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National Scrapie Eradication Program

Fiscal Year 2021 Report

October 1, 2020 to September 30, 2021

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Veterinary Services
Strategy and Policy Unit
Sheep and Goat Health Center

Prepared January 5, 2022



A Note on Navigation

This presentation has hyperlinks for navigation. Text in **blue** is a hyperlink to the slide or website being discussed. Additionally, there are action buttons on each page:


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Introduction

The National Scrapie Eradication Program focuses on seven primary areas:

- Education and prevention
- Animal identification and compliance
- Surveillance [Regulatory Scrapie Slaughter Surveillance (RSSS) and on-farm]
- Tracing positive and exposed animals and testing exposed animals
- Cleanup of infected and source flocks through genetic susceptibility testing and indemnification of susceptible exposed animals
- Monitoring previously infected and exposed flocks
- The Scrapie Free Flock Certification Program (SFCP)

*Program Summary**

Performance Measures **-** The percent of cull black-faced sheep found positive at slaughter (Chart 1) was 0.0145% in fiscal year (FY) 2021, and the percent of cull sheep found positive at slaughter adjusted for face color[1] was 0.0021% in FY 2021 (Chart 2).

Positive Animals – One sheep sampled at slaughter in January of FY 2021 tested positive for classical scrapie. This sheep had resided in a flock in Wisconsin, and VS attributed the flock of origin to Arkansas; it was not completely traceable due to lack of identification to flock of origin. In October of FY 2021, one sheep tested positive at slaughter for non-classical scrapie (Nor98-like).

States that have been free of classical scrapie cases for >7 Fiscal Years

Sheep: 41 states (Figure 1 and Figure 2)
Goats: 47 states (Figure 3 and Figure 4)

**106 FY 2021 samples are pending testing; report will be updated if necessary*
[1]White, black and mottled-faced color sheep are weighted based on population; white-faced sheep have the greatest weight. If a white-faced positive sheep is found, this statistic will markedly increase. See notes below for details.

*Program Summary**

Infected and Source Flocks **-** One infected herd/flock, located in Wisconsin, was identified in FY 2021. One flock in Texas has had an open infected status since April 2016, but there are no exposed animals on the premises. Animals designated for testing must be sampled and valid test results obtained before the status can be closed.

The number of newly designated infected and source flocks by fiscal year since FY 1997 is shown in Chart 3. The peak was in FY 2005 with 179 flocks.

**106 FY 2021 samples are pending testing.*

Program Summary*

Scrapie in Goats –The total number of NVSL confirmed positive cases in goats is 44 since FY 2002. Samples from three of these positive animals were collected through RSSS, one in November 2014, the second in July 2018, and the most recent in June 2019. The remainder of the positive cases have been found though testing of clinical suspects, testing of exposed animals, and trace-out investigations.

Scrapie Free Flock Certification Program (SFCP) – At the end of the FY 2021, there were 200 flocks participating in the Scrapie Free Flock Certification Program (SFCP). Statuses of these flocks were 31 export monitored, 43 export certified, and 126 select monitored flocks (Figure 5). SFCP open statuses by fiscal year of Status date[2] from FY 2007 to FY 2020 are depicted in Chart 4.

**106 FY 2021 samples are pending testing.*

[2]*Chart 4 represents the cumulative change in SFCP enrollment over time, and includes open and closed statuses/programs, and active and inactive flocks/herds. Previous charts of SFCP participation by year were manually updated and used the enrollment date to determine the year of participation in SFCP. With the change to Tableau charts, the start/status date is used. Many participating flocks were grandfathered into the Export category in 2013 with an earlier status date.*

Surveillance

Surveillance activities are reported by Field Operations Districts shown in Figure 6. Surveillance minimums are based on estimated breeding sheep and goat populations in each State, and the distribution of sheep and goat populations by District is shown in Chart 5.

Components of Scrapie Surveillance

- **Regulatory Scrapie Slaughter Surveillance (RSSS)** started April 1, 2003. It is a targeted slaughter surveillance program which is designed to identify infected flocks. As of the end of FY 2021, samples have been collected from 701,245 animals since April 1, 2003. 28,479 samples were collected in FY 2021, 21,070 from sheep and 7,409 from goats.[3] There have been 491 NVSL confirmed positive animals (474 classical cases – 471 sheep and 3 goats) and 17 Nor98-like cases since the beginning of RSSS. One sheep tested positive for classical scrapie in FY 2021.* Figure 6 depicts RSSS collection sites in FY 2021.

**106 FY 2021 samples are pending testing.*

[3] *Total sampling is decreased primarily due to the negative impacts of COVID-19 on the ability to collect samples.*

Surveillance

Components of Scrapie Surveillance

- **RSSS Genotyping** started in November 2018 as a pilot project to decrease the costs of scrapie IHC testing in a subset of submission by only testing those animals that are genetically susceptible to scrapie. DNA is first analyzed to determine the genotype at codon 171, and tissue samples are only IHC tested if the sheep is genetically susceptible, not if it is genetically resistant/less susceptible (QR, RR, RK, or RH). The number of genotyped sheep is included in the total number of sheep tested through RSSS. To date, no samples from genetically susceptible sheep referred for scrapie testing have tested positive. The project was deemed in May 2021 to result in cost savings and RSSS genotyping will be continued indefinitely at the currently participating sites.
    - In FY 2019 and 2020, a total of 5,191 sheep were genotyped; 3,660 (70.5%) of these were not genetically susceptible.
    - In FY 2021, 2,874 sheep were genotyped; 2,149 (74.8%) of these were not genetically susceptible.

The number of sheep and goats collected in each District for RSSS is shown in Chart 6. Figure 7 is a hex map, representing the number of animals collected in each State. Chart 7 compares RSSS sampling by month for the current year with the monthly average of the previous 6 years.

Surveillance

Components of Scrapie Surveillance (continued)

- **On-farm Surveillance** includes both regulatory testing of scrapie exposed and potentially exposed sheep and goats and testing sheep and goats on farm for routine surveillance. 901 sheep and 858 goats were tested on-farm in FY 2021. No animals tested positive.*

Surveillance Goals

The annual target is to test at least 40,000 animals for scrapie. Negative impacts of COVID-19 on the ability to collect samples contributed to not meeting this target. 30,238 animals were sampled for scrapie testing in FY 2021.

- 28,479 RSSS samples and 1,759 on-farm samples
- Of which 21,971 were sheep and 8,267 were goats.

Progress towards meeting the national surveillance target is depicted in Chart 8. Distribution of sampling by type (RSSS or on-farm) and by species is shown in Chart 9. Chart 10 and Table 1 is a breakdown by face-color (sheep) and type (goats) by age. Chart 11 shows samples collected at slaughter by fiscal year by species and face-color (sheep).

**106 FY 2021 samples are pending testing*

Surveillance

State Sampling Minimums

The National Scrapie Eradication Program establishes annual sheep and goat sampling minimums for each State and tracks the States' level of compliance with meeting these minimums. These State minimums were implemented in FY 2010 to ensure adequate geographical representation, so that APHIS can find the last remaining cases and document freedom from scrapie. State sampling minimums are established based on the population demographics of mature sheep and goats in each State. To account for the impacts of COVID on the ability of personnel to collect samples, the State sampling minimums were reduced to 74% of the State sampling minimum projected at the beginning of the year. The calculations used to derive the sampling minimums are described in the National Scrapie Surveillance Plan. The COVID-adjusted State sampling minimums for sheep and goats, and the total number of animals sampled by State of Animal ID, are listed by District in Tables 2, 3, 4, and 5.

The percent sampling minimum for sheep and goats achieved by each State in FY 2021 are depicted in Figure 8 and Figure 9.

Surveillance

Surveillance option for meeting state minimums

Historically, several States have had difficulty meeting their annual sampling requirement. Starting in FY 2018, these States were able to increase and, in most cases, meet the sampling minimum by identifying sheep producers or dealers for genotyping of codon 171 prior to live-animal testing (rectal biopsy) of the genetically susceptible (primarily QQ, also KK, QH, QK) animals. Genotyping is done to reduce the costs associated with live-animal testing. The susceptible sheep that were live-animal tested and the genetically less susceptible (QR, RK, or RH) and genetically resistant (RR) sheep were credited to the State. Under this option, 609 sheep were genotyped during FY 2021; 167 of these had genotypes considered susceptible (27.4%). None of the susceptible animals that were live-animal tested were positive. In all, 442 sheep with genotypes considered resistant were credited to States.

Sheep sampled on producer premises that had tags originating in a different State were credited to both the State of origin and the State where sampling occurred; if sampling occurred on a dealer premises they were credited only to the State of origin. These additional samples are included in the Total Number of Sheep Sampled column of Districts Tables (Tables 2 through 7), and in the calculations for the hex maps showing the percent of sampling minimum achieved (Figures 6 and 7). These genotyped animals are not included in any other charts in this report.

Surveillance

Surveillance Stages

Surveillance objectives for scrapie will be addressed in three stages:

- ***Stage 1.*** Eradicate scrapie in the U.S. sheep & goat population by finding remaining cases.
- ***Stage 2.*** Continue high-level surveillance to ensure that no cases remain.
- ***Stage 3.*** Maintain sufficient ongoing monitoring to meet World Organisation for Animal Health (OIE) requirements.

A sampling rate of 6/1000 breeding ewes or does is used for stage 1 minimums, and a sampling rate of 4/1000 breeding ewes or does is used for stage 2 minimums.

For Stage 1 states to be eligible to progress to Stage 2 they must achieve 90% or more of their annual state minimums for 4 out of the past 5 years and not have had a positive scrapie case for a minimum of 7 years.

Figure 10 and Figure 11 show the sampling stage of each state for sheep for FY 2021 and FY 2022 respectively.

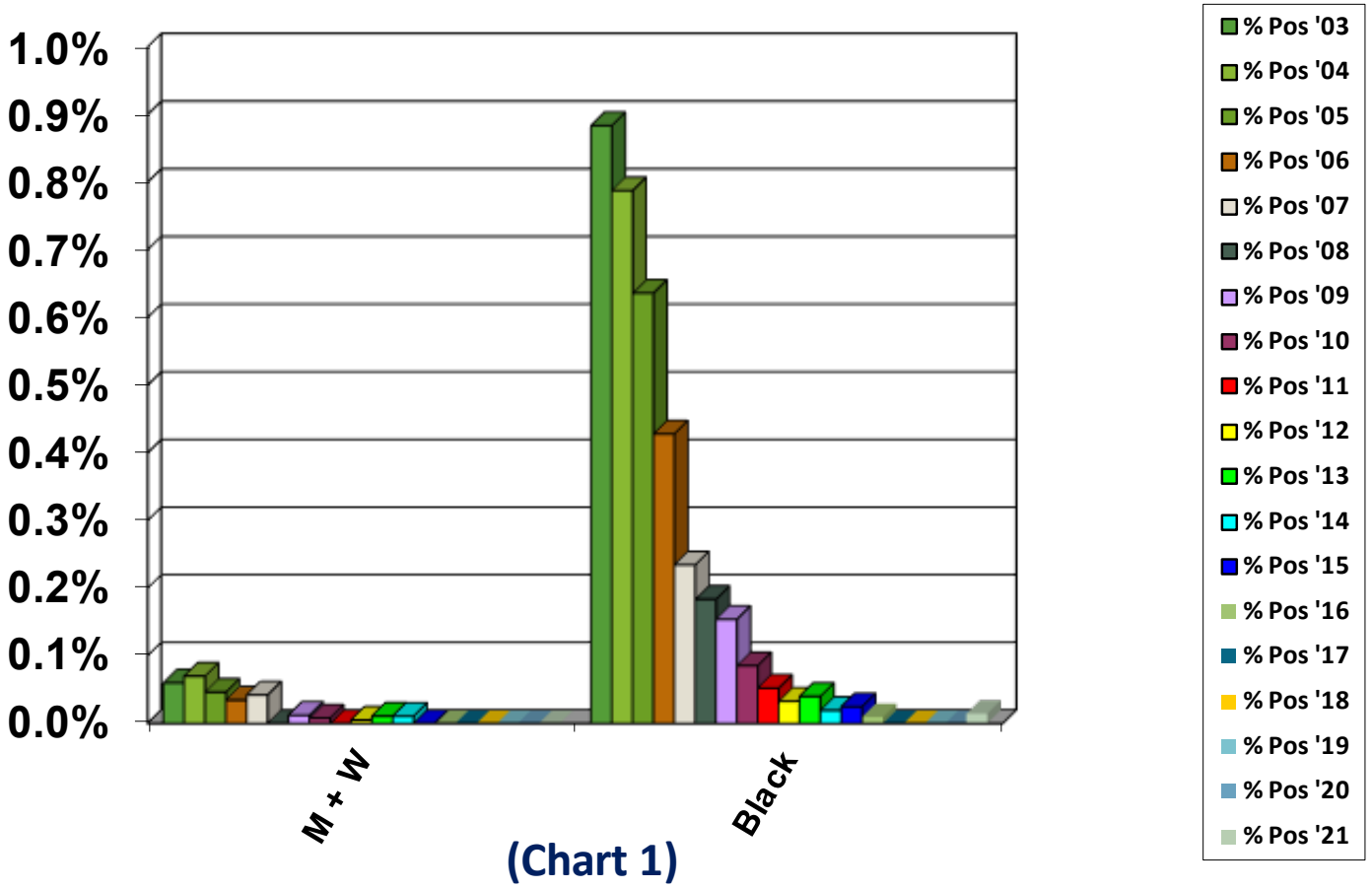
For goats, the sampling minimum was set at stage 2 sampling levels in order to allow time for implementation of goat ID requirements. Any state that has a positive goat going forward will be moved to stage 1.

Conclusion

- Meeting sampling minimums was challenging for states due to COVID-19 impacts on ability of personnel to collect samples
- Most states met COVID-19 adjusted sampling minimums for sheep and goats
- The remainder of this report contains figures, tables, and charts to accompany the previous slides

Percent of RSSS Sheep Samples that Tested Positive for Classical Scrapie - By Face Color

*FY 2003 – FY 2021**

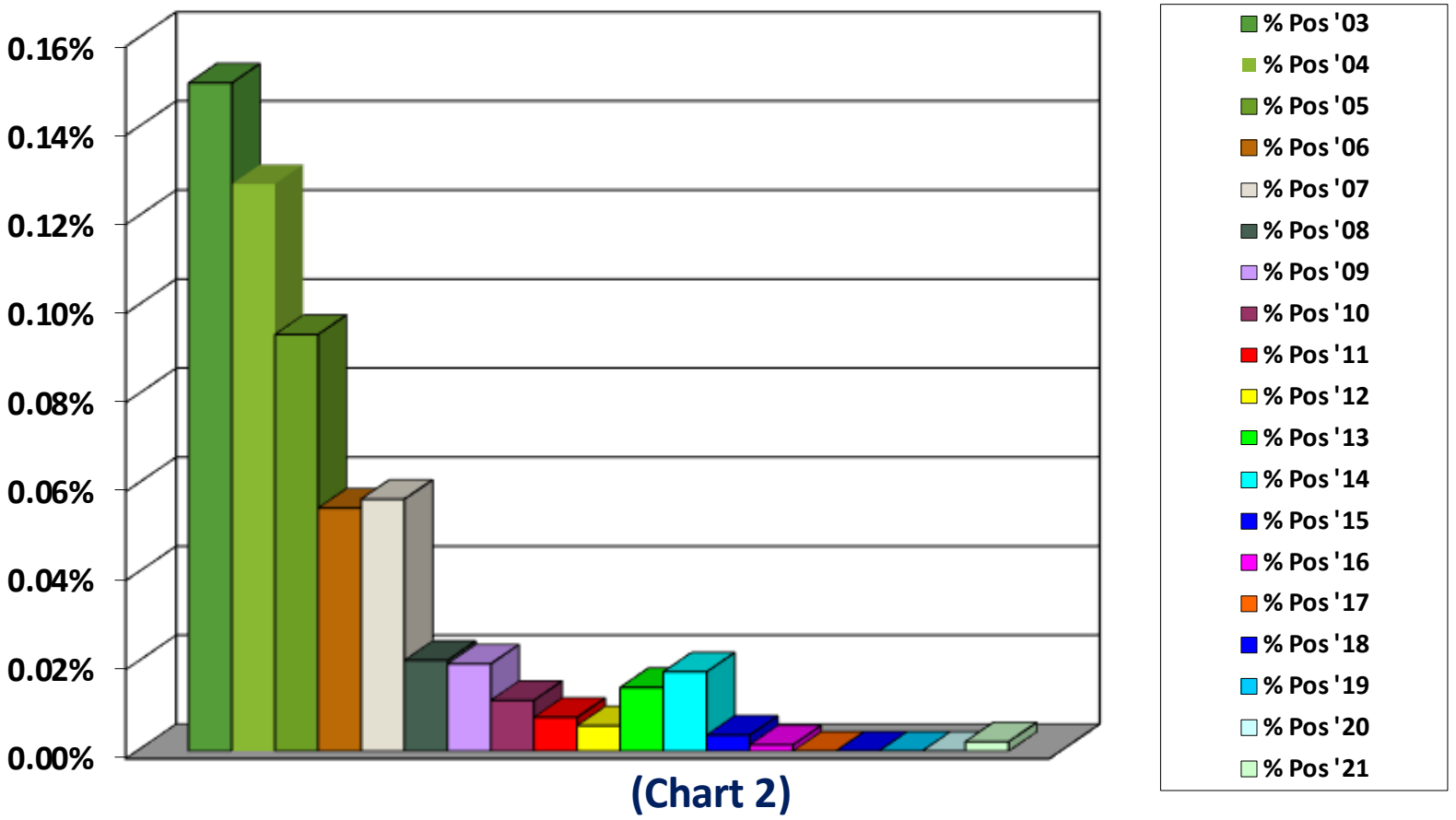


(Chart 1)

* 106, FY 2021, samples are pending testing. Adjusted to exclude multiple positive animals from same flock. Mottled- and white-faced combined. Does not include Nor98-like scrapie cases found through RSSS.

Percent of RSSS Sheep Samples that Tested Positive for Classical Scrapie - Weighted by Face Color

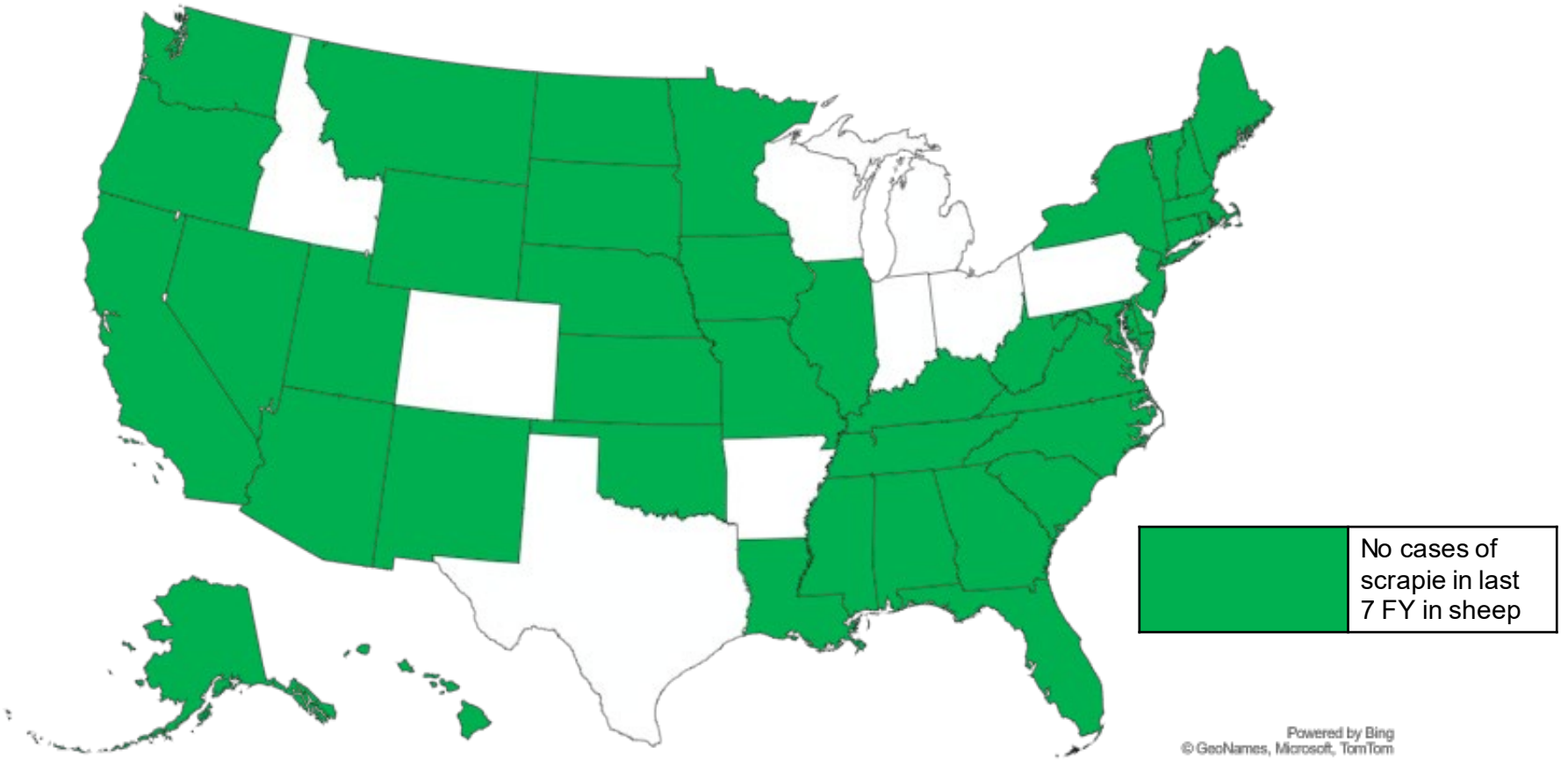
*FY 2003 – FY 2021**



(Chart 2)

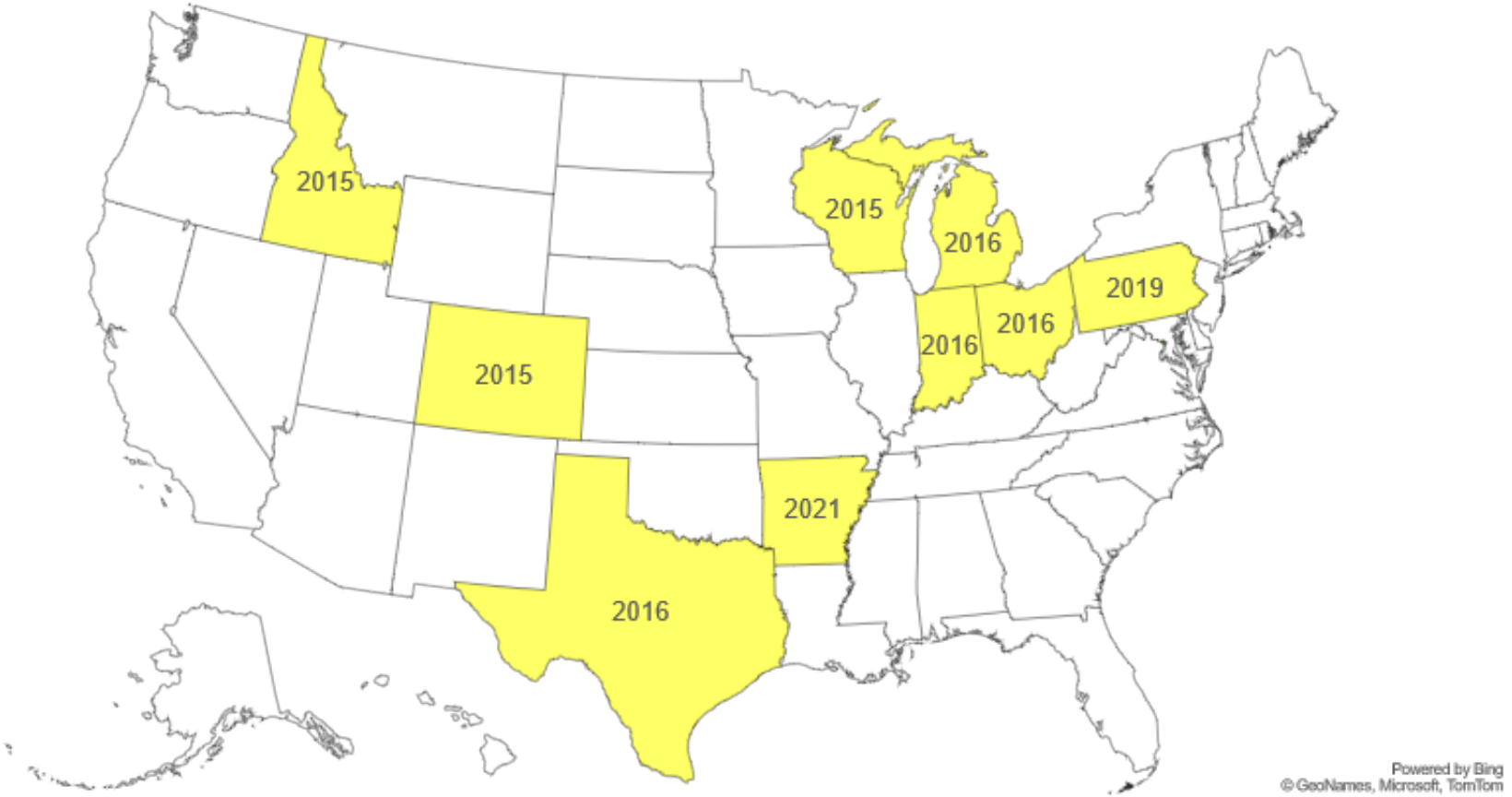
* 106, FY 2021, samples are pending testing. Adjusted to exclude multiple positive animals from the same flock. Does not include Nor98-like scrapie cases found through RSSS.

States Free of Classical Scrapie >7 FY in Sheep



(Figure 1)

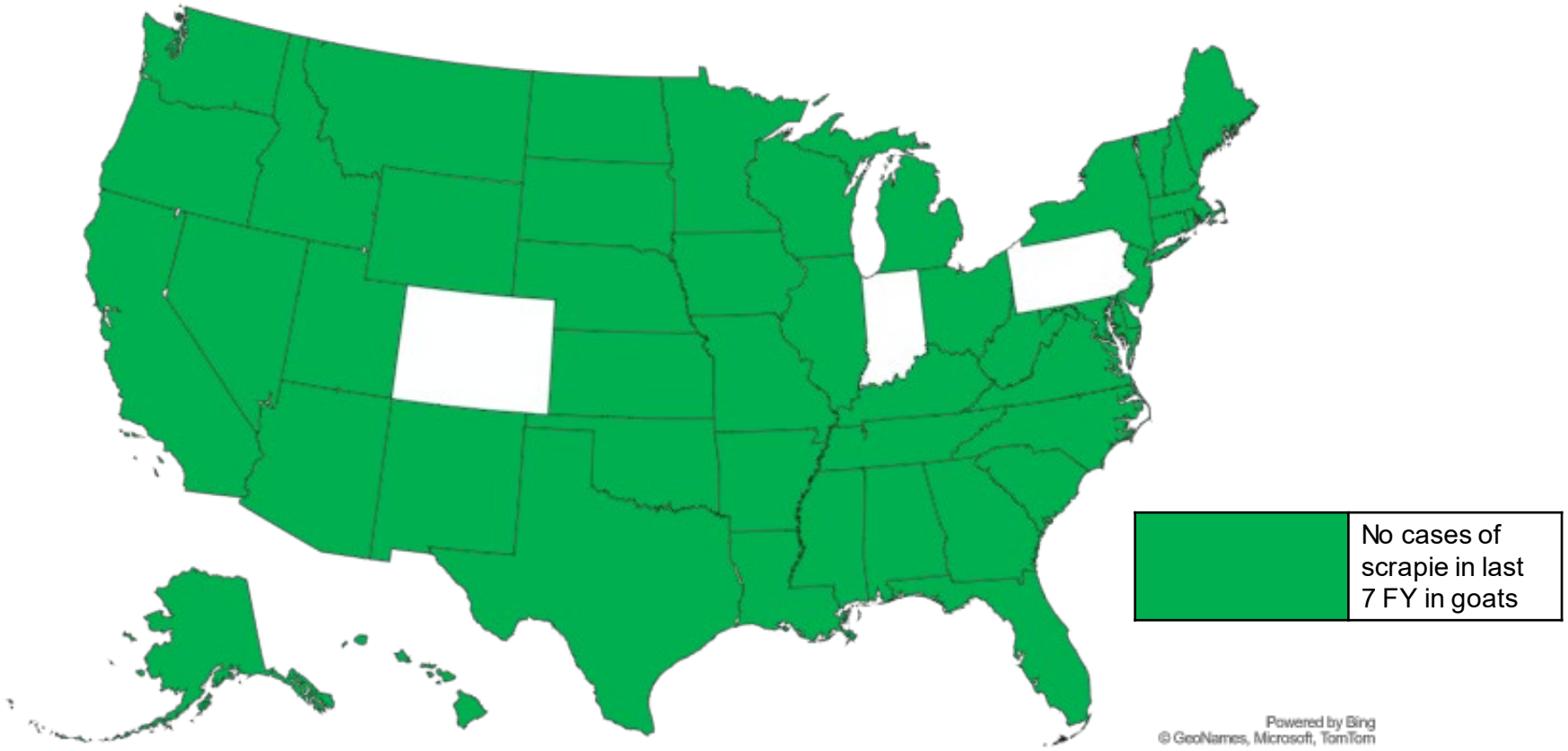
States with Classical Scrapie in last 7 FY in Sheep



States with cases of classical scrapie in sheep in the last 7 FY with FY of detection

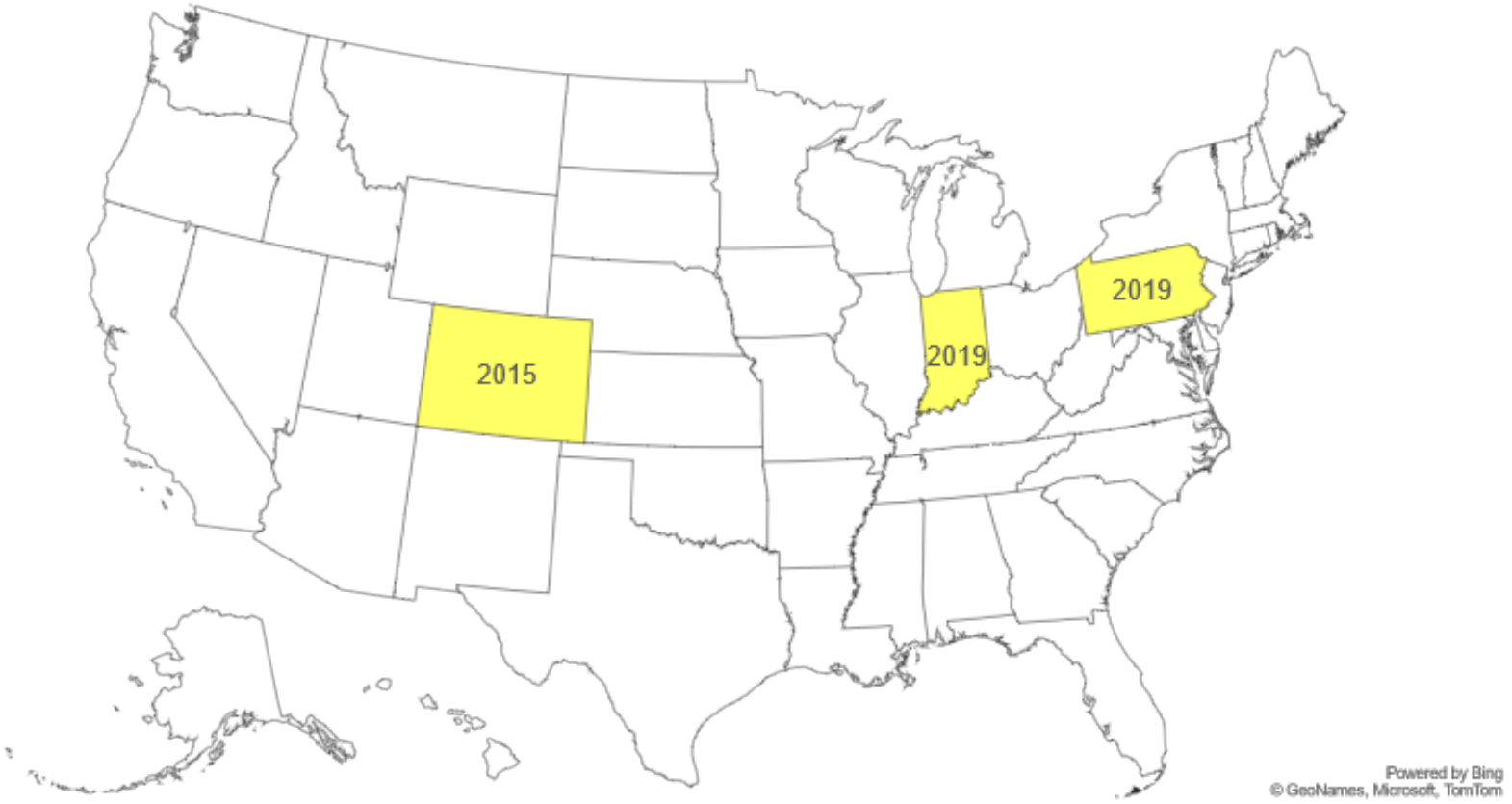
(Figure 2)

States Free of Classical Scrapie >7 FY in Goats



(Figure 3)

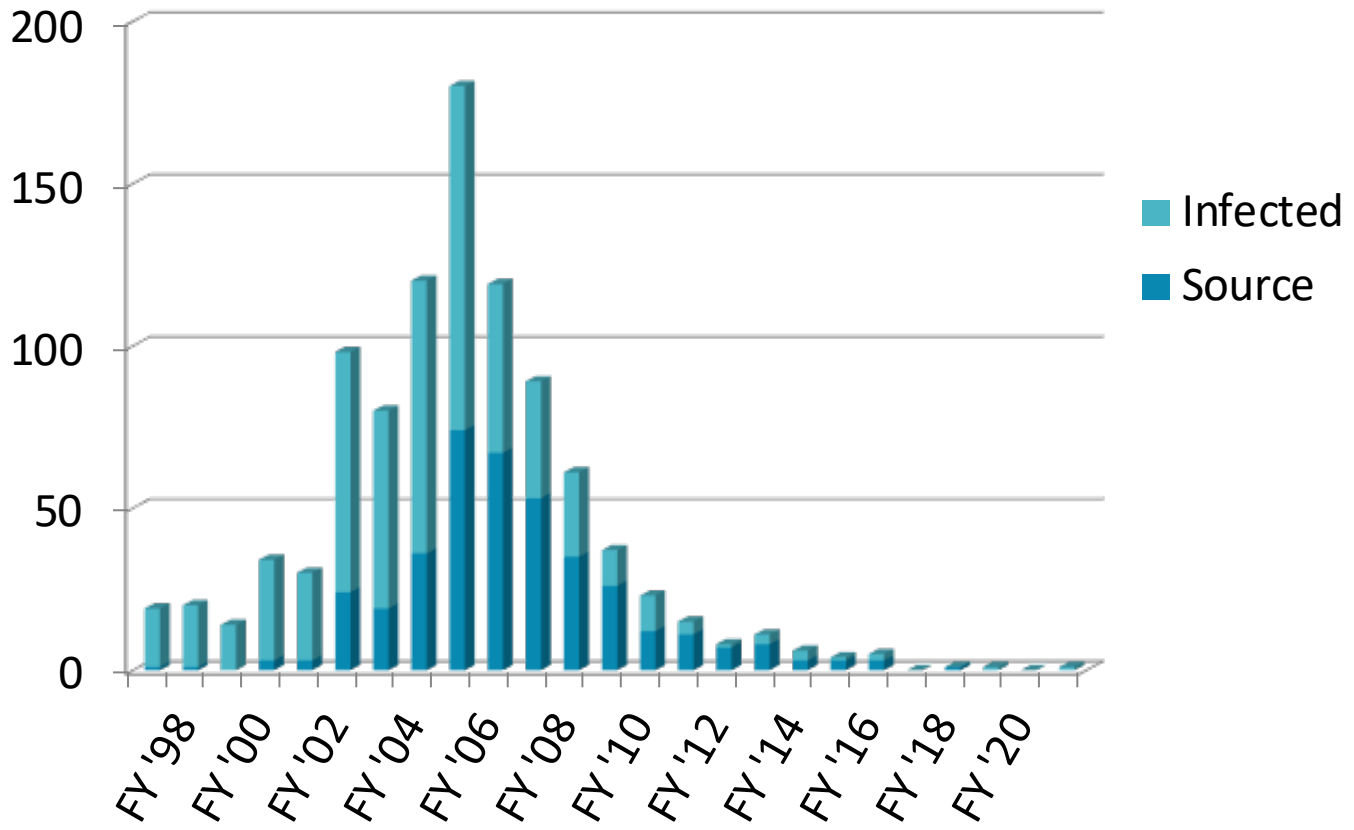
States with Classical Scrapie in last 7 FY in Goats



	States with cases of classical scrapie in goats in the last 7 FY with FY of detection

(Figure 4)

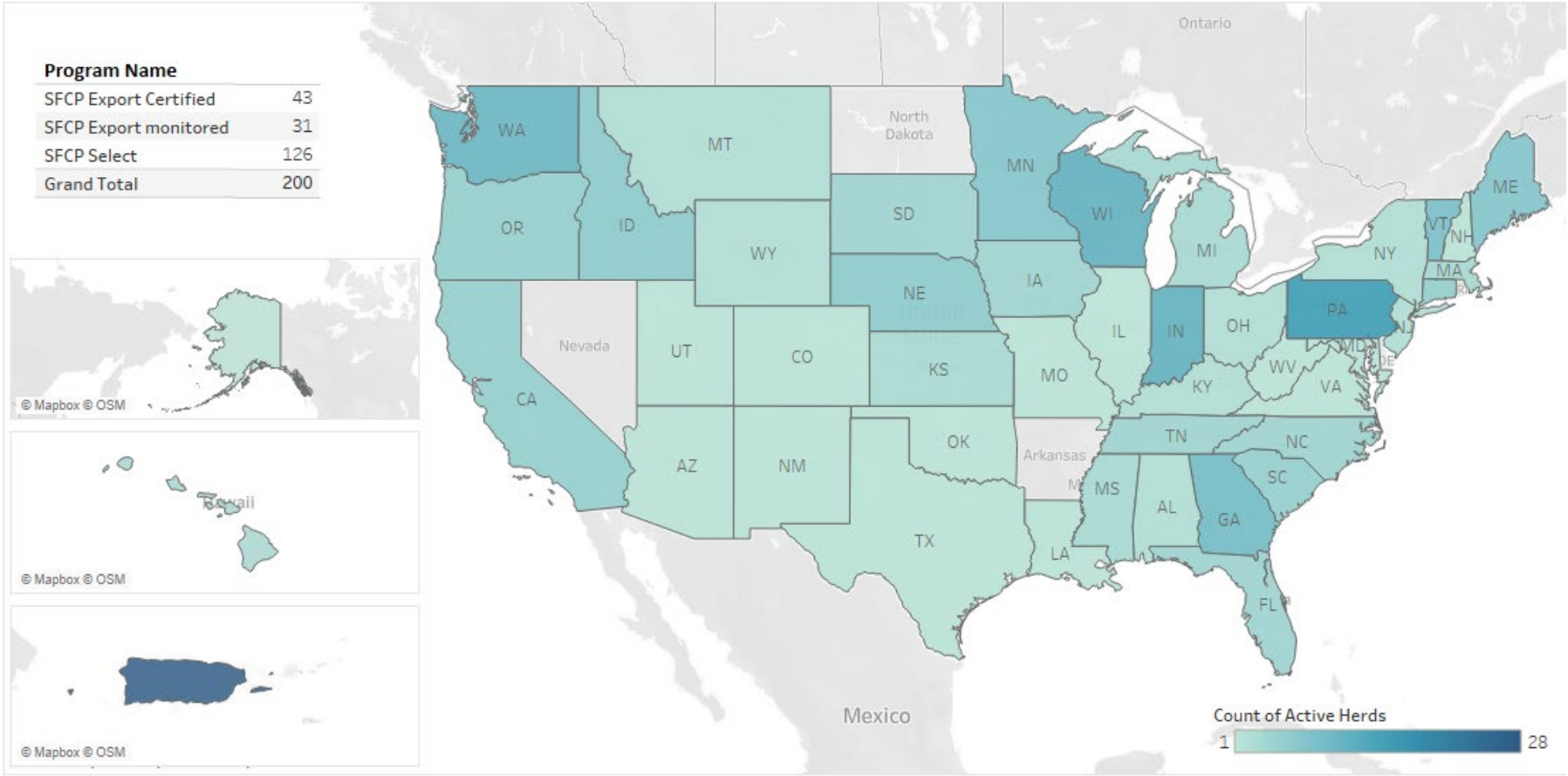
Infected and Source Flocks
New Statuses by Year – *Fiscal Years 1997 to 2021**



(Chart 3)

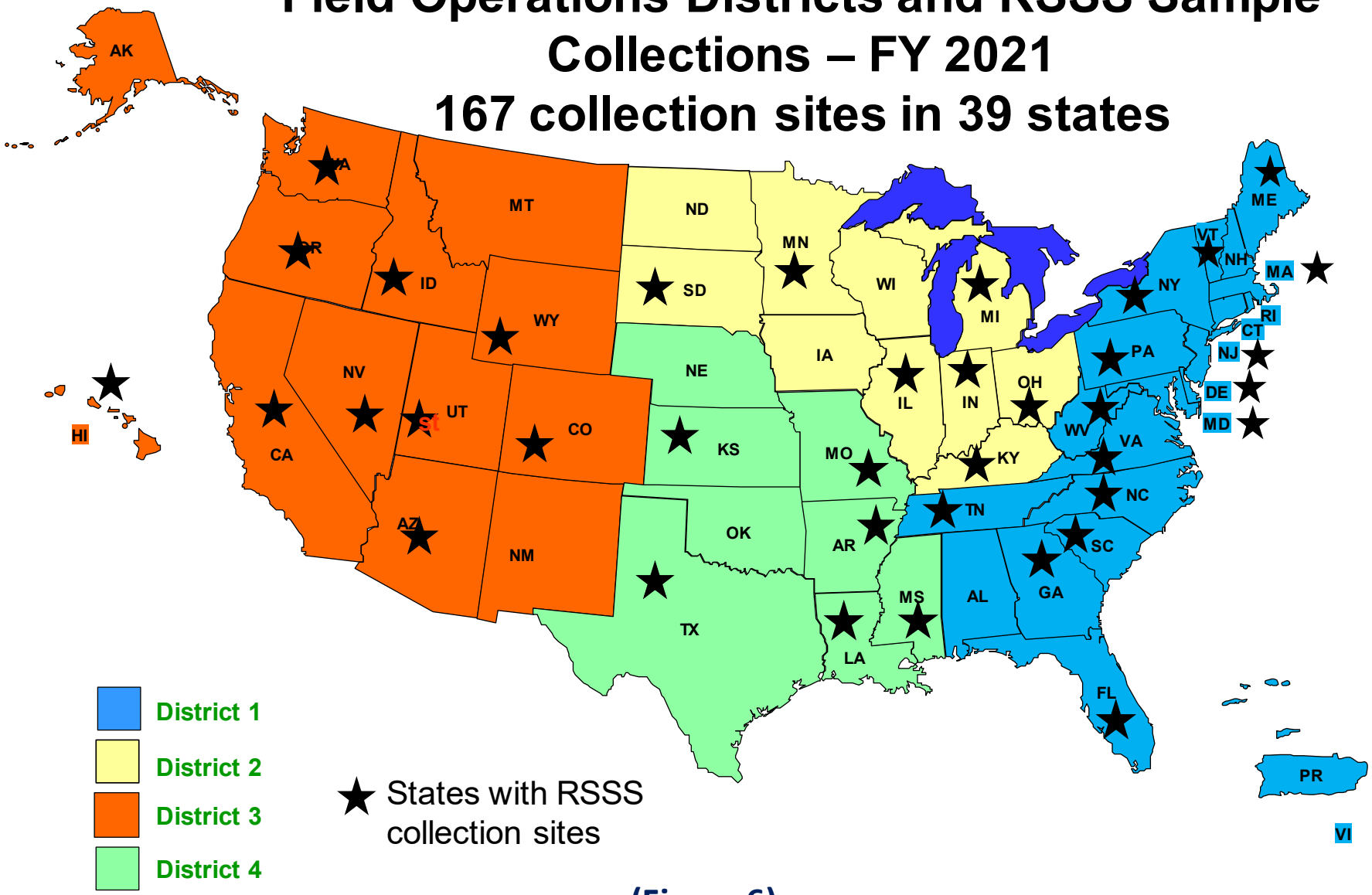
*106 FY 2021 samples are pending testing.

Scrapie Free Flock Certification Program: Participating Flocks and Herds



(Figure 5)

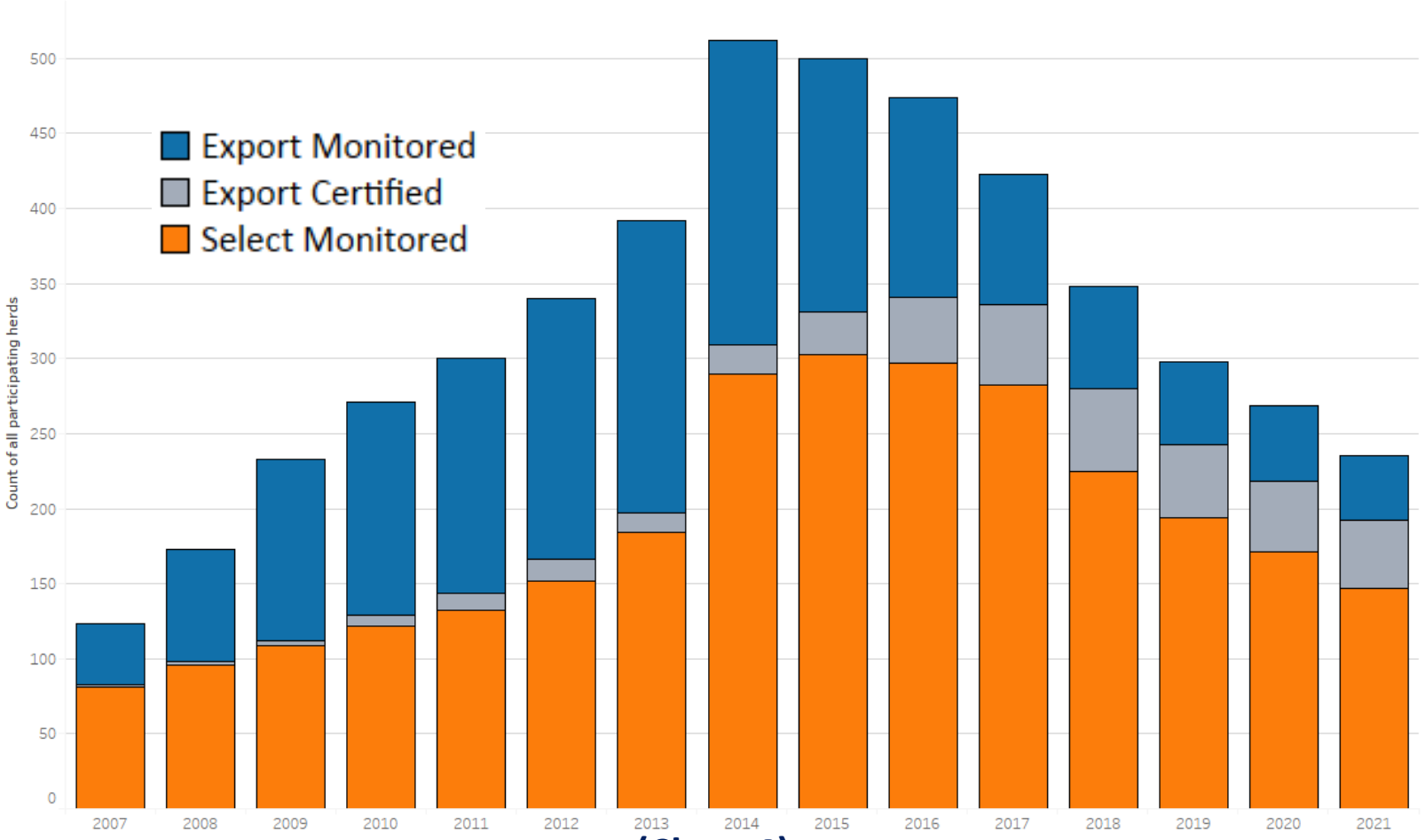
Field Operations Districts and RSSS Sample Collections – FY 2021
167 collection sites in 39 states



(Figure 6)

SFCP Participating Flocks Based on Status Date

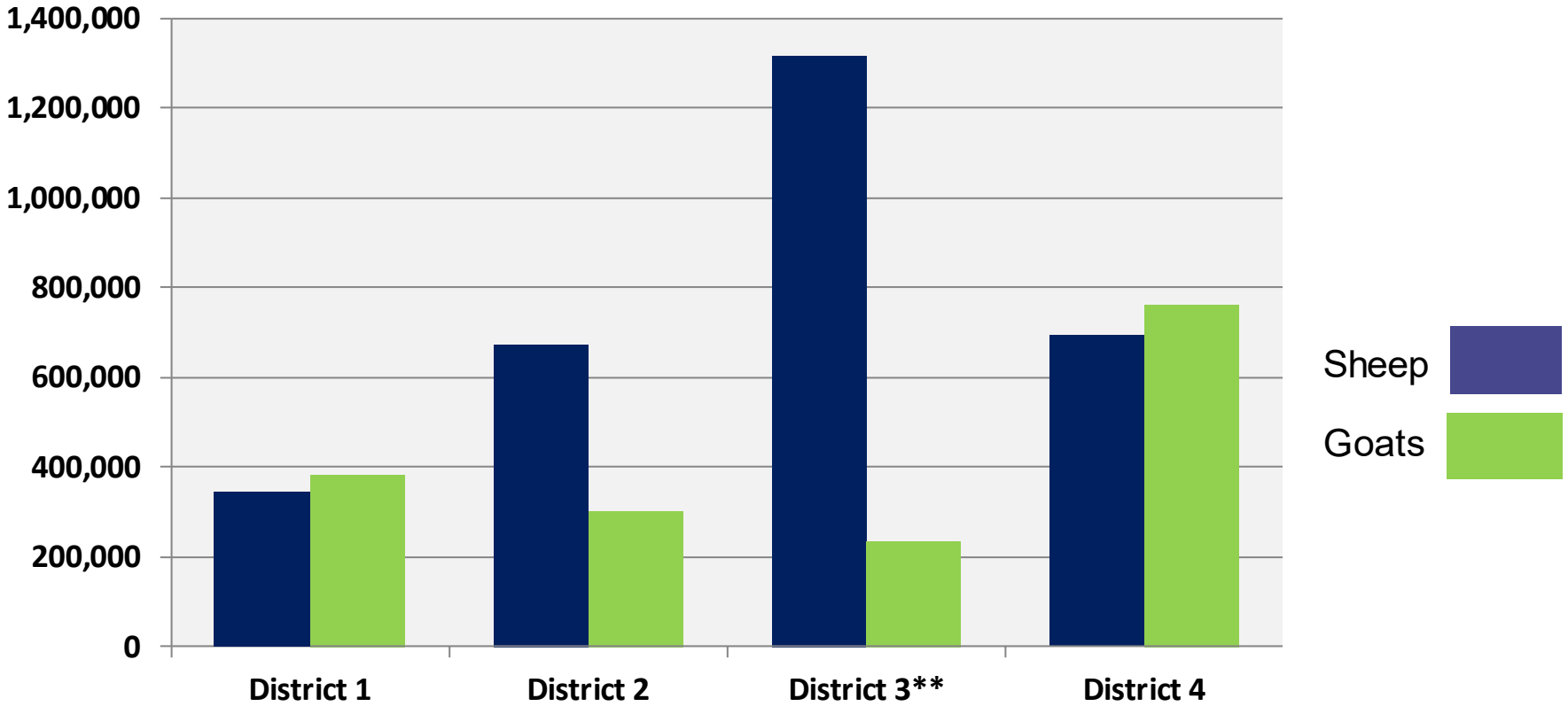
FY 2007 to FY 2021



(Chart 4)

Represents the cumulative change in SFCP enrollment over time, and includes open and closed statuses/programs, and active and inactive flocks/herds. Chart is based on current or last status date; many participating flocks were grandfathered into Export program in 2013 with earlier status date.

Total Breeding Adult Sheep and Goat Populations by District*



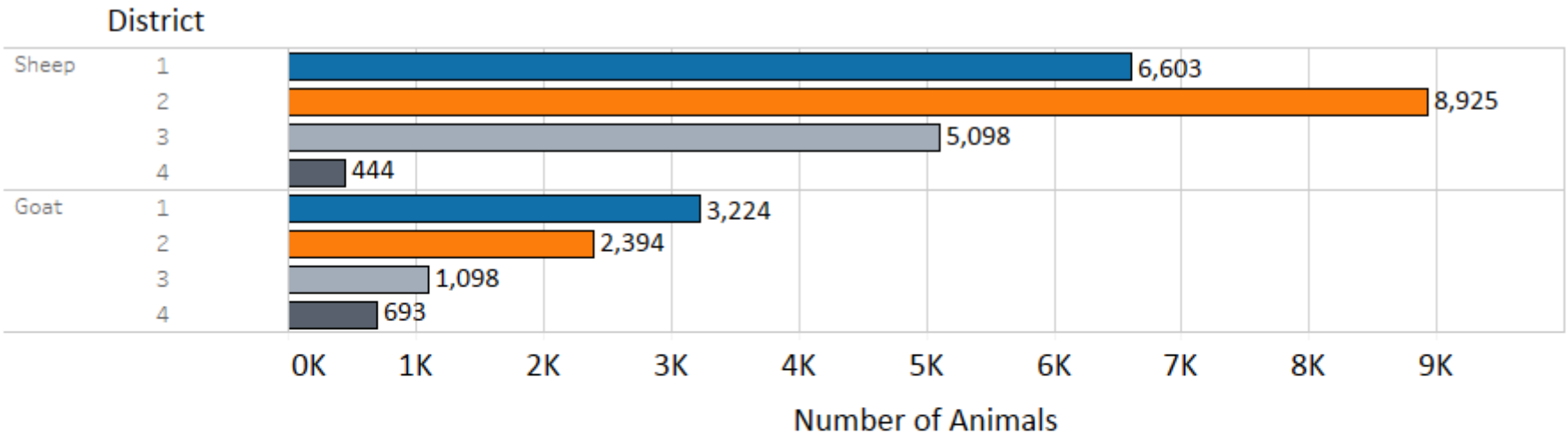
(Chart 5)

* Source: NASS Sheep and Goat, January 31, 2021.

** Does not include sheep and goats residing on the Navajo Nation.

Total RSSS Samples Collected by District

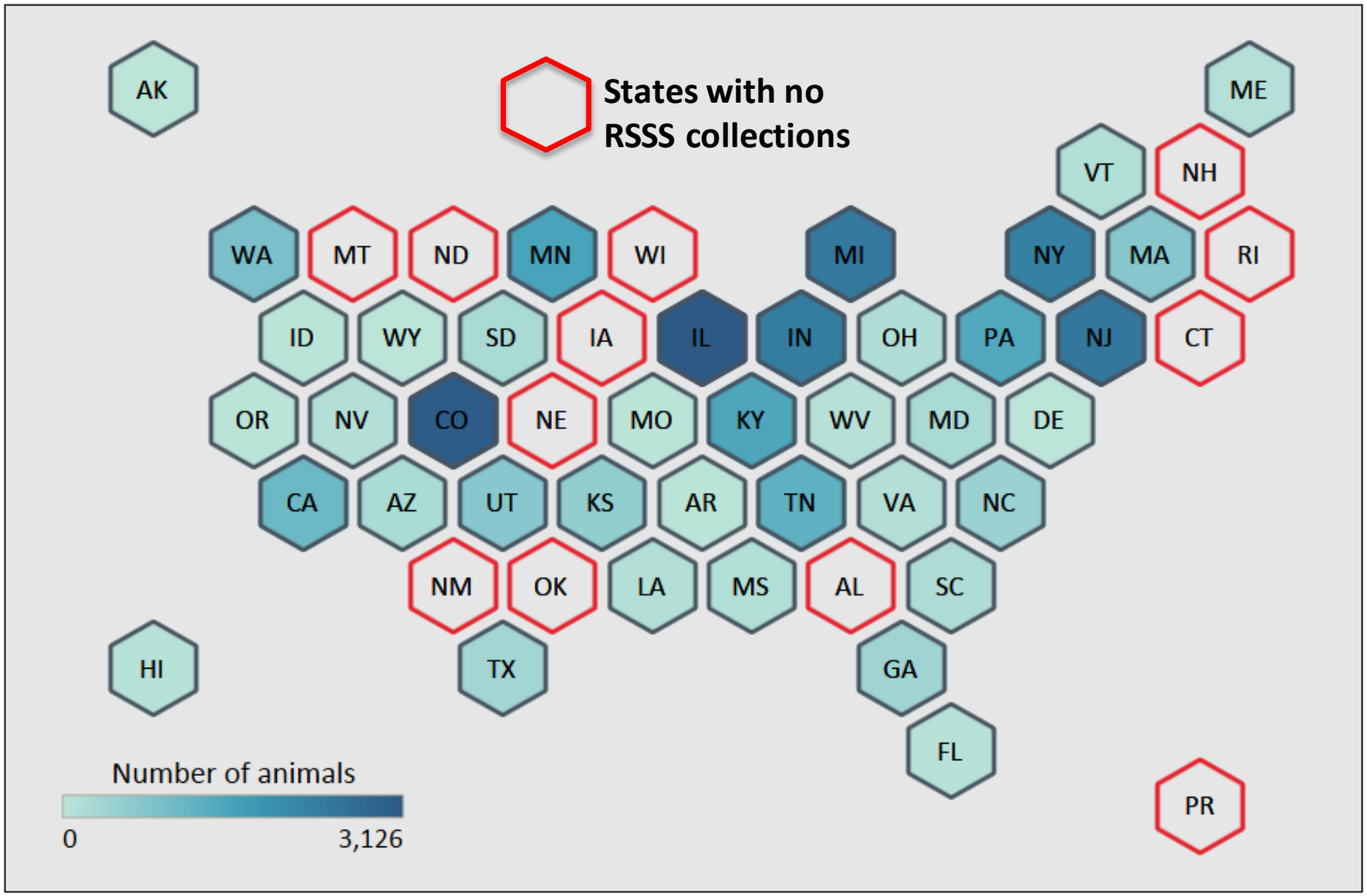
FY 2021



(Chart 6)

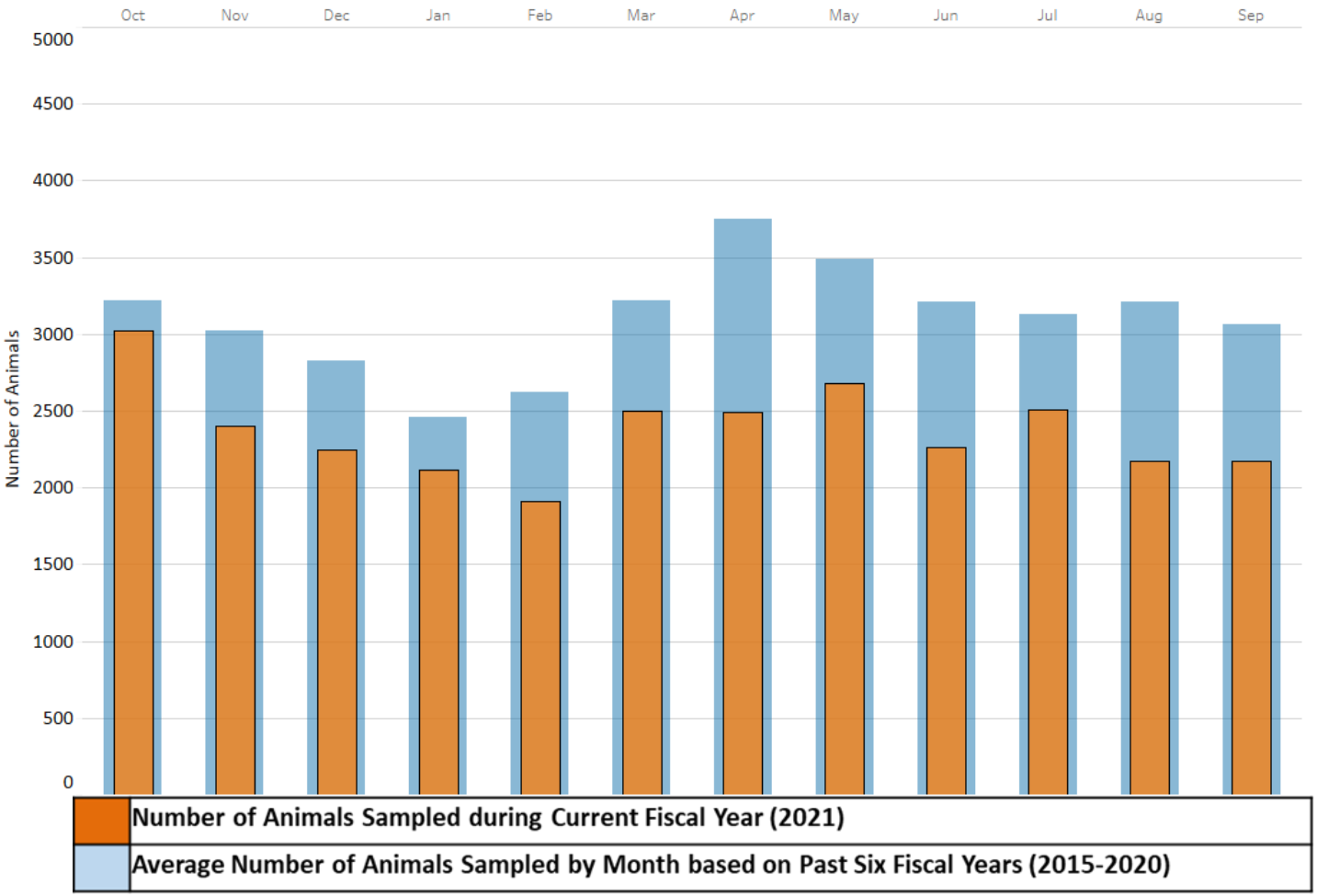
Total RSSS Samples Collected by State

FY 2021



(Figure 7)

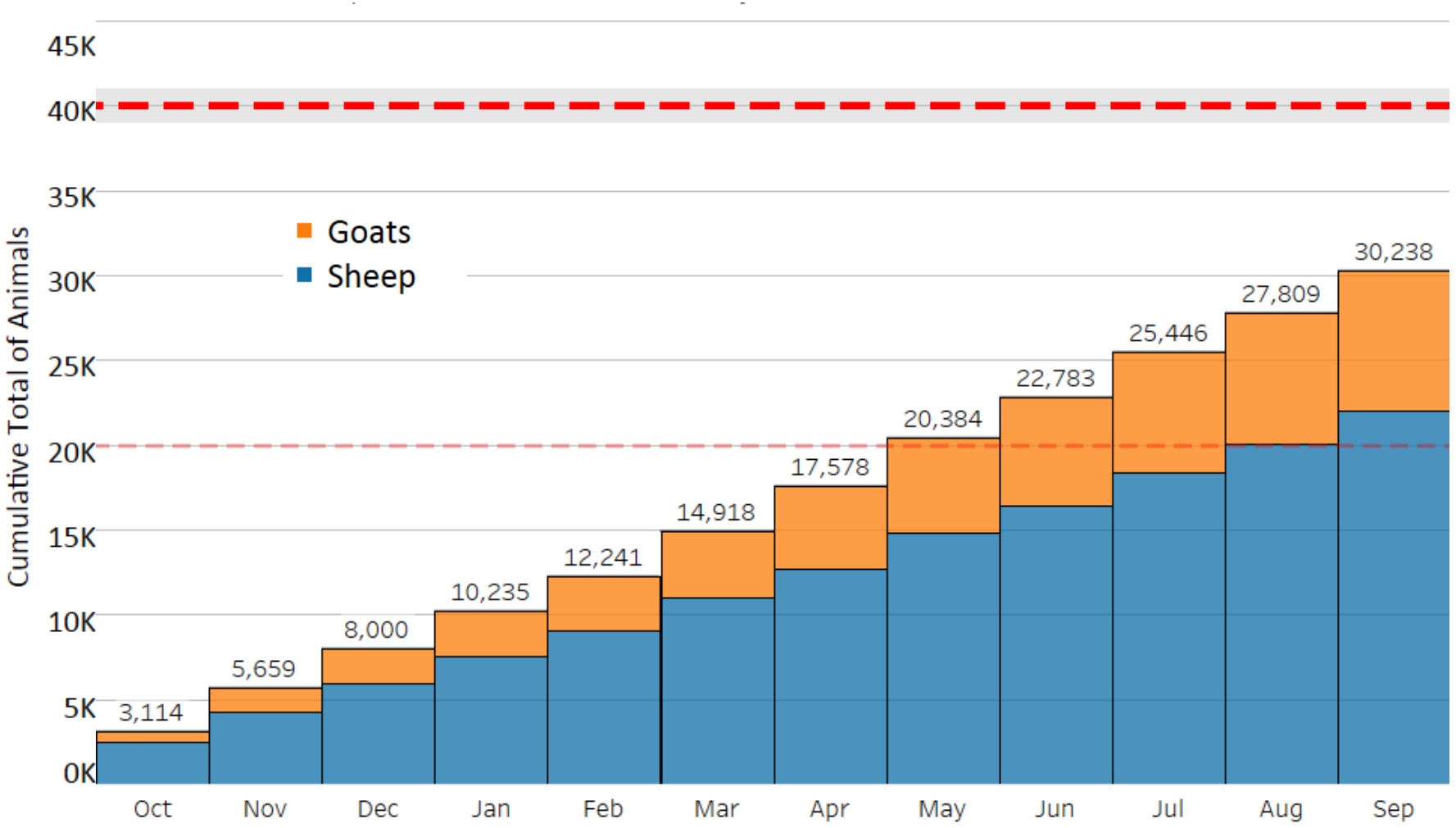
Comparison by Month of RSSS Samples Collected in FY 2021 to Average of FY 2015 – FY 2020



(Chart 7)

Cumulative Number of Animals Sampled by Month

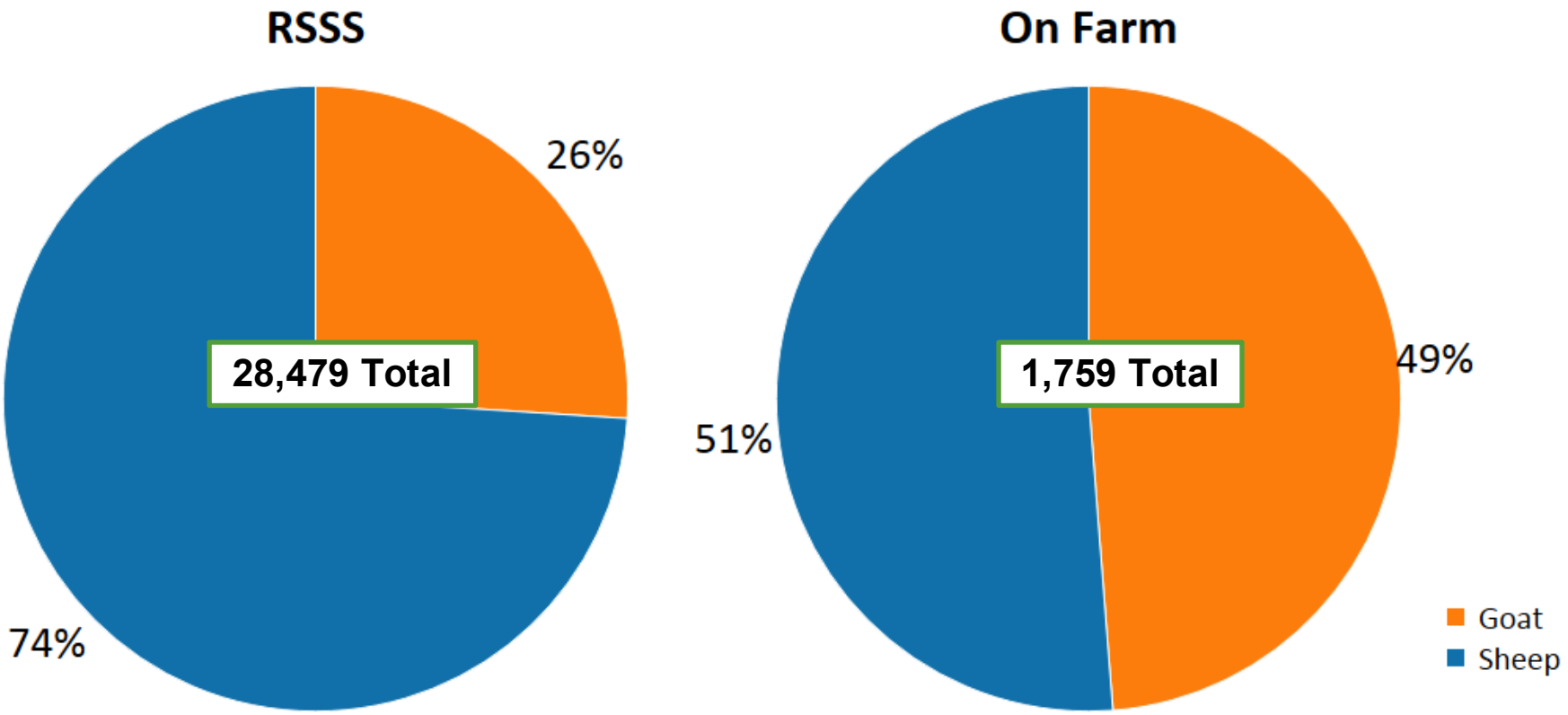
FY 2021



(Chart 8)

RSSS and On-Farm Surveillance Sampling by Species

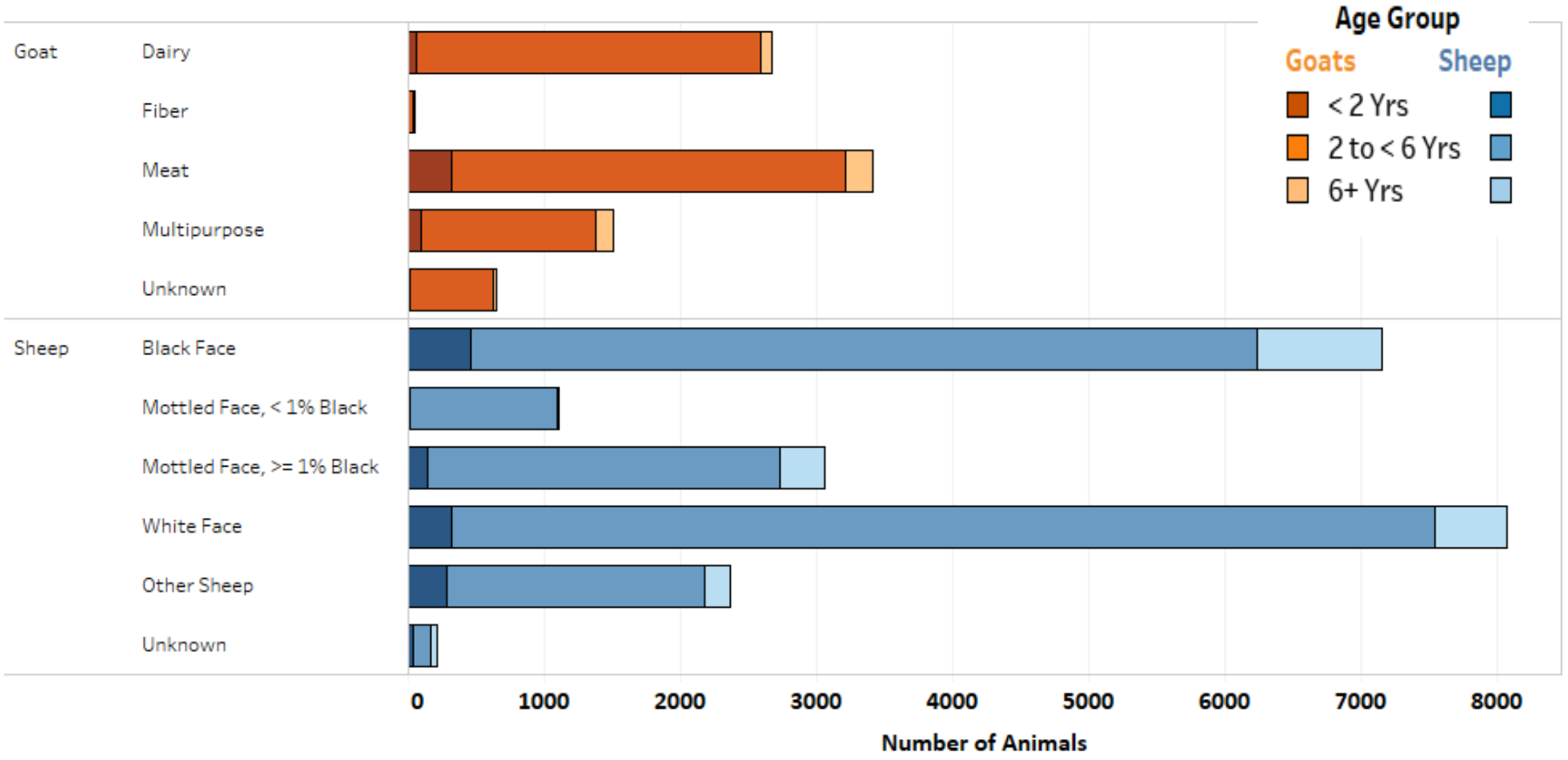
FY 2021



(Chart 9)

RSSS and On-Farm Surveillance Testing by Species

FY 2021



(Chart 10)

RSSS and On-Farm Surveillance Testing by Species FY 2021

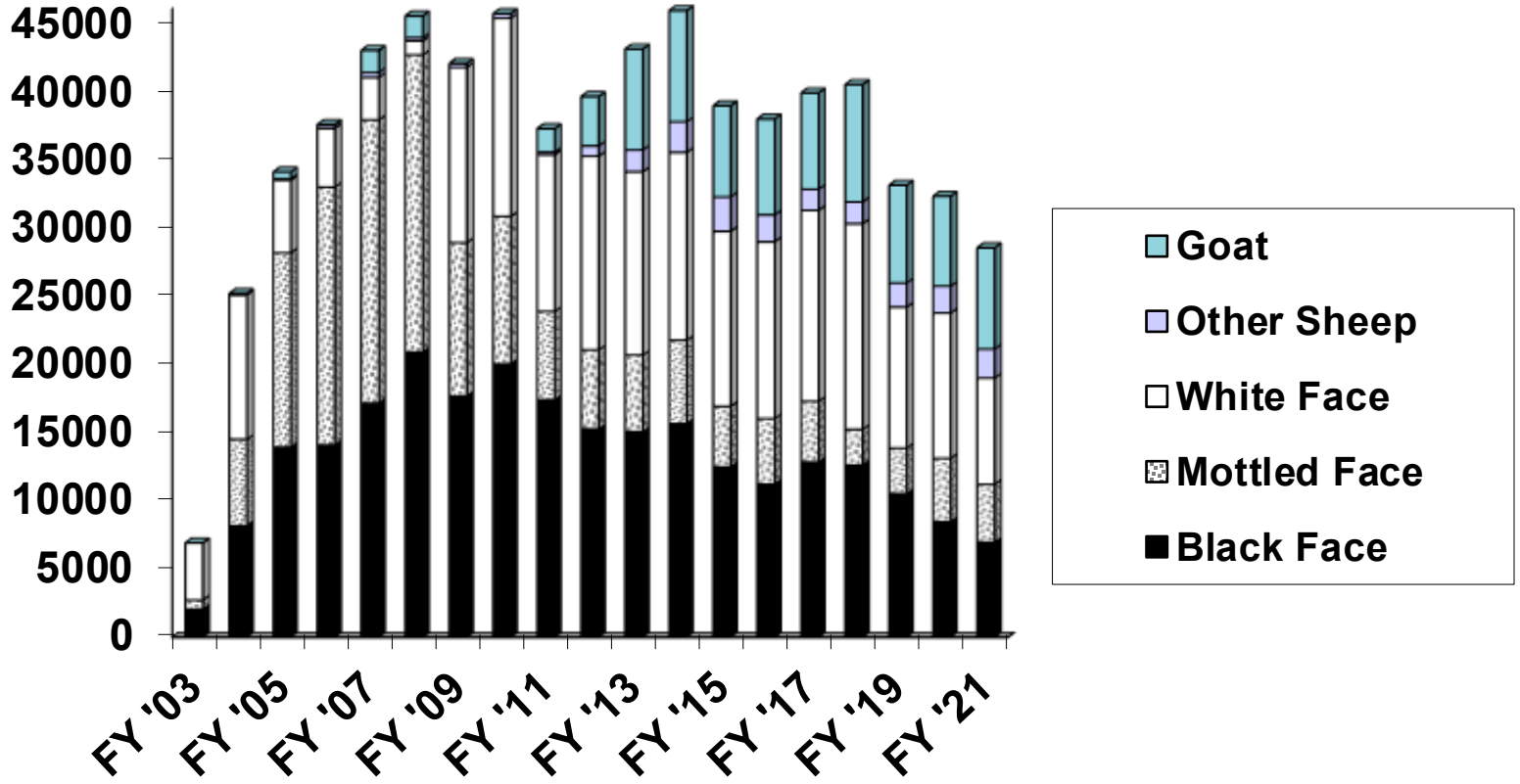
		Age Group			
Species	Type	<2 Years	2 to <6 Years	6+ Years	Grand Total
Goat	Dairy	55	2,539	78	2,672
	Fiber		34	4	38
	Meat	320	2,892	201	3,413
	Multipurpose	90	1,289	122	1,501
	Unknown	11	607	25	643
	Total	476	7,361	430	8,267
Sheep	Black Face	461	5,782	913	7,156
	Mottled Face, < 1% Black	7	1,090	8	1,105
	Mottled Face, >= 1% Black	144	2,584	330	3,058
	White Face	312	7,233	525	8,070
	Other Sheep	277	1,900	193	2,370
	Unknown	41	125	46	212
	Total	1,242	18,714	2,015	21,971
Grand Total		1,718	26,075	2,445	30,238

Number of Records
4 7,233

(Table 1)

Darker shading represents greater number of animals tested that met targeting criteria.

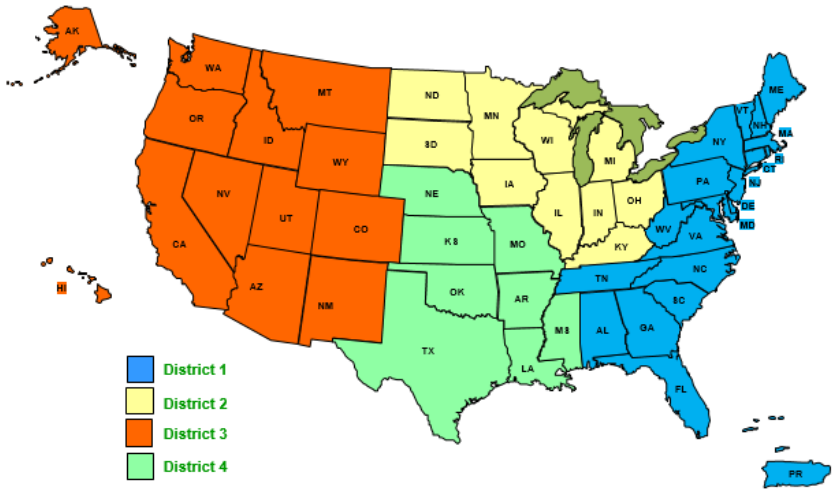
Surveillance Samples Collected at Slaughter FY 2003 – 2021



(Chart 11)

Other sheep includes hair sheep, and sheep with gray, red, or unknown face color. Chart includes animals collected for RSSS & CSPS.

FY 2021 Sheep and Goat State Sampling Minimums[1] and State Collections - *District 1*

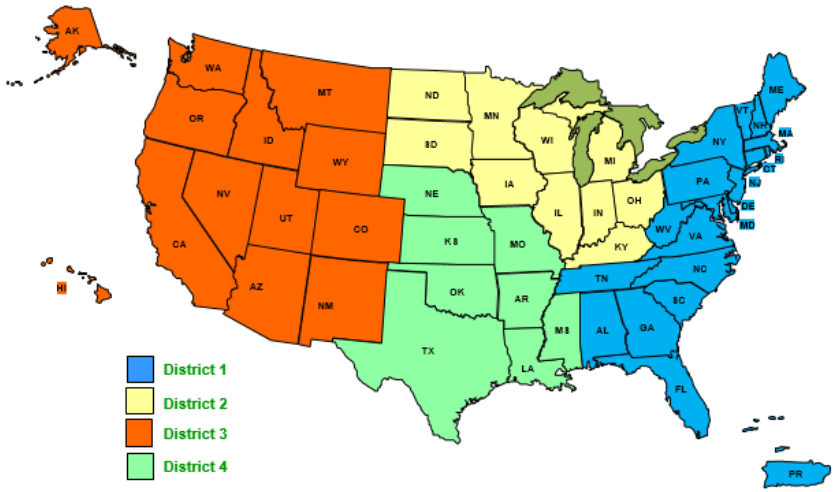


State	Sheep		Goat	
	Total Sampled FY 2021	Sampling Minimum FY 2021	Total Sampled FY 2021	Sampling Minimum FY 2021
Alabama	111	17	104	65
Connecticut	35	14	25	6
Delaware	17	4	7	2
Florida	38	17	113	71
Georgia	153	51	148	86
Maine	100	32	19	7
Maryland	119	48	59	15
Massachusetts	487	32	91	9
New Hampshire	67	21	9	5
New Jersey	92	37	35	12
New York	412	249	160	44
North Carolina	254	78	105	68
Pennsylvania	486	403	296	68
Rhode Island	74	6	12	1
South Carolina	48	26	124	45
Tennessee	1057	138	328	136
Vermont	101	41	28	11
Virginia	467	311	108	62
West Virginia	231	101	77	26

(Table 2)

[1]State minimums are adjusted for COVID impacts

FY 2021 Sheep and Goat State Sampling Minimums[1] and State Collections - *District 2*

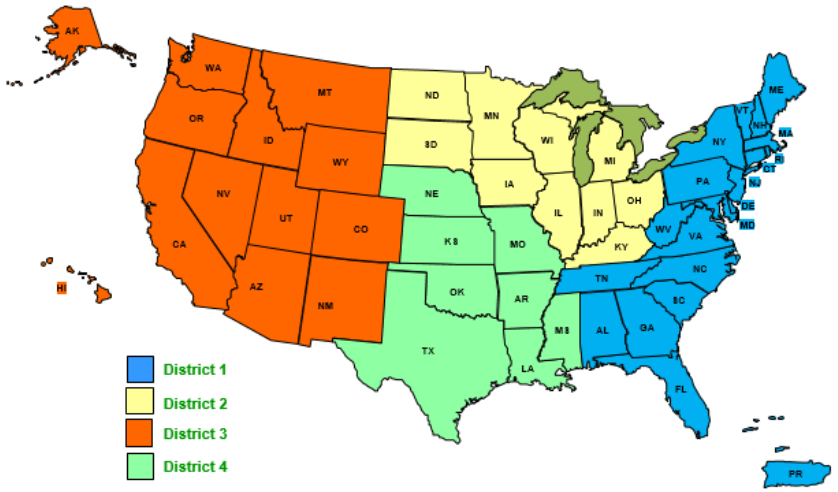


State	Sheep		Goat	
	Total Sampled FY 2021	Sampling Minimum FY 2021	Total Sampled FY 2021	Sampling Minimum FY 2021
Illinois	414	360	161	55
Indiana	562	380	126	81
Iowa	745	740	321	105
Kentucky	564	171	94	103
Michigan	776	351	91	46
Minnesota	984	300	508	62
North Dakota	823	189	26	9
Ohio	874	740	117	87
South Dakota	2067	702	69	26
Wisconsin	863	389	669	164

(Table 3)

[1]State minimums are adjusted for COVID impacts

FY 2021 Sheep and Goat State Sampling Minimums[1] and State Collections - *District 3*

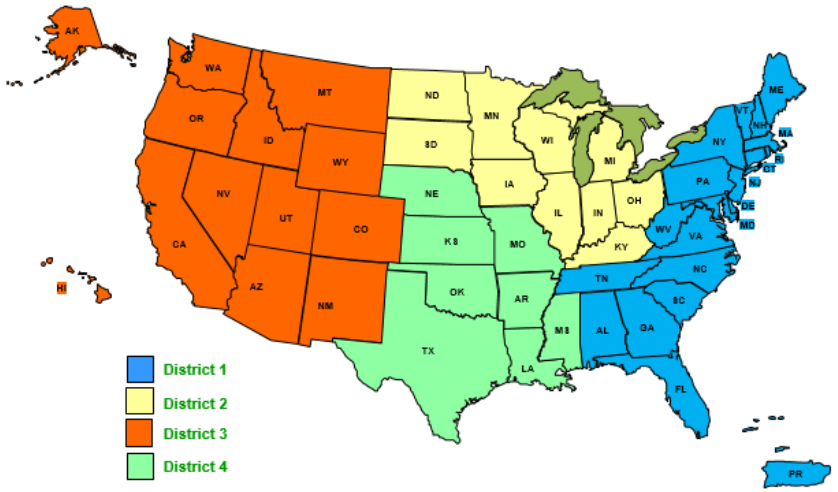


State	Sheep		Goat	
	Total Sampled FY 2021	Sampling Minimum FY 2021	Total Sampled FY 2021	Sampling Minimum FY 2021
Alaska	9	1	6	1
Arizona	143	56	88	30
California	764	535	433	273
Colorado	1326	589	287	68
Hawaii	66	45	43	31
Idaho	404	467	74	49
Montana	1172	269	32	26
Nevada	271	172	36	22
New Mexico	302	47	79	26
Oregon	294	184	64	91
Utah	771	361	71	31
Washington	345	56	99	64
Wyoming	1223	443	49	26

(Table 4)

[1]State minimums are adjusted for COVID impacts

FY 2021 Sheep and Goat State Sampling Minimums[1] and State Collections - *District 4*

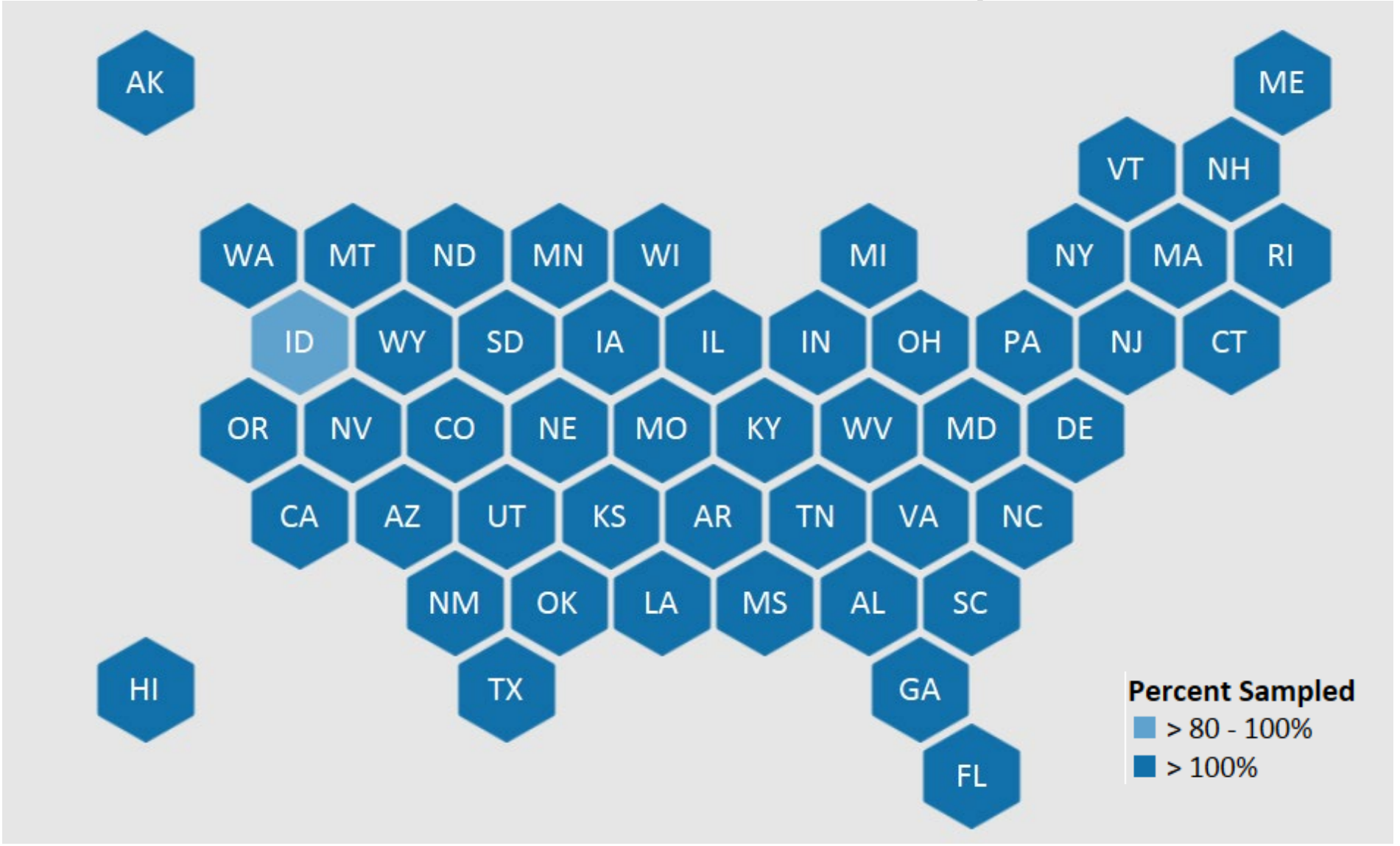


State	Sheep		Goat	
	Total Sampled FY 2021	Sampling Minimum FY 2021	Total Sampled FY 2021	Sampling Minimum FY 2021
Arkansas	38	16	111	78
Kansas	443	103	232	106
Louisiana	62	12	58	39
Mississippi	38	19	83	53
Missouri	372	132	400	197
Nebraska	513	113	107	62
Oklahoma	148	68	264	204
Texas	764	679	1653	740

(Table 5)

[1]State minimums are adjusted for COVID impacts

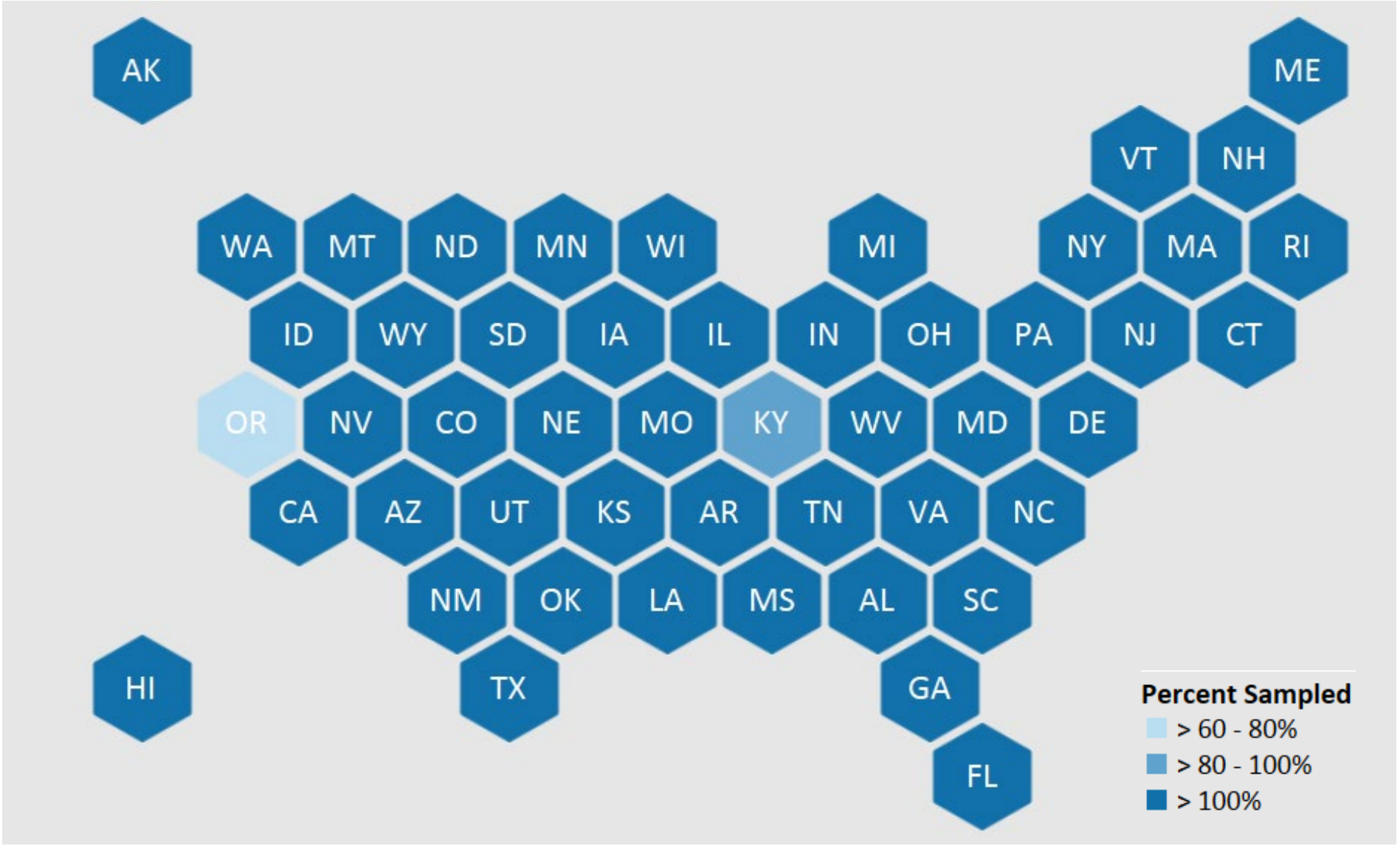
Percent of Sampling Minimum Achieved in FY 2021[1] - RSSS and On-farm Surveillance - Sheep



(Figure 8)

[1]State minimums are adjusted for COVID impacts

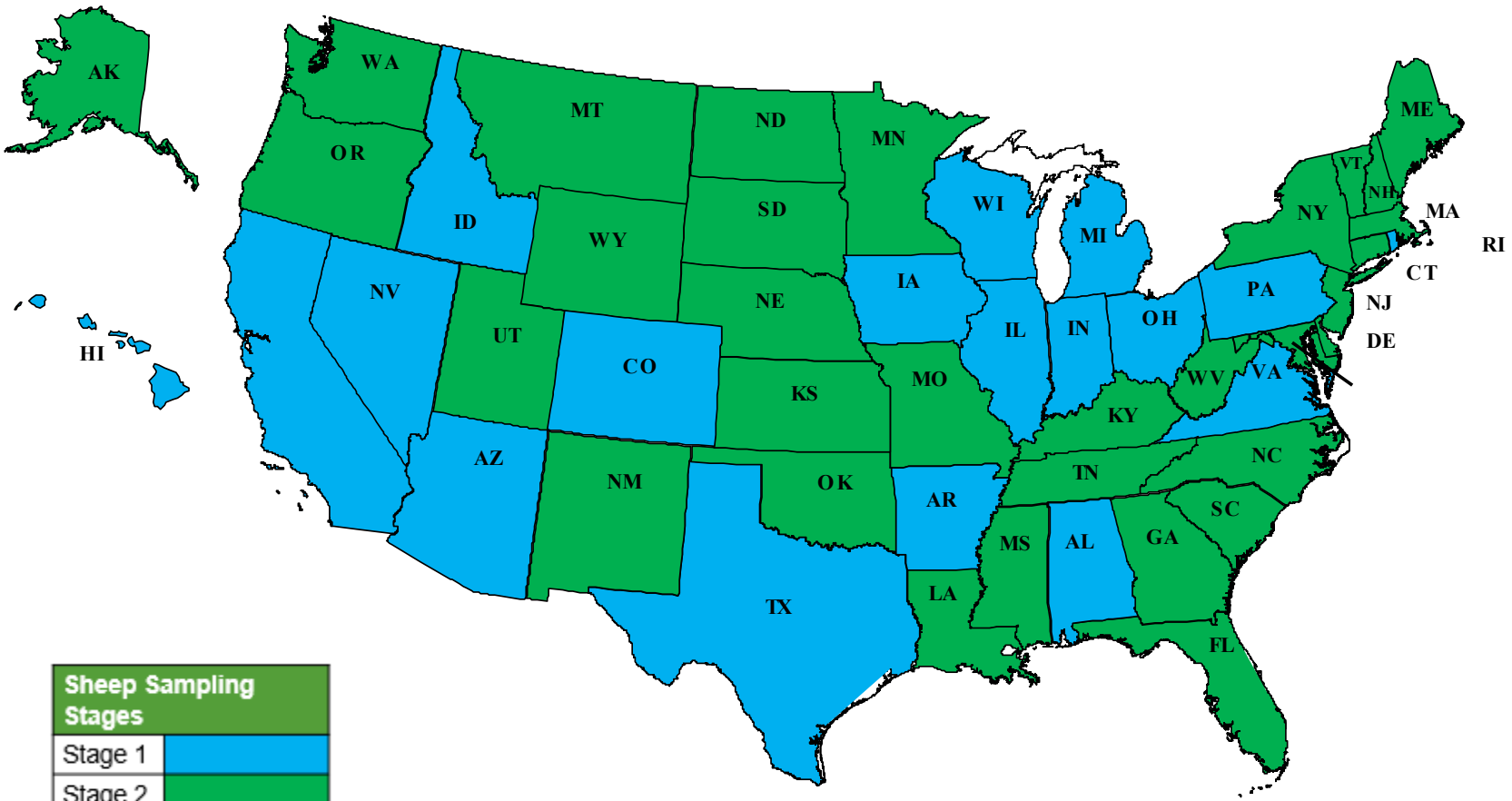
Percent of Sampling Minimum Achieved in FY 2021[1] - RSSS and On-farm Surveillance - Goats



(Figure 9)

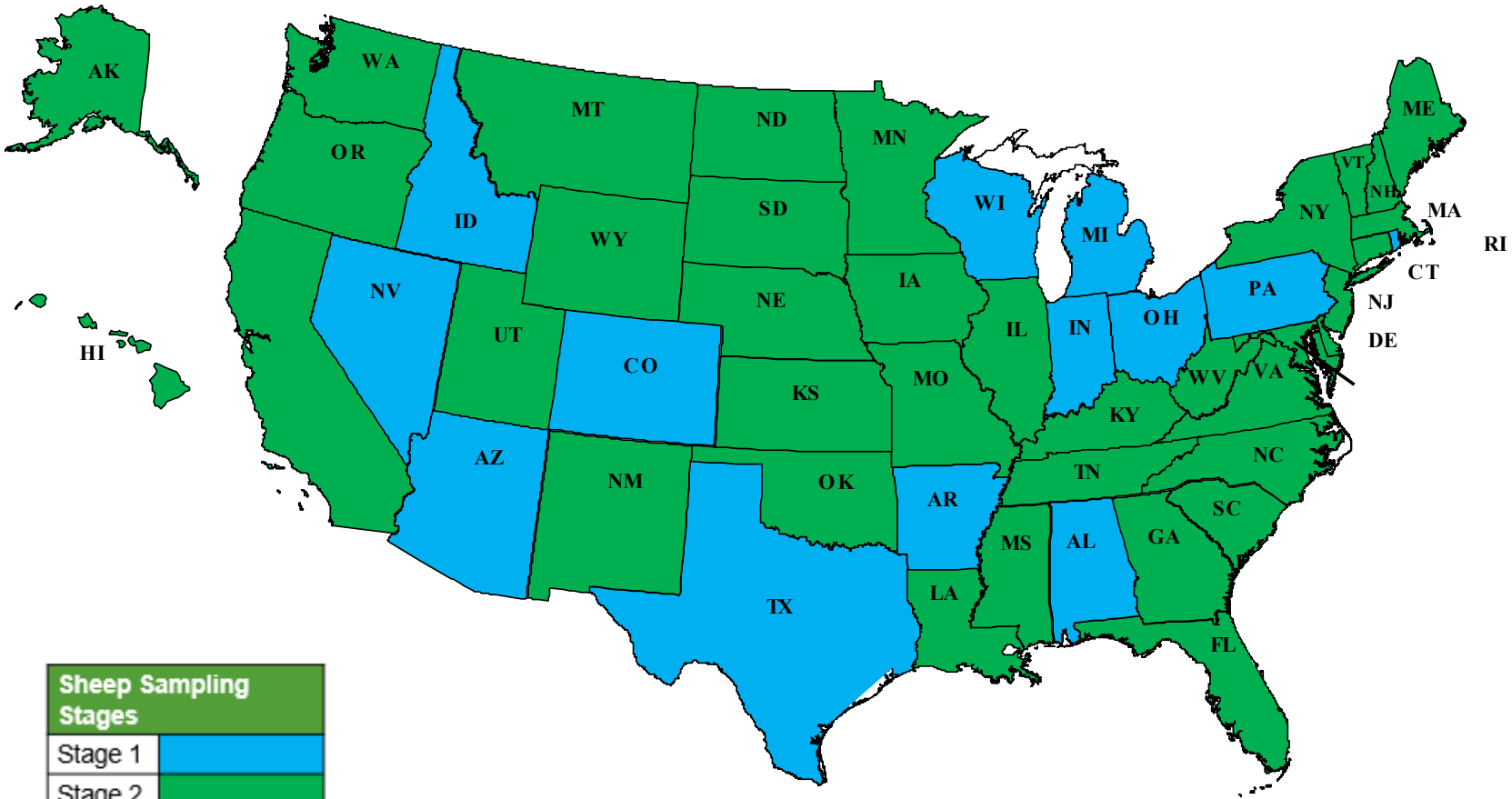
[1]State minimums are adjusted for COVID impacts
AK and RI have a sampling minimum of 1, and DE has a sampling minimum of 2.

FY 2021 Sheep Surveillance Sampling Stages



(Figure 10)

FY 2022 Sheep Surveillance Sampling Stages



(Figure 11)