 6**

Main diagnosis of interest from necropsy or biopsy conducted in MAPAQ laboratories in finishers from 2018 to 2020 and submission percentage for this animal subcategory

Number of submissions – Feeder hogs	278	308	256
Diagnosis	2020	2019	2018
Porcine reproductive and respiratory syndrome	116 (42 %)	96 (31 %)	100 (39 %)
Enzootic pneumonia ( <i>M. hyopneumoniae</i> )	53 (19 %)	35 (11 %)	34 (13 %)
Swine Influenza	52 (19 %)	49 (16 %)	37 (14 %)
Tracheitis	49 (18 %)	30 (10 %)	23 (9 %)
Swine Circovirus	27 (10 %)	15 (5 %)	20 (8 %)
<i>E. coli</i> diarrhea	17 (6 %)	7 (2 %)	5 (2 %)
<i>Streptococcus suis</i> infection	17 (6 %)	18 (6 %)	18 (7 %)
<i>Actinobacillus suis</i> infection	16 (6 %)	17 (6 %)	16 (6 %)
<i>Mycoplasma hyorhinis</i> infection	15 (5 %)	20 (6 %)	26 (10 %)
Salmonellosis	14 (5 %)	9 (3 %)	13 (5 %)
Swine dysentery	3 (1 %)	–	1 (0,4 %)
Sapelovirus encephalomyelitis	2 (0,7 %)	5 (2 %)	2 (0,8 %)