

# Are some goats resistant to scrapie?

## What's the news?

Recent studies suggest that two goat prion gene alleles can make goats resistant to classical scrapie. This finding would offer goat producers a chance to eliminate scrapie susceptibility from their goat herds through selective breeding.

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*"Scrapie resistance genotype testing offers goat breeders valuable tools for genetic selection that sheep breeders have used for years to promote scrapie eradication."*

—Dr. Joan Dean Rowe  
Veterinarian and Dairy Goat Breeder

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## What is scrapie?

Scrapie is an infectious degenerative disease affecting the central nervous system of sheep and goats and is believed to always be fatal. Scrapie results from infection with a disease-causing agent known as a prion. Prions disrupt the normal nervous system structure and ultimately lead to formation of abnormal protein deposits in the central nervous system, which in turn leads to progressive neurological degeneration. Scrapie is a transmissible spongiform encephalopathy (TSE), which is a class of diseases that includes bovine spongiform encephalopathy (BSE, or "mad cow" disease) and chronic wasting disease of deer and elk.



## How is scrapie usually transmitted?

The classical form of the disease is naturally transmitted from infected does during kidding via ingestion of infected placenta or birthing fluids by herd mates and newborn kids. Previous contamination of premises is believed to be another source of scrapie infection. Once infected, the animal remains infected for life. Good management and biosecurity practices are critical in reducing the chance of infection in goat herds.

## What are the important prion gene alleles for resistance in goats?

The two alleles that appear to make goats resistant to classical scrapie are S146 and K222. Goats that have a single copy of either of these alleles have been resistant to scrapie infection during natural disease outbreaks and also direct challenge experiments.

Both of these alleles occur naturally in U.S. goats. So far, the S146 allele has been identified in both dairy and meat goat breeds, including Alpine, Nubian, Boer, Saanen, LaMancha, Pygmy, and Tennessee fainting goats (myotonic).

The K222 allele has been found most often in dairy breeds, including Toggenburg, LaMancha, Alpine, Saanen, and Anglo-Nubian goats.

*Photo courtesy of Jennifer Bice,  
Redwood Hill Farm.*



# Should I genotype my goats?

## Why should I breed my goats for the S146 and K222 alleles?

Scrapie negatively affects animal health and welfare, animal movement, and trade. Infected flocks can experience significant production loss. Breeders can use genotyping information to select breeding stock to increase frequency of the beneficial alleles within their herds. Breeding for resistance could help control classical scrapie at the herd and population levels.

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*“By genotyping their goats, producers could potentially reduce the risk of infection in their herds, develop options to conserve genetics and animals if a herd were to become infected, and add market value to their breeding stock.”*

—Dr. Joan Dean Rowe  
Veterinarian and Dairy Goat Breeder

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As with sheep, general management and biosecurity practices are very important in reducing scrapie infection in goats, and goat producers are encouraged to maintain overall herd health, enhance productivity, and reduce inbreeding by selecting goats superior for many traits, not just scrapie resistance.

## Where can I have the testing done?

Goat genetic testing services are available at Veterinary Genetics Laboratory of UC-Davis (<https://www.vgl.ucdavis.edu/services/GoatScrapie.php>).

Testing services are being developed at NeoGen Genomics, Inc. (<http://genomics.neogen.com/en/research-and-development-genomic-discovery#sheep-and-goat>).

**Special pricing for genotyping might be available for members of certain goat associations.**

## Does the United States have an official program for genetic testing in goats?

Scrapie-resistance alleles in goats have not been formally recognized in the United States, so genetic testing in goats is not considered official testing for scrapie program purposes. As part of the National Scrapie Eradication Program, however, USDA is considering conducting a genetic-based herd-cleanup pilot project in goats—similar to the one conducted for sheep—focused on the S146 and K222 goat alleles.

### For more information, please visit

[https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/sheep-and-goat-health/national-scrapie-eradication-program/ct\\_scrapie\\_disease\\_information](https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/sheep-and-goat-health/national-scrapie-eradication-program/ct_scrapie_disease_information)

### References

A New Tool: Genetic Scrapie Resistance in Goats. SN White and DA Schneider. June 2018. [https://www.aphis.usda.gov/animal\\_health/animal\\_diseases/scrapie/downloads/white-schneider-2018-goat-scrapie-resistance-dna-test.pdf](https://www.aphis.usda.gov/animal_health/animal_diseases/scrapie/downloads/white-schneider-2018-goat-scrapie-resistance-dna-test.pdf)

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