



National Scrapie Eradication Program Progress Report

USDA APHIS Veterinary Services
June 2024



National Scrapie Eradication Program (NSEP)



Mission

- To eradicate classical scrapie from the sheep and goat population in the U.S.,
- To document the eradication of classical scrapie, and
- To achieve scrapie-free status in the U.S., as described by the World Organisation for Animal Health (formerly, OIE)

https://www.aphis.usda.gov/animal_health/animal_diseases/scrapie/downloads/monthly_scrapie_report.pdf

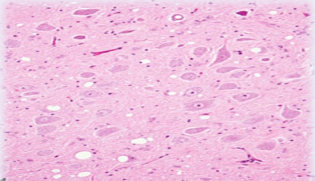


Advances in Scrapie Diagnosis and Genetics

Decades of advancements in science and program implementation have improved diagnosis in animals and eradication of scrapie from flocks/herds.



Prior to 1990's

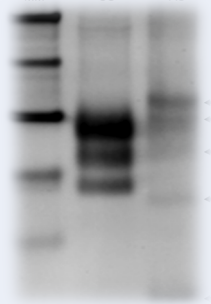


1a
Pathological changes in a scrapie infected brain.

Clinical signs, histopathology, and mouse bioassays were used for diagnosis. The mouse bioassay was used for autolyzed tissues and took up to 18 months to 2 years to diagnose a clinical animal.

Greenlee JJ. Review: Update on Classical and Atypical Scrapie in Sheep and Goats. *Veterinary Pathology*. 2019;56(1):6-16. doi:10.1177/0300985818794247

Western Blot 1990-1992

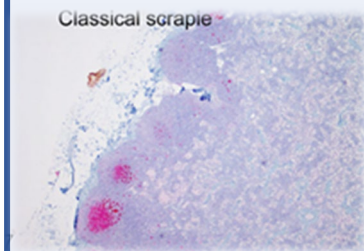


Use of western blot to diagnose scrapie allowed for a diagnosis in tissues that were severely autolyzed and in peripheral tissues such as lymph nodes and tonsils where PrPsc was deposited during the incubation period.

Greenlee JJ. Review: Update on Classical and Atypical Scrapie in Sheep and Goats. *Veterinary Pathology*. 2019;56(1):6-16. doi:10.1177/0300985818794247



IHC 1993



The immunohistochemistry (IHC) test allows for a diagnosis in tissues such as lymph nodes and tonsils where PrPsc was deposited during the incubation period and in CNS tissues where the histological lesions required for an official diagnosis were not always present.

Greenlee JJ. Review: Update on Classical and Atypical Scrapie in Sheep and Goats. *Veterinary Pathology*. 2019;56(1):6-16. doi:10.1177/0300985818794247

Genetics-Sheep 1994

Ewe (136/171)	Ram (136/171)		
	AQ	VQ	AR
AQ	AA QQ*	AV QQ	AA QR
VQ	AV QQ	VV QQ	AV QR*
AR	AA QR	AV QR*	AA RR

Highly Susceptible Rarely Susceptible Resistant

Research found that homozygosity for glutamine (Q) at Codon 171 of the prion protein gene predisposes a sheep to natural scrapie if exposed to the agent. This led to the finding that the presence of arginine (R) at codon 171 conferred resistance to scrapie.

Image: USDA Source

Live Animal Testing 2000/2005



Preclinical diagnosis of scrapie by sampling the third eyelid (2000) and rectal mucosa (2005). Scrapie PrPsc is deposited into the lymphoid tissue associated with the third eyelid and rectal mucosa where it can then be detected by IHC. The third eyelid sample was the first test that could be conducted on live animals at the farm.

Image: USDA Source



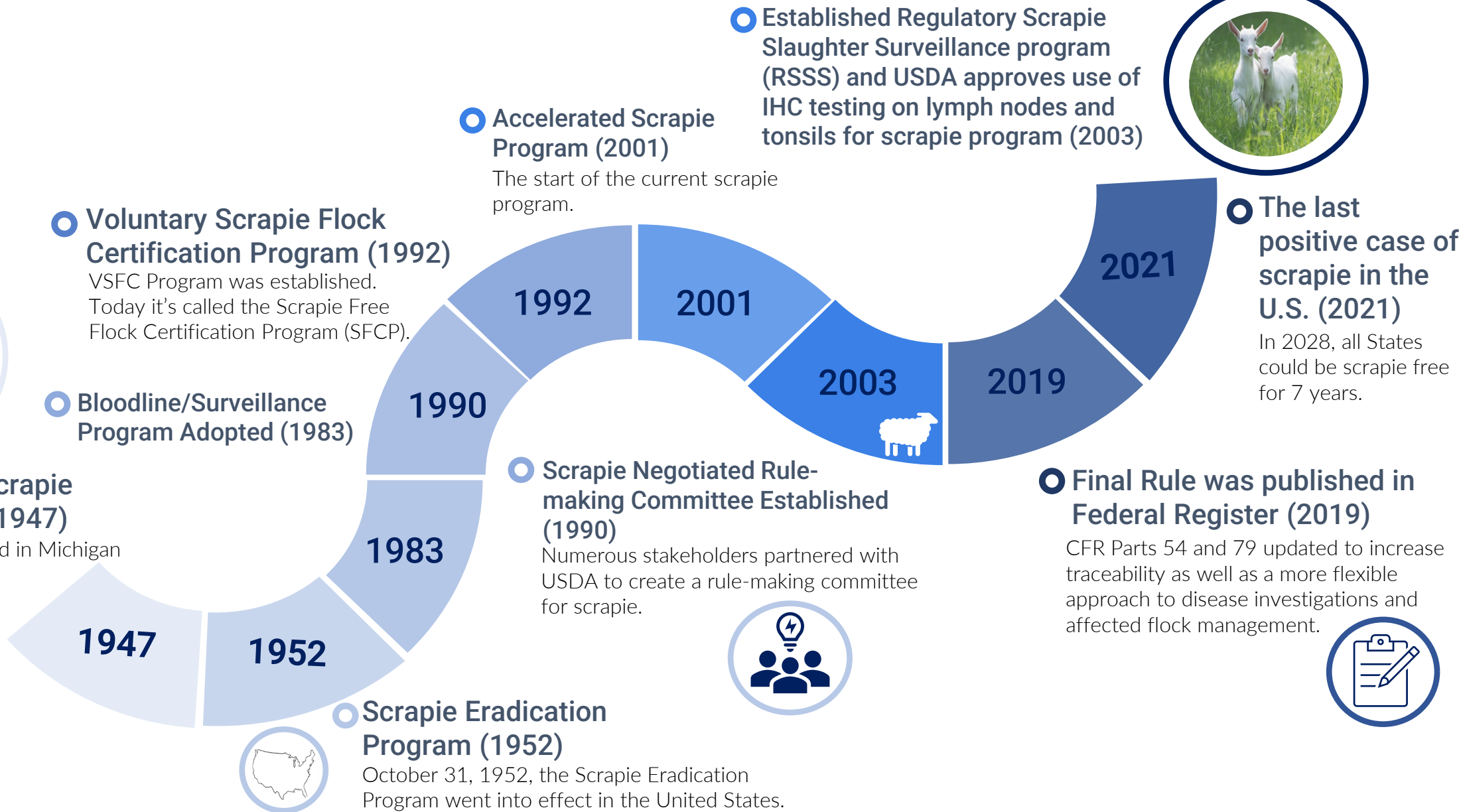
Genetics-Goats 2017

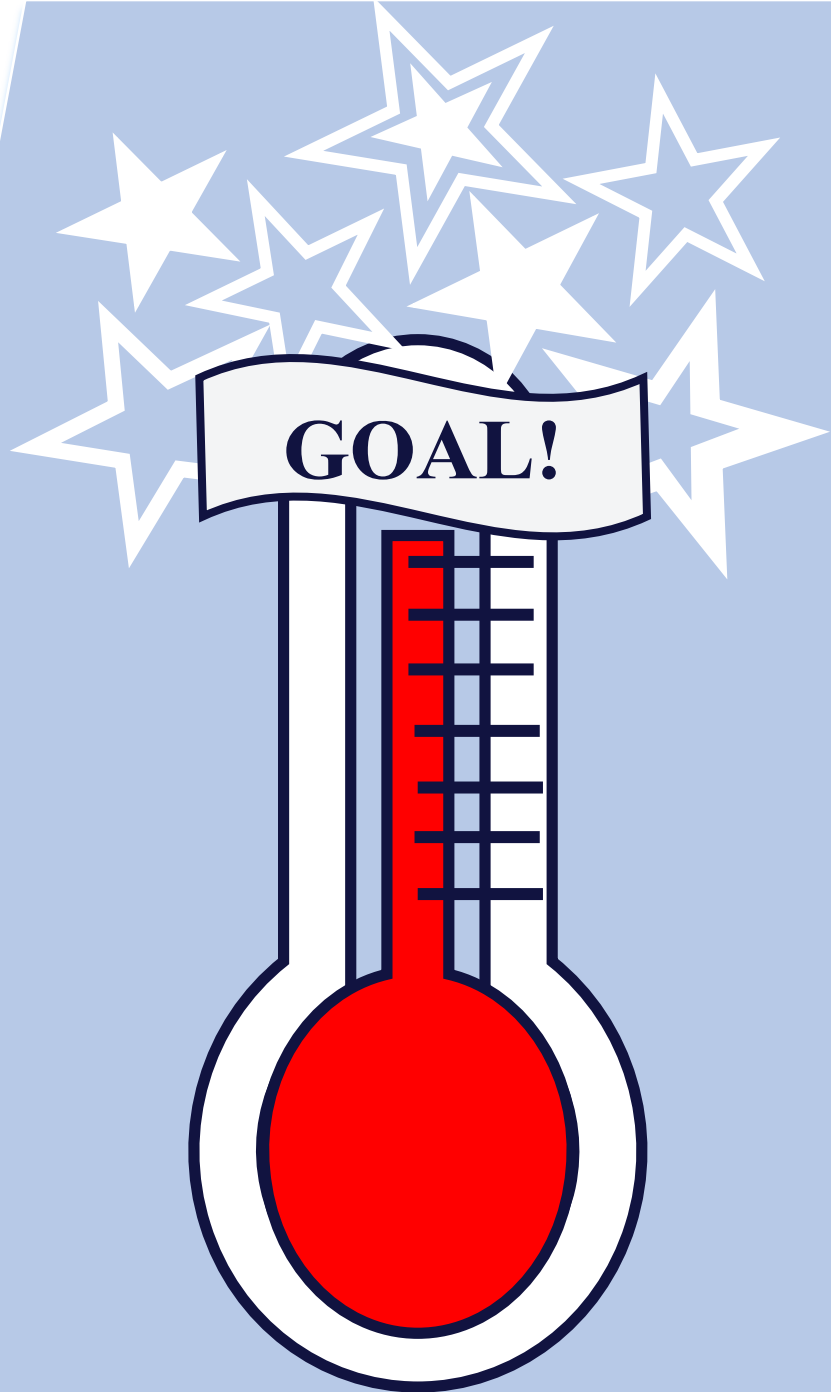
Doe at Codon 146	Buck at codon 146	
	N	S
N	NN- Susceptible	NS- Less susceptible
S	NS- Less susceptible	SS- Less susceptible

In 2017, the European Commission recommended the use of genetics in goats to mitigate the risk of scrapie to sheep and goat populations. "Goats bearing just a single copy of either allele S146 (serine [S] amino acid at prion protein position 146), and K222 (lysine [K] at position 222) have been strongly resistant to infection during natural outbreaks as well as direct challenge experiments."

Image: USDA Source

Scrapie Program Advancements from 1947–Present





Your hard work is paying off!

762,000+

RSSS samples collected since 2003

58,800+

On-farm samples collected since 1999

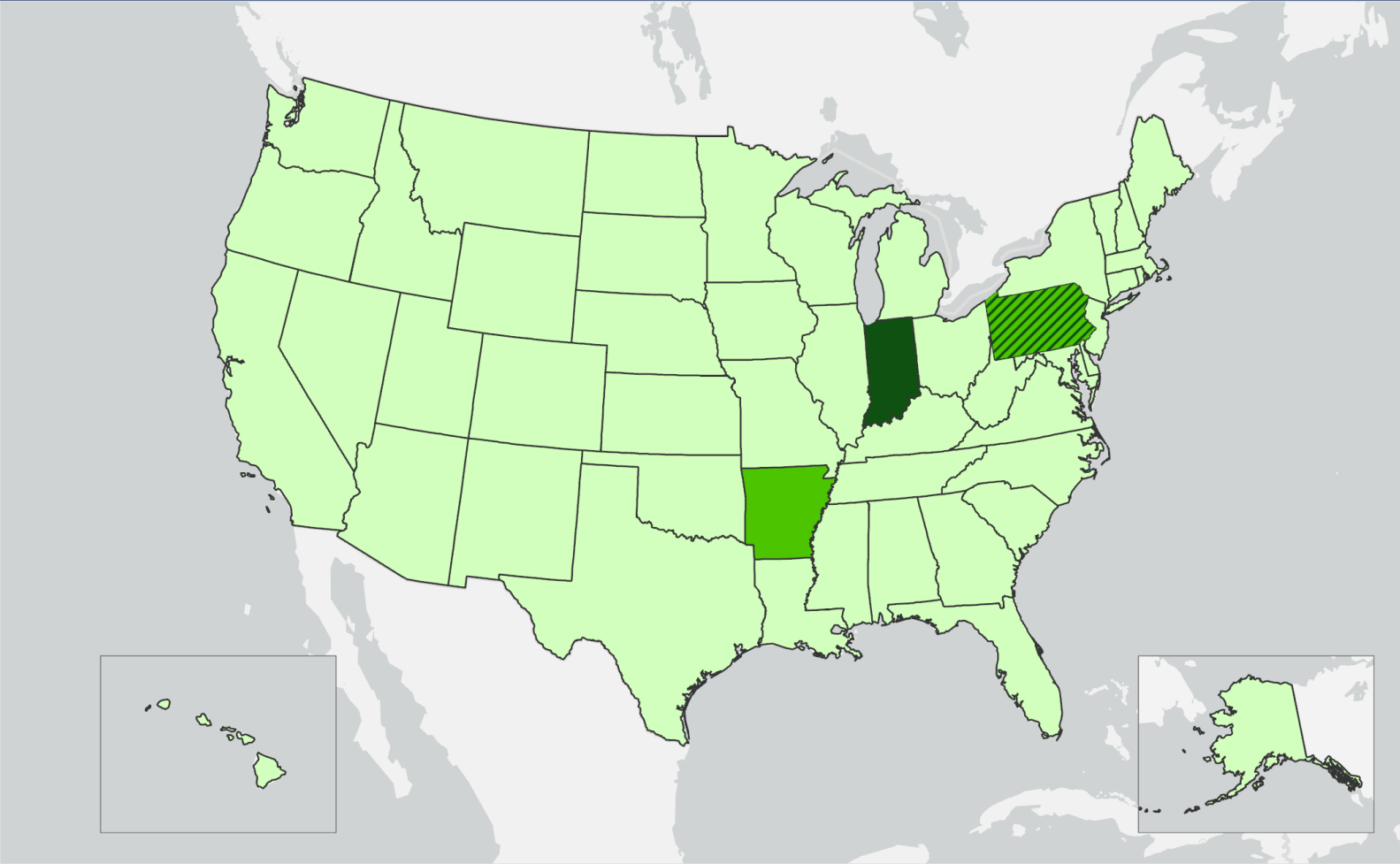
FY 2021

The last case of classical scrapie was found in the U.S. Since this finding, the NSEP has tested over 71,000 animals for scrapie.

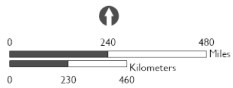
States Free of Classical Scrapie Cases greater than 7 Years



States Free of Classical Scrapie Cases



- States free of scrapie cases for more than 7 years
- States with cases of scrapie only in goats in last 7 years
- States with cases of scrapie only in sheep in last 7 years
- States with cases of scrapie in both sheep and goats in last 7 years



Data Source:
National Scrapie Database

Date Created:
1/26/2024

USDA APHIS
2150 Centre Ave
Fort Collins, Co 80526

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In FY 2023, APHIS VS provided over **\$1.5 million** to States and other cooperators to prevent, control, and monitor for scrapie and other diseases in U.S. sheep and goats.

Partnerships

There was a **15%** increase in total animals sampled through slaughter and on-farm in FY 2023 compared to FY 2022.

Surveillance

76% of the 2,203 slaughter sheep samples* that were genotyped in FY 2023 had resistant scrapie genetics

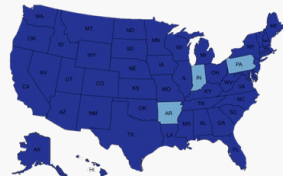
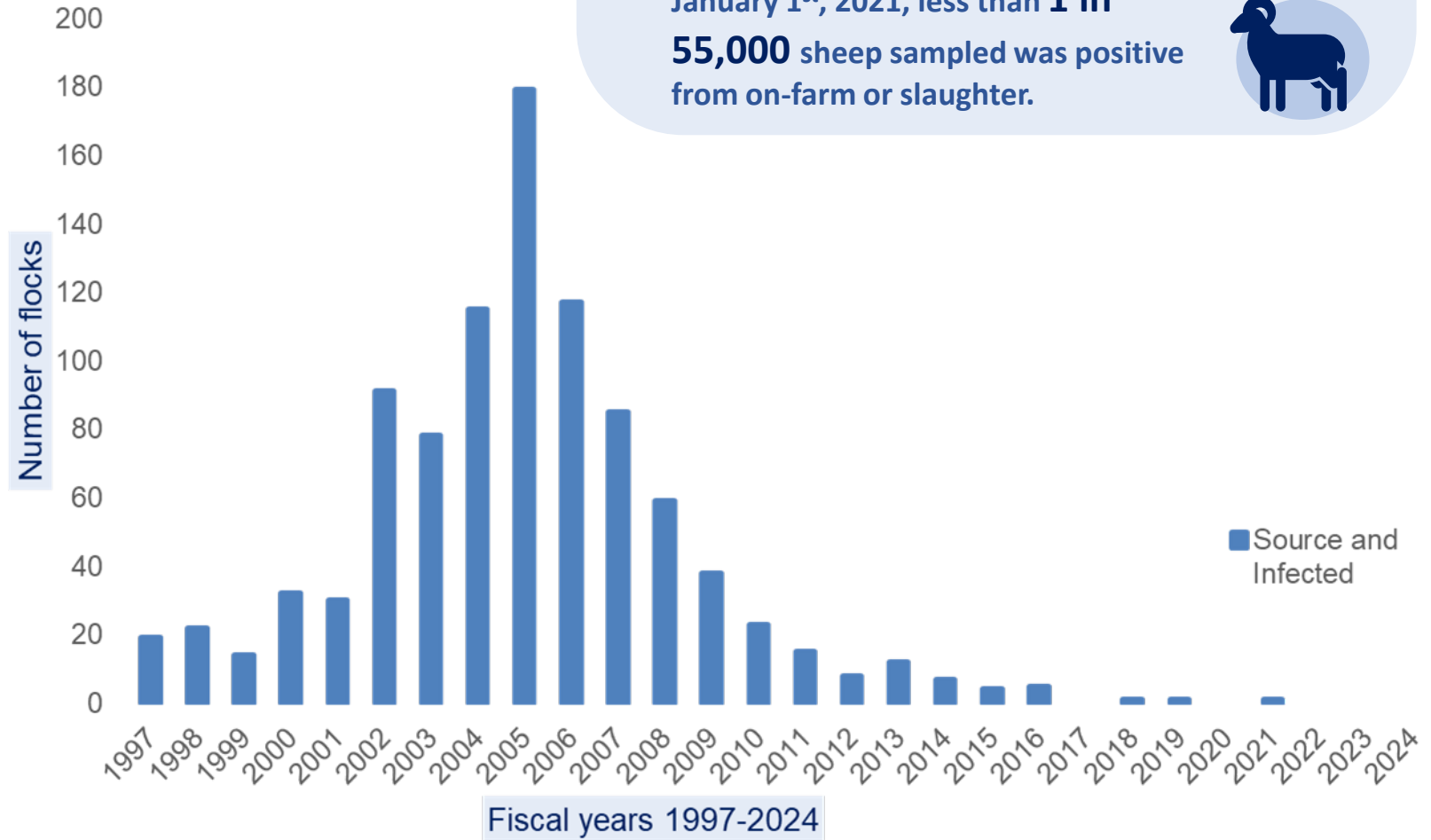
(*RSSS Genotyping Project)

Genetics



OUR IMPACT

1 in 379 sheep sampled at slaughter in 2002-2003 was positive. Since January 1st, 2021, less than **1 in 55,000** sheep sampled was positive from on-farm or slaughter.



47/50

U.S. States are FREE of classical scrapie cases for greater than 7 years

• APRIL 2024 •

In **April 2024**, the World Organization of Animal Health (WOAH) convened an ad hoc group at the urging of the U.S. and the Region of Americas, to update the **Scrapie Chapter** with consideration given to the use of genetic resistance and live animal testing as a means of safe trade.

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25

Paris, France

