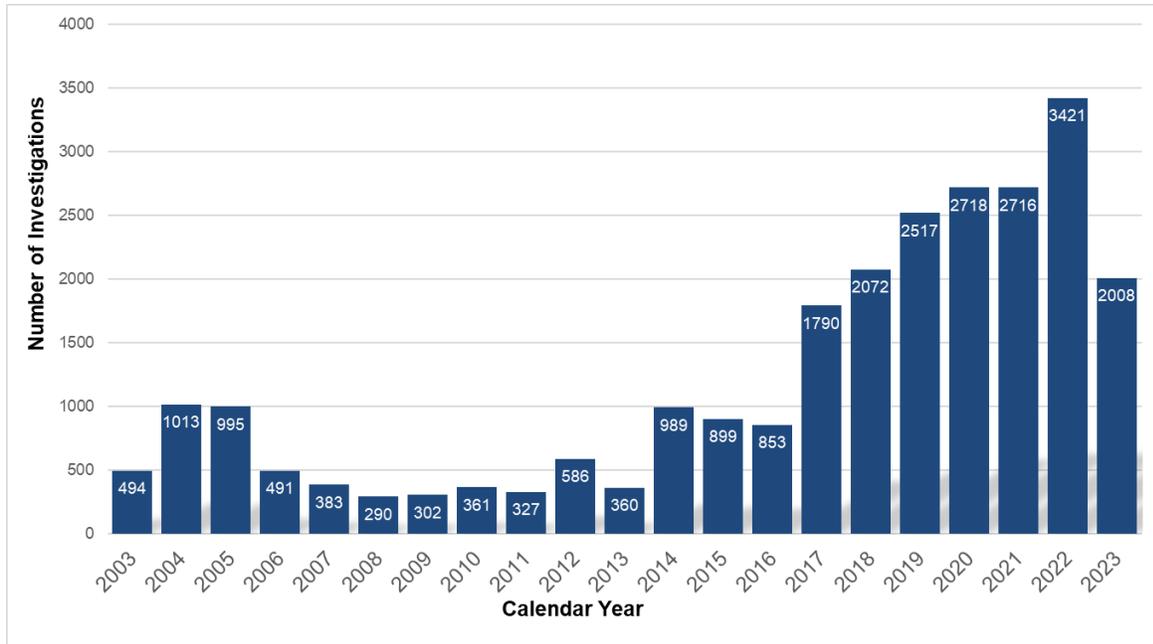


# Calendar Year 2023 Update: FAD Investigation Report

## SUMMARY OF RECENT FAD INVESTIGATIONS

In the past 21 years, there have been over 25,000 investigations conducted for possible foreign animal disease (FAD) or emerging disease incidents throughout the United States, ranging from a yearly low of 290 investigations in calendar year 2008 to a high of 3,421 investigations in calendar year 2022 (Figure 1).

**Figure 1: FAD Investigations from 2003 to 2023**



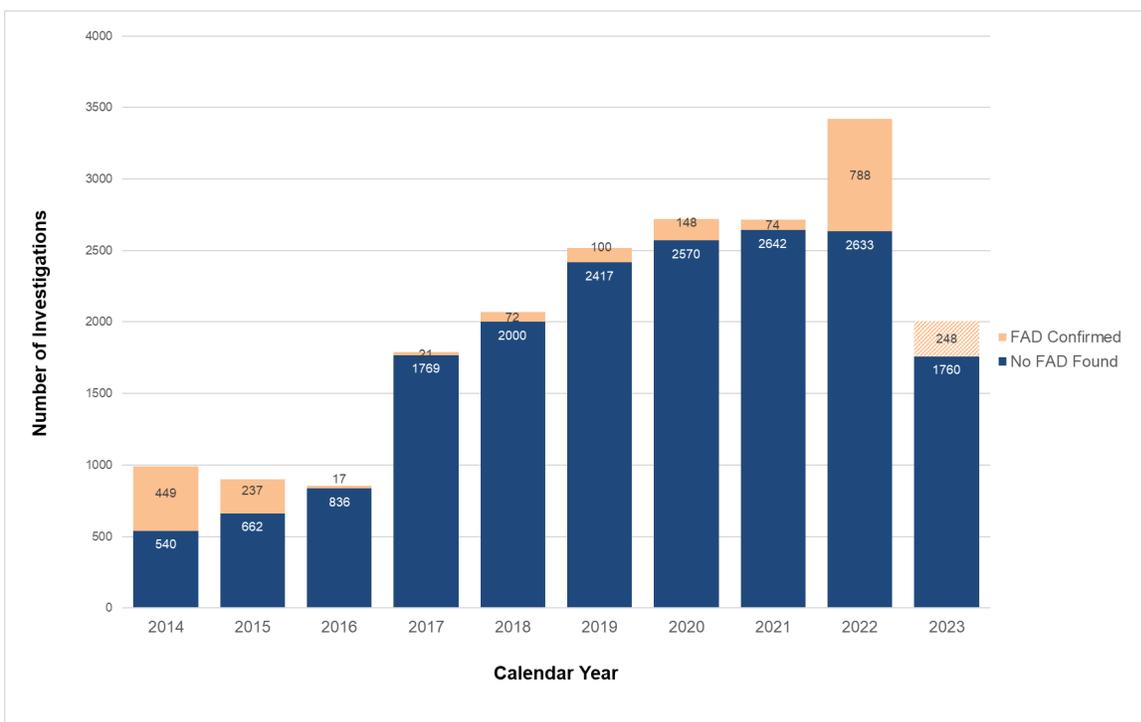
This summary of FAD investigations was compiled from annual animal health reports in the United States published by Veterinary Services (VS) of the USDA Animal and Plant Health Inspection Service (APHIS) (available [here](#)), data from the World Organization for Animal Health (WOAH) World Animal Health Information Database (available [here](#)), and the Emergency Management Response System (EMRS) of APHIS VS. All data in this report from 2014 to present are from EMRS 2.0 (EMRS2), which is the VS system of record for FAD incidents.

## 2014 – 2023

From 2014 through 2023, 19,983 possible FAD or emerging disease incidents were investigated by VS and State collaborators. In most years, only a small percentage of those were confirmed by the investigation to be an emerging disease or FAD. The exceptions during this period included the following: a widespread vesicular stomatitis outbreak in 2014, the highly pathogenic avian influenza (HPAI) outbreak in the United States in 2015, an outbreak of virulent Newcastle disease (vND) that occurred between 2018 and 2020, and an outbreak of rabbit hemorrhagic disease virus-2 (RHDV2) (Figure 2). Please note that in and after CY 2015, vesicular stomatitis has not been considered an FAD in the United States. In CY 2022, the current largest HPAI outbreak in the United States started in February affecting 48 States by the end of CY 2023. The outbreak response is currently ongoing as of

the date of this publication.

**Figure 2: FAD Investigations by Result, 2014 to 2023\***



\* FAD confirmations are updated for 2022 in the Figure above due to investigations inputted a month after the last publication. FAD confirmations shown for 2023 are preliminary estimates.

In Figure 2, it is important to note these are not annual “animal” or “case” counts of FADs in the United States. Figure 2 illustrates the number of investigations that resulted in an FAD confirmation out of the total investigations of each year.

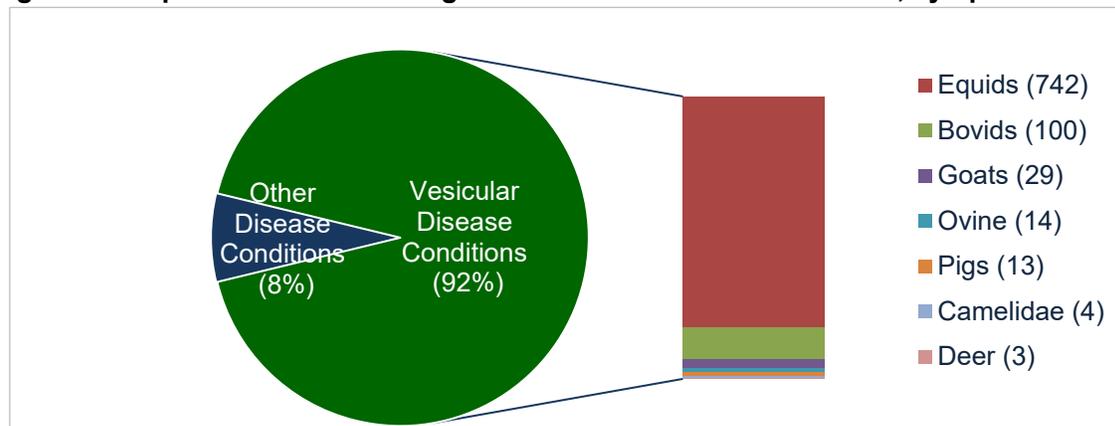
The sections below detail FAD investigations for the last 10 years (2014–2023). In Figures 3–5 below, the bar color is based on relative number, not on species. The species with the most vesicular investigations is red. Red does not refer to pigs (or bovids, equids), etc. Figures 6–12 are in a new format; the color is still based on relative number, not species.

## 2014

There were 989 FAD investigations conducted in 2014. VS and State collaborators conducted investigations in 46 States and Puerto Rico. Colorado (556), Texas (153), and Georgia (18) reported the most investigations. As in 2005, the reason for the high number of investigations was largely due to a widespread outbreak of vesicular stomatitis virus. Of the 989 investigations, approximately half resulted in a confirmed positive FAD detection—the majority of these findings were vesicular stomatitis-positive diagnoses (433 positive premises in 2014). Additionally, 2 investigations resulted in the detection of HPAI, 13 investigations resulted in the identification of EP, and 1 investigation resulted in the identification of a foreign reptile tick species (*Amblyomma nuttalli* Donitz).

Of these 989 investigations, 905 were vesicular complaints with 742 in equids, 100 in bovids (cattle, bison), 29 in goats, 14 in sheep, 13 in pigs, 4 in camelidae (alpaca, llama) and 3 in deer (Figure 4).

**Figure 3: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2014**

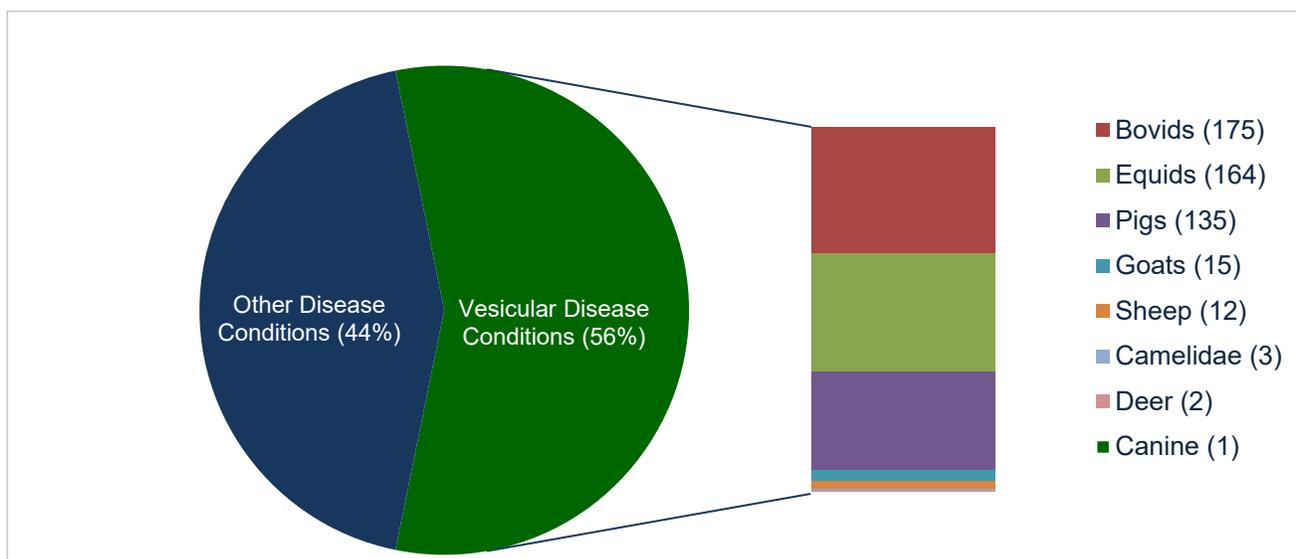


## 2015

There were 899 FAD investigations conducted in 2015. Iowa (110), Minnesota (61), and Colorado (56) reported the most investigations. This year, the high number of investigations was primarily due to the largest outbreak of HPAI in U.S. history, focused in the Midwest. During the HPAI outbreak, in CY2015, there were 211 positive commercial premises, 20 positive backyard premises, and 4 positive captive wild birds (please note, the outbreak started in late December 2014). There were also 2 detections of EP.

Please note that for CY2015, most vesicular stomatitis investigations are not reported as in prior years, as vesicular stomatitis is no longer considered an FAD. However, any vesicular stomatitis investigations in caprine, ovine, cervid, and bovine species are reported in the total FAD investigation number. In these species groups, other FADs, including foot-and-mouth disease (FMD), must be ruled out through an investigation. In addition, there were FAD investigations conducted in equids that included vesicular stomatitis as a differential; these were counted in the totals.

Of these 899 investigations, 507 were vesicular complaints with 175 in bovids (cattle, bison), 164 in equids, 135 in pigs, 15 in goats, 12 in sheep, 3 in camelidae (alpaca, llama), 2 in deer, and 1 in a canine (Figure 5).

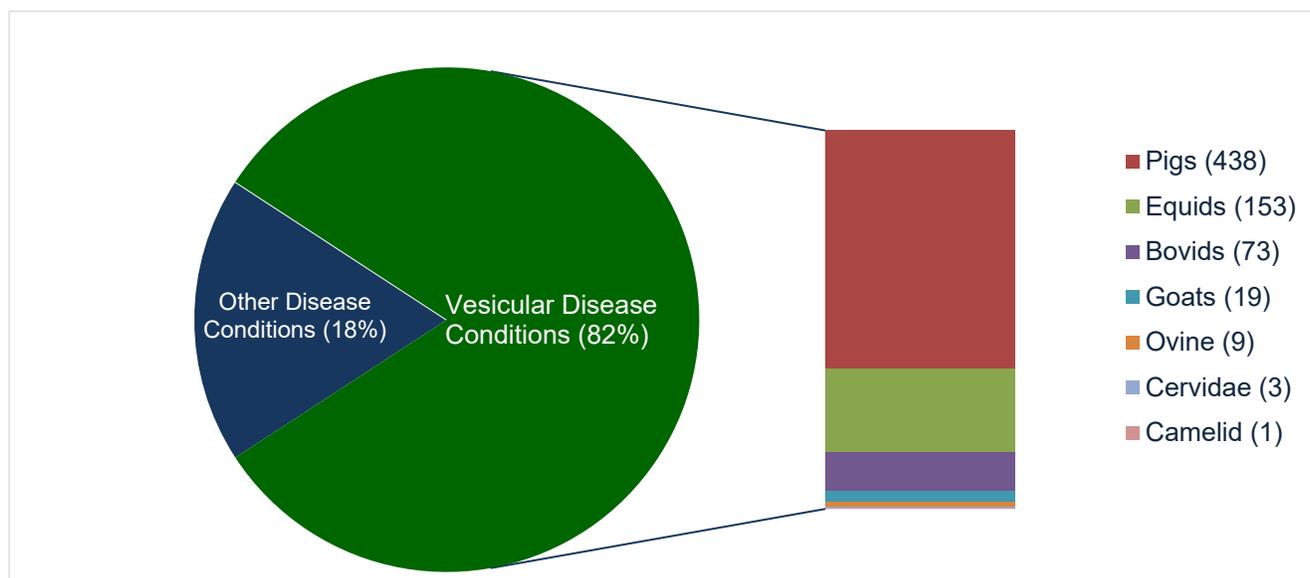
**Figure 4: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2015**

## 2016

There were 853 FAD investigations conducted in 2016. Wisconsin (124), Minnesota (114), and Iowa (66) reported the most investigations. This year, the high number of FAD investigations was primarily due to Senecavirus A, a vesicular disease of swine that has clinical signs that may appear similar to FMD vesicles and lesions. Senecavirus A is not an FAD; however, USDA APHIS, States, and industry take any report of vesicular lesions very seriously due to the potential consequences of an FMD outbreak. Of these 853 investigations, 696 were vesicular complaints with 438 in pigs, 153 in equids, 73 in bovids (cattle, bison), 19 in goats, 9 in sheep, 3 in cervids, and 1 in a camelid (Bactrian camel) (Figure 6).

In CY2016, there was a single case of HPAI in Indiana on a commercial premises. There was also a single investigation that resulted in an EP detection. Additionally, there were 3 detections of ectoparasites during FAD investigations—species of ticks which were considered to be foreign animal pests.

Importantly, a New World Screwworm (NWS) outbreak was detected in Florida in CY2016, resulting in 12 investigations that yielded one or more presumptive or confirmed positive NWS results. This Florida NWS outbreak was the first infestation documented in the United States in approximately 50 years.

**Figure 5: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2016**

## 2017

In CY2017, there were 1,790 FAD investigations. Wisconsin (541), California (367), Michigan (159), Ohio (142), and Minnesota (109) all reported 100 or more FAD investigations. The number of FAD investigations was markedly higher in 2017 due to Senecavirus A. Due to the clinical similarities between FMD and Senecavirus A, as well as the enormous consequences of an FMD outbreak in the United States, USDA APHIS, States, and industry continue to vigilantly investigate swine vesicular lesions. CY2017 is only the second time in the past 20 years that the number of FAD investigations conducted in the United States has surpassed 1,000 (the last time was in 2004 with 1,013 FAD investigations), and the first time FAD investigations have ever exceeded 1,500.

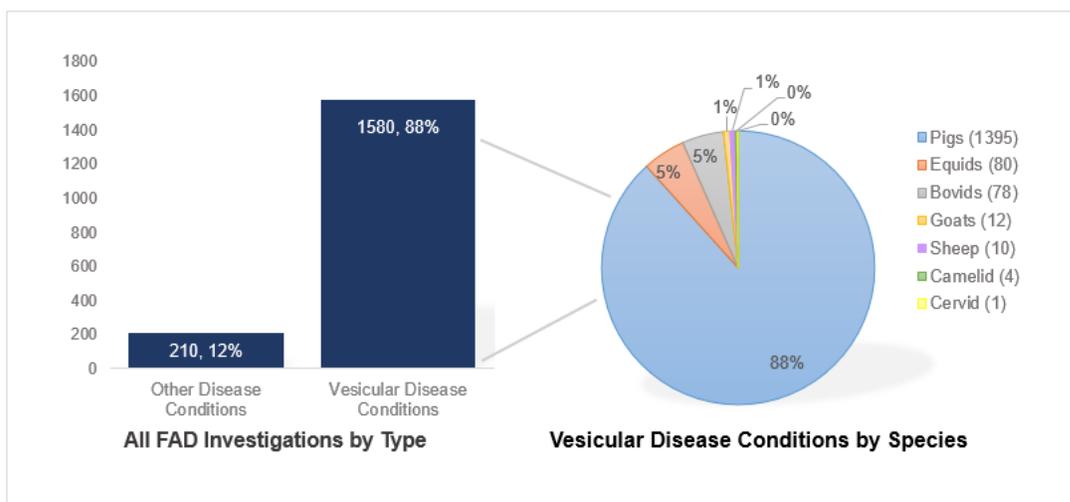
Of these 1,790 investigations, 1,580 were vesicular complaints with 1,395 in pigs, 80 in equids, 78 in bovids, 12 in goats, 10 in sheep, 4 in camelids (alpaca, llama, unknown type of camel), and 1 in a cervid (reindeer) (Figure 7).

In terms of FADs detected, response to the NWS outbreak continued from CY2016 into CY2017: there was one new FAD investigation, initiated in CY2017, which resulted in an additional confirmed positive NWS detection. This was the single detection on the Florida mainland during the NWS incident. Importantly, utilizing the sterile insect technique, NWS was declared to be successfully eradicated from the United States in March 2017.

Additionally in CY2017, there were two cases of HPAI in Tennessee, both on commercial premises. There were also two identifications of ectoparasites—both species of ticks which were considered to be foreign animal pests. Fourteen FAD investigations resulted in a positive EP finding (again, please note that this does not reflect EP incidence or prevalence in the United States). In addition to these terrestrial FAD identifications, two aquatic FADs were also detected in CY2017: acute hepatopancreatic

necrosis disease (caused by *Vibrio parahaemolyticus*, which affected shrimp) and infectious salmon anemia. However, 98.8 percent of all FAD investigations in CY2017 did not detect the presence of a FAD or pest.

**Figure 6: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2017.**



## 2018

For the first time ever, over 2,000 FAD investigations were conducted in 2018. The 2,072 FAD investigations were conducted in 44 States and Puerto Rico. California (925), Wisconsin (312), Ohio (148), Michigan (136), and Oregon (134) all reported more than 100 FAD investigations. As in 2016 and 2017, the number of FAD investigations was again higher due to Senecavirus A. Due to clinical similarities in swine between this virus and FMD, APHIS, States, and industry continue to investigate all reports of swine vesicular lesions to rule-out this highly contagious foreign animal disease.

Of these 2,072 investigations, 1,729 were vesicular complaints with 1,592 in pigs, 58 in equids, 57 in bovids (primarily cattle; bison, bongo), 9 in sheep, 7 in goats, and 6 in cervids (Figure 8).

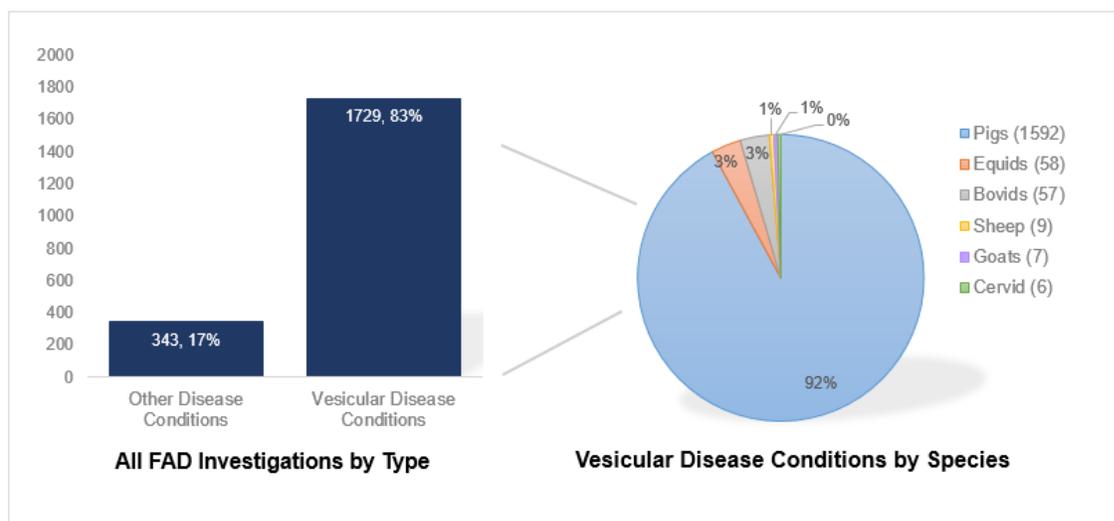
There were a number of FADs detected in CY 2018 from FAD investigations. The vND outbreak in southern California resulted in 181 FAD investigations that identified 55 infected premises. This is not the total number of vND cases in CY2018—only the number of FAD investigations (sick calls/complaints) that resulted in the detection of vND.

Twelve FAD investigations resulted in a pest detection: 10 were ticks considered to be foreign to the United States, 1 was NWS from an imported dog, and 1 was the identification of a parasitic fly not known to exist in the United States. FAD investigations resulting in tick detections found primarily *Haemaphysalis Longicornis* (the Asian longhorned tick) which was first detected in the United States in 2017. In addition, 3 FAD investigations resulted in EP detections in 2018.

Two FAD investigations resulted in the detection of rabbit hemorrhagic disease (RHD). One of the investigations detected RHD virus-1 (RHDV1); the other detected RHD virus-2 (RHDV2). While both

FADs, RHDV2 had never been previously identified in the United States. Finally, though there was no associated FAD investigation, it should be noted that there was also a detection of bonamia exitiosa (in an oyster) in CY 2018. An FAD in the United States, this disease was detected as part of routine surveillance and prompted no official action.

**Figure 7: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2018**



## 2019

In CY2019, there were 2,517 FAD investigations conducted in 49 States and Puerto Rico. Almost all States reported FAD investigations in EMRS2 for the first time. The majority of investigations (74 percent) took place in California (1,003), Wisconsin (222), Tennessee (194), Ohio (177), Oregon (153), and Michigan (118). Since 2016, the number of FAD investigations continue to increase surpassing the previous year attributed to Senecavirus A. Due to the clinical similarities in swine between this virus and FMD—a disease with potentially devastating consequences in the event of a U.S. outbreak—APHIS, States, and industry continue to investigate all reports of swine vesicular lesions to rule-out this highly contagious FAD.

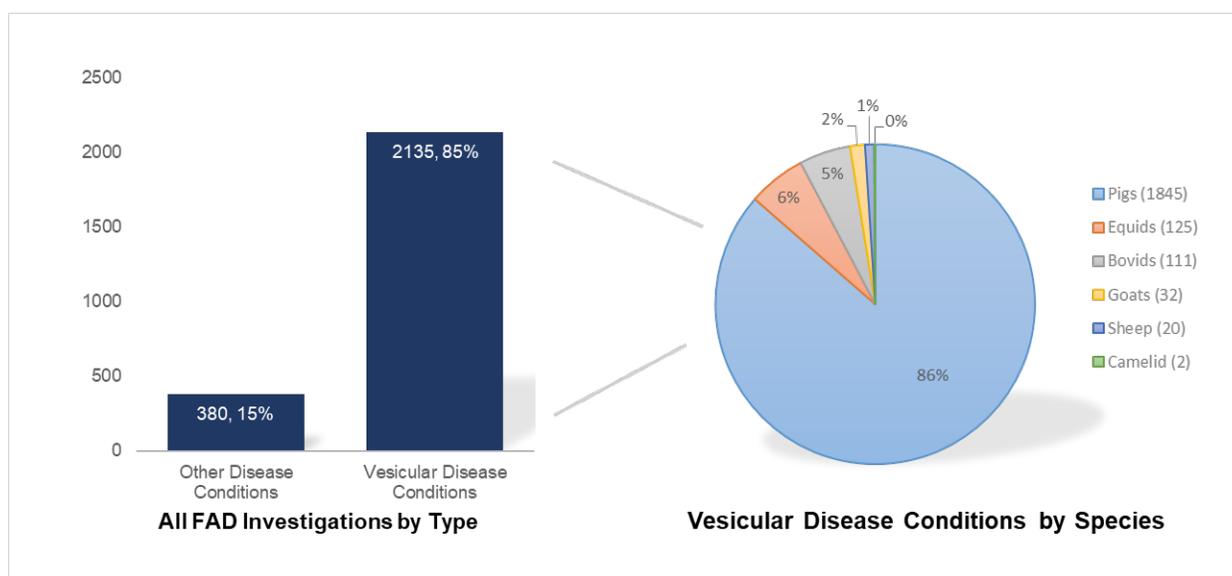
Of these 2,517 FAD investigations, 2,135 were vesicular complaints: 1,845 in pigs, 125 in equids, 111 in bovids (cattle, bison), 20 in sheep, 32 in goats, and 2 in camelids (alpacas) (Figure 9).

This year also exhibited a higher number of FADs detected from FAD investigations. The vND outbreak in southern California, which began in 2018 and was eradicated in 2020, resulted in 152 FAD investigations that identified 54 infected premises in CY2019. This is not the total number of vND cases in CY2019—only the number of FAD investigations (sick calls/complaints) that resulted in the detection of vND. There was also an outbreak of rabbit hemorrhagic disease virus-2 (RHDV2) in Washington State where 6 FAD investigations resulted in detections. RHDV2 was first identified in the United States in 2018.

Thirty-two investigations resulted in a positive EP finding (again, please note that this does not reflect EP incidence or prevalence in the United States). In addition, 1 investigation resulted in the identification of the Asian longhorned tick (*Haemaphysalis Longicornis*).

Several FAD detections this calendar year can also be attributed to aquatic investigations. Infectious Hypodermal and Haematopoietic Necrosis Virus (IHHNV) was found on 3 FAD investigations, Red Sea Bream Iridoviral Virus (RSIV) was found on 2 FAD investigations, Tilapia Lake Virus (TiLV) on 1 FAD Investigation, and White Spot Syndrome Virus (WSSV) on 1 FAD Investigation.

**Figure 8: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2019**



## 2020

There were 2,718 investigations conducted in CY 2020. For the first time, every State plus Puerto Rico reported at least one FAD investigation in EMRS2. Similar to previous years, the majority of investigations took place in California (801), Wisconsin (261), Tennessee (237), Illinois (183), Ohio (172), Oregon (120), and Michigan (110), with an overall calendar year total greater than any other year due to Senecavirus A. As noted previously, APHIS, States, and industry continue to investigate all reports of swine vesicular lesions to rule-out FMD—a disease with potentially devastating consequences if ever detected in the United States.

As seen in Figure 10, 2,259 FAD investigations or 83 percent of the total number of investigations were vesicular complaints: 1,931 in pigs, 166 in equids, 121 in bovids, 18 in goats, 11 in sheep, 6 in camelids, 5 in cervids, and 1 put into the livestock category.

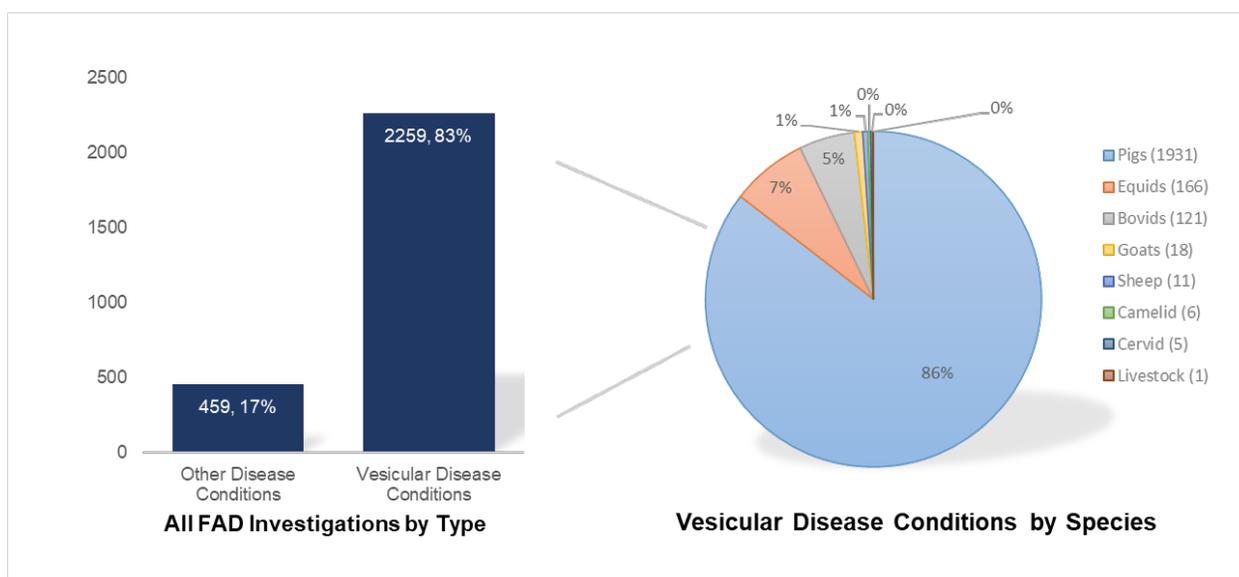
In CY 2020 there were an elevated number of FADs detected from investigation primarily due to an outbreak of rabbit hemorrhagic disease virus-2 (RHDV2). RHDV was first detected in the United States in 2018, again in 2019, and again in 2020 which led to an outbreak that resulted in 128 domestic detections upon investigation. This is not the total number of cases, only the number of domestic

investigations that resulted in a detection of RHDV2. Additionally, the vND outbreak that began in 2018 led to 6 detections and was ultimately eradicated this year.

Thirteen investigations resulted in a positive EP finding in seven States (again, this does not reflect EP incidence or prevalence in the United States). There was also a detection of HPAI upon investigation on a commercial premises.

It should also be noted, even though there was no associated FAD investigation, there was a detection of Ostreid herpesvirus – 1 microvariant (OsHV-1) in oysters upon surveillance and required immediate notification.

**Figure 9: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2020**



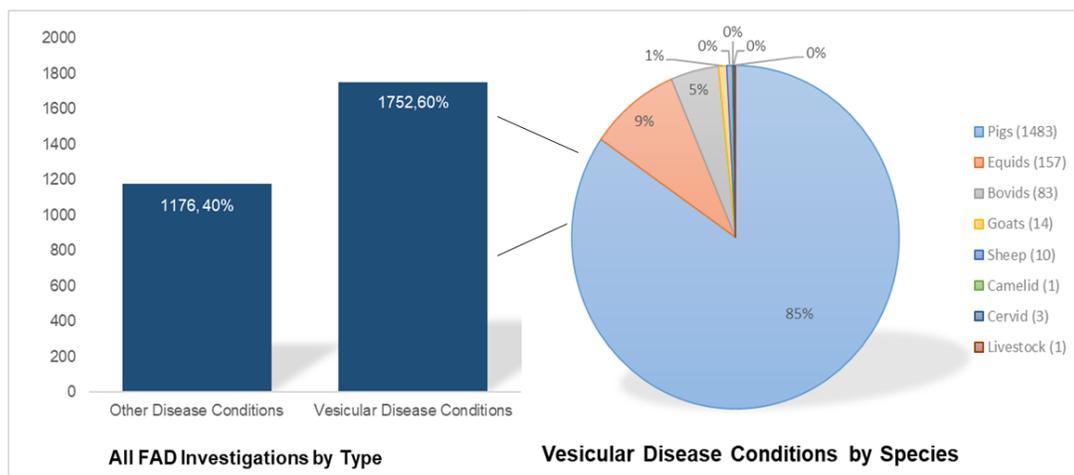
## 2021

There were 2,716 investigations conducted in CY 2021. 46 States plus the Virgin Islands and Puerto Rico reported at least one FAD investigation in EMRS2. Similar to previous years, the majority of investigations took place in California (676), Puerto Rico (387), Iowa (161), Tennessee (160), Wisconsin (159), Ohio (128), Oregon (108), Michigan (98), and Virgin Islands (89), with a calendar year total consistent with last year's numbers. As noted previously, APHIS, States, and industry continue to investigate all reports of swine vesicular lesions to rule-out FMD—a disease with potentially devastating consequences if ever detected in the United States.

In CY 2021, the upward trend of FADs detected from investigation continued primarily due to the increase in investigations in pigs (1536), many of which were due to ongoing ASF/CSF surveillance as well as the ongoing response efforts in Puerto Rico (387). In 2021, there were a total of 129 domestic investigations that resulted in a detection of RHDV2. The vND outbreak that began in 2018 and ended in 2020 led to 7 detections this year as a result of ongoing surveillance. In April, there was a detection of tropical bont ticks found in livestock leading to 67 domestic investigations in the Virgin Islands for this year.

As seen in Figure 11, 1,754 FAD investigations or 65 percent of the total number of investigations were vesicular complaints: 1,483 in pigs, 158 in equids, 83 in bovids, 14 in goats, 10 in sheep, 1 in camelids, 4 in cervids, and 1 in the livestock category.

**Figure 10: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2021**



**2022<sup>1</sup>**

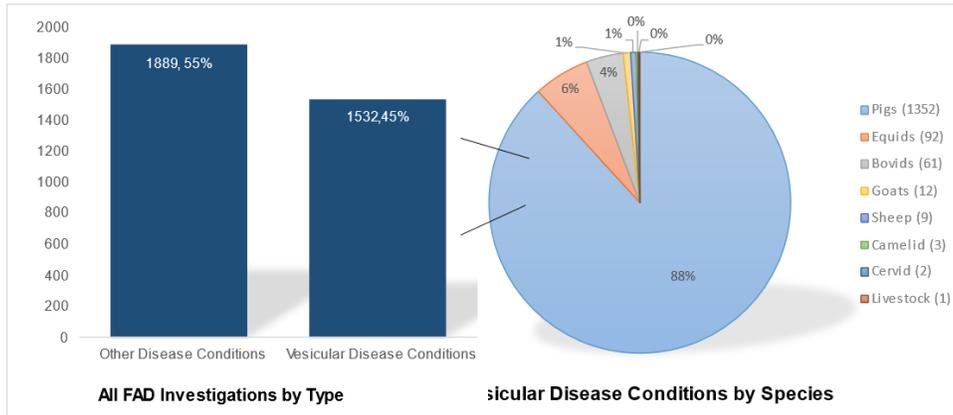
There were 3,421 investigations conducted in CY 2022. 48 States including Puerto Rico reported at least one FAD investigation in EMRS2. Similar to previous years, the majority of investigations took place in California (548), Wisconsin (259), Minnesota (201), Tennessee (182), Iowa (179), New York (172), Oregon (161), Michigan (134), and Kansas (133), with a calendar year exceeding previous years. This year, the high number of investigations was due primarily to the nation-wide outbreak of HPAI across the United States, affecting 47 States towards the end of CY 2022. There were 947 HPAI investigations or 27 percent of the total number of investigations.

In CY 2022, there were a total of 25 domestic investigations that resulted in a detection of RHDV2, a drastic decrease from last year.

As seen in Figure 12, 1,532 FAD investigations or 45 percent of the total number of investigations were vesicular complaints: 1,352 in pigs, 92 in equids, 61 in bovids, 12 in goats, 9 in sheep, 3 in camelids, 2 in cervids, and 1 in the livestock category.

<sup>1</sup> Numbers for 2022 were updated as of the publication of this report due to additional investigations inputted into EMRS after the last report (CY 2022 FADI Report).

**Figure 11: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2022**



**2023**

There were 2,008 investigations conducted in CY 2023. All 50 States reported at least one FAD investigation in EMRS2. Similar to previous years, the majority of investigations took place in California (373), Tennessee (155), Minnesota (118), Wisconsin (112), Pennsylvania (101), Michigan (90), Iowa (88), Kansas (87), and Ohio (80).

The nation-wide outbreak of HPAI across the United States, affecting 48 States (one new since 2022), is still ongoing. In CY 2023, there were 274 HPAI investigations or 13 percent of the total number of investigations. This is a 71 percent decrease from the number of HPAI investigations in 2022.

In CY 2023, there were six domestic investigations that resulted in a detection of RHDV2. In May 2023, APHIS confirmed the United States' 7<sup>th</sup> detection of bovine spongiform encephalopathy (BSE) in a cow at a slaughter plant in South Carolina; this BSE case was atypical.

As seen in Figure 12, 1141 FAD investigations or 57 percent of the total number of investigations were vesicular complaints: 899 in pigs, 131 in equids, 78 in bovids, 13 in goats, 12 in sheep, 2 in camelids, 2 in cervids, 3 in the livestock category, and 1 exotic (rhino).

**Figure 12: Proportion of FAD Investigations due to Vesicular Conditions, by Species in 2023**

