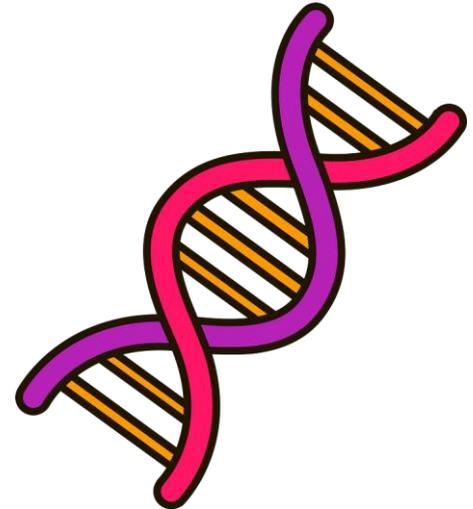


Using Genetics to Reduce Scrapie Risk

2026 ASI Convention-
Young & Emerging Entrepreneurs

Andrew Weaver
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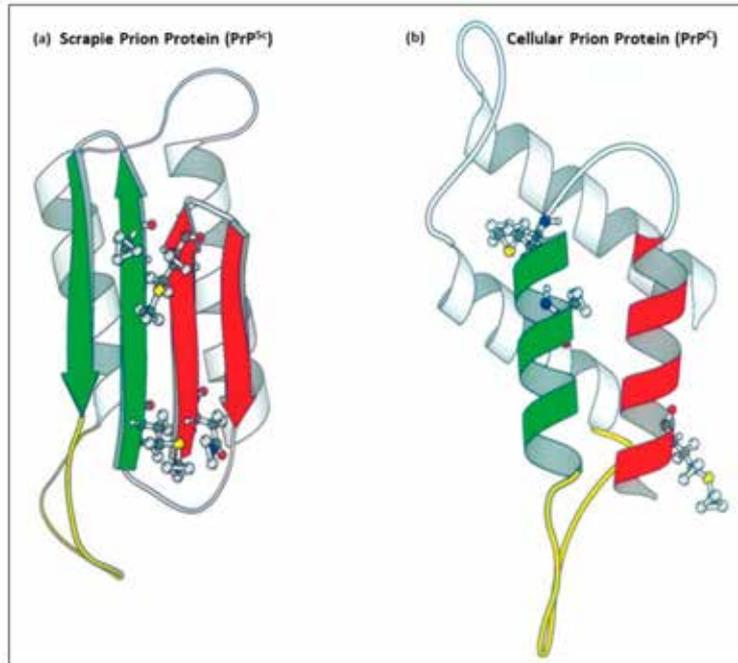
Only use **RR rams** and all of your lambs will be scrapie resistant



Scrapie 101

- Degenerative neurologic disease caused by prion proteins
 - Same family of diseases as Bovine Spongiform Encephalopathy and Chronic Wasting Disease
 - No treatment
- Eventually fatal
- No symptoms until 2-5 years of age
 - Transmitted around birth
 - Rubbing (wool shedding), incoordination, tremors, and nervousness

Scrapie 101



Adapted from Huang et al.



<https://scrapiecanada.ca/about-scrapie/>

Scrapie Traceability Program

- Since 2002, prevalence has decreased due to testing and traceability through the National Scrapie Eradication Program
- Last case in U.S. was in January 2021
 - We can be declared scrapie free in 2028 if we don't have another case (assuming sufficient surveillance)
 - Test all mature sheep that die on property
- Currently, National Scrapie Eradication Program is providing up to 100 plastic flock ID tags free-of-charge to first time participants

Scrapie Traceability Program

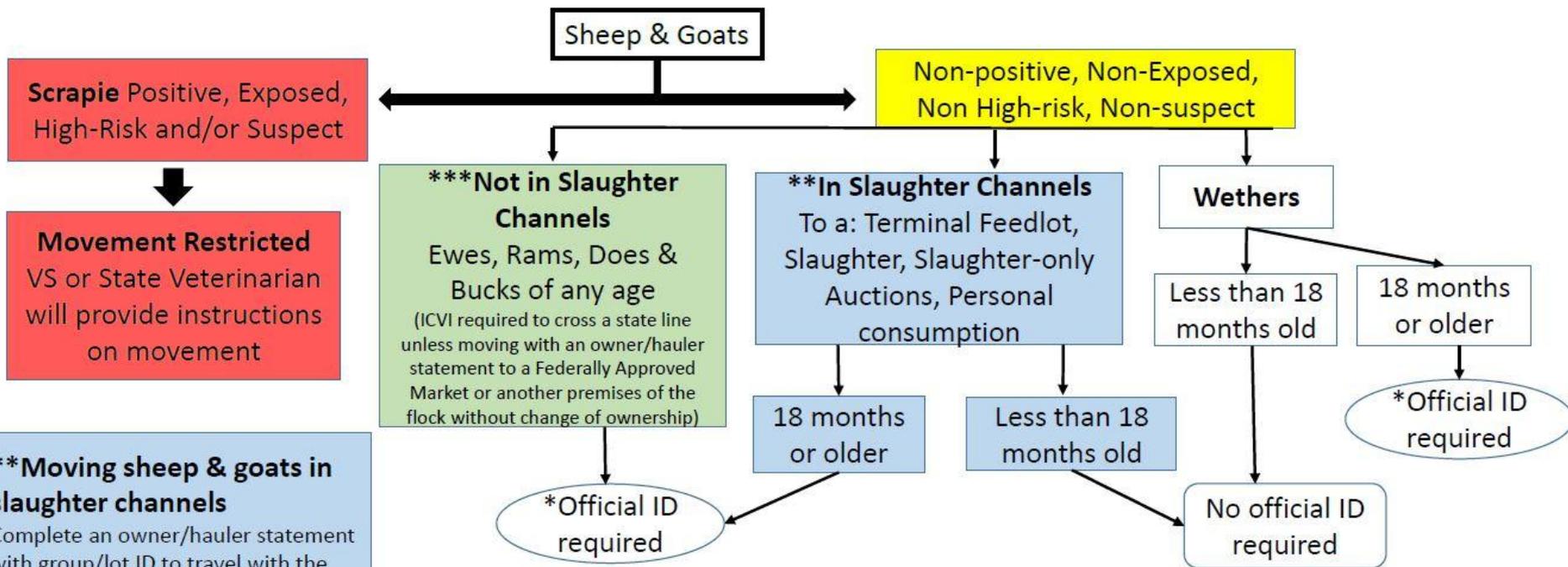
- Keep tagging and submitting samples!



SHEEP & GOAT Official Identification Decision Tree

4/10/19

Easiest = if it is leaving your farm, put in an official eartag (for some exceptions see below)



****Moving sheep & goats in slaughter channels**
 Complete an owner/hauler statement with group/lot ID to travel with the animals
 Tattoos and implanted microchips may not be used for animals in slaughter channels or moving through a livestock sale. When individual ID is required apply an official ear tag.

* Group/lot ID and owner/hauler statement may be used for some movements in place of individual ID
 ***Registry or Flock ID tattoos or implanted microchips may be used with additional requirements

For more information, visit <http://www.aphis.usda.gov/animal-health/scrapie>

Genetic Conditions Testing

- Describe **single genes** that control susceptibility to disease or impact animal productivity
 - Different from quantitative traits (weaning weights, fecal egg counts, etc.) controlled by many genes
- Testing provided through a variety of entities
 - Neogen, Gene Check, Flock 54
 - Some provide all in one package while others allow you to select specific genes to test



Scrapie Genetic Testing

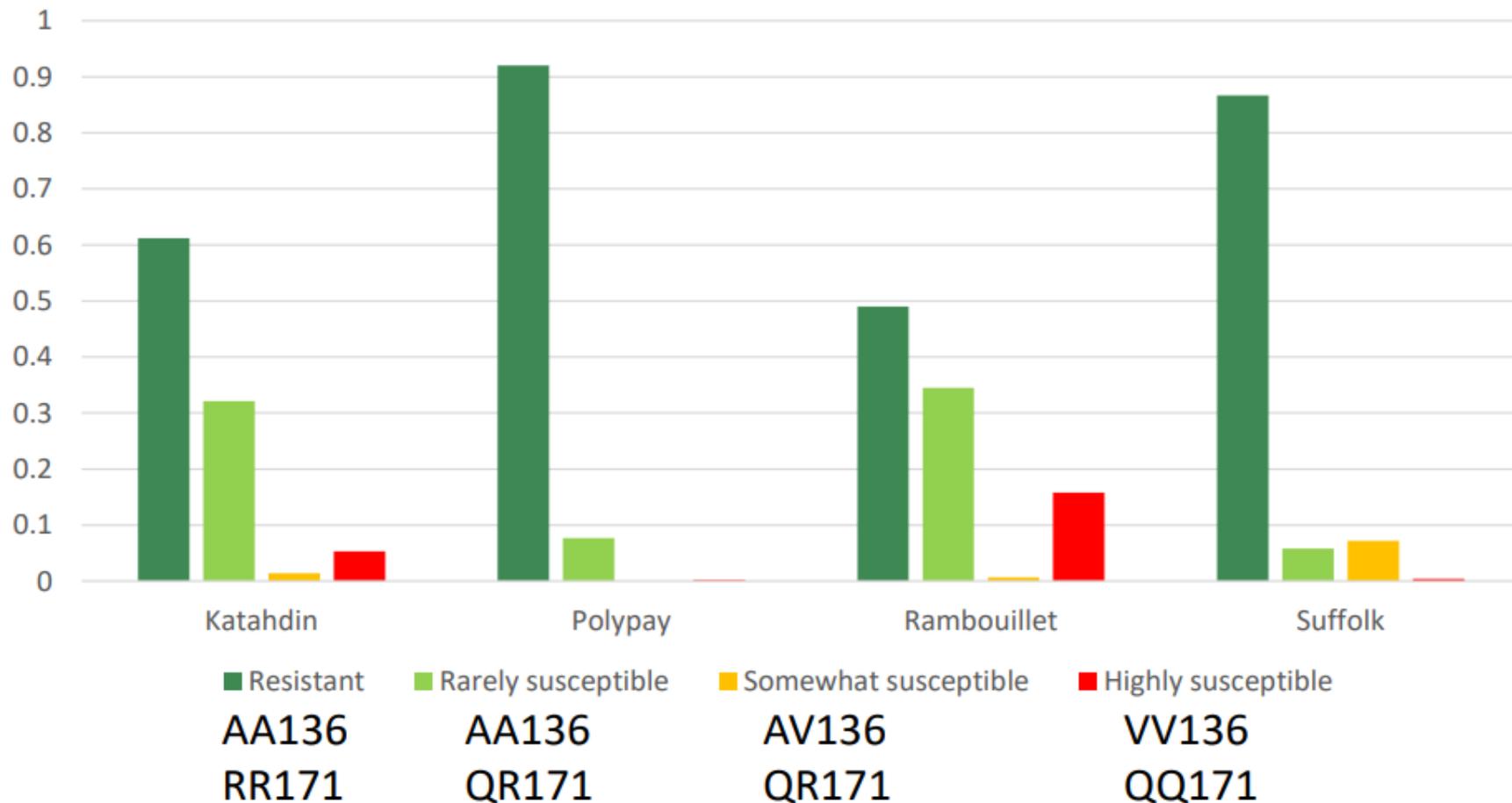
- Codons 136 and 171 in the gene that codes for prion proteins have been associated with scrapie susceptibility
- Codon 171 is the primary determinant

Scrapie Susceptibility		
Codon 136	Codon 171	Description
AA	RR	Complete Resistance
AA	QR	Rarely Susceptible
AV	QR	Somewhat Susceptible
VV	QQ*	Susceptible

*QQ susceptible regardless of 136 status

Scrapie Genotype Frequencies

Within Breed Frequency of *PRNP* genotypes



Breeding for Scrapie Resistance

Q



R

Mating of two heterozygotes

Q

Q

Q

Q

R



R

Q

R

R

R

Breeding for Scrapie Resistance

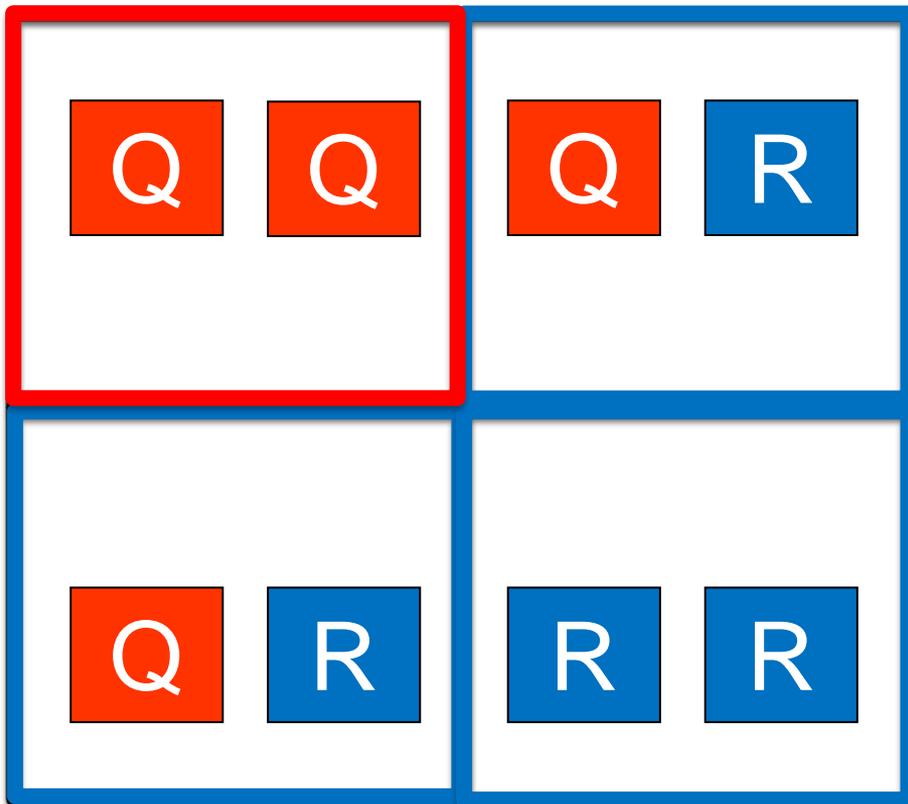
Q



R

Mating of two heterozygotes

Q



**75% Resistant
25% Susceptible**



R

**Of the resistant individuals,
2/3 are carriers**

Breeding for Scrapie Resistance

R



R

Mating of RR
ram to QR ewe

Q

Q

R

Q

R



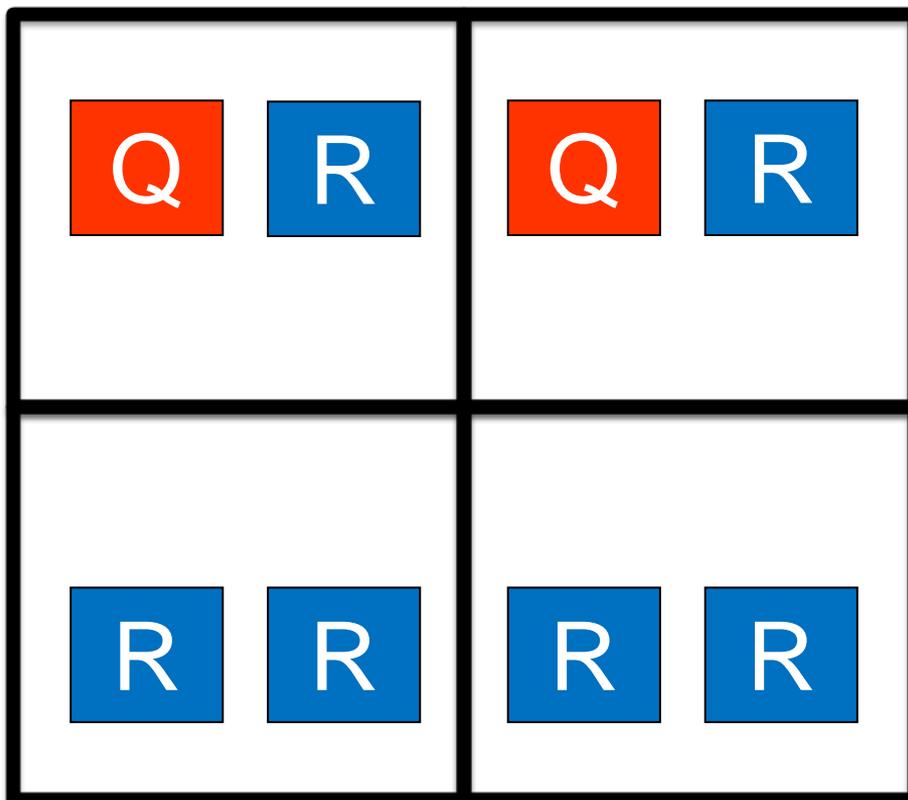
R

R

R

R

R



Breeding for Scrapie Resistance

R



R

**Mating of RR
ram to QR ewe**

Q

Q

R

Q

R

**100% Resistant
0% Susceptible**



R

R

R

R

R

**50% homozygous
50% heterozygous**

Breeding for Scrapie Resistance

R



R

Mating of RR ram to QR ewe

Q

Q

R

Q

R



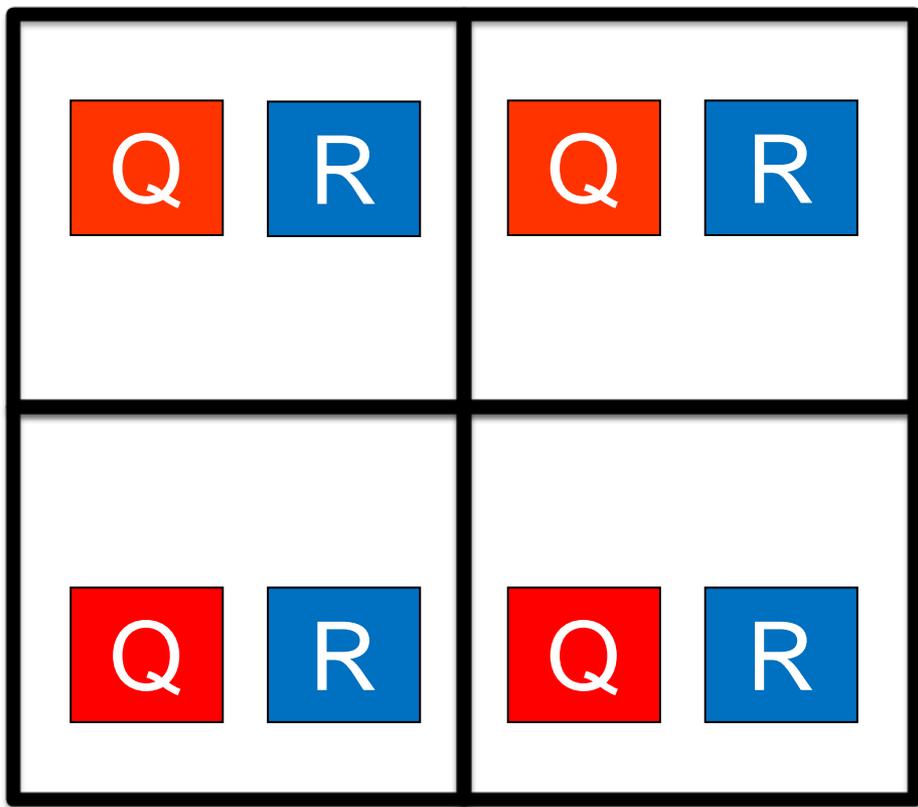
Q

Q

R

Q

R



Breeding for Scrapie Resistance

R



R

Mating of RR
ram to QR ewe

Q

Q

R

Q

R

100% Resistant
0% Susceptible



Q

Q

R

Q

R

0% homozygous
100% heterozygous

Summary and Call to Action

- Scrapie free status will open international market opportunities for our industry
- Traceability program has been extremely successful and must continue
- Genetics can be used to ensure we have a scrapie free U.S. sheep flock
 - Use of **only RR rams** ensures resistance in **ALL progeny**
 - Resistant sheep are exempt from destruction if scrapie positive case is found

Questions

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