

REPORT OF THE COMMITTEE ON SCRAPIE

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The Committee met on October 21, 2014 at the Sheraton Hotel in Kansas City, Missouri, from 9:00 am to 12:05 pm. There were 13 members and 18 guests present.

Presentations & Reports

USDA APHIS Scrapie Program Update and Scrapie Surveillance Projects

Diane Sutton, DVM

United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (USDA-APHIS-VS)

Scrapie Eradication Program Results

- The percent positive black-face sheep sampled at slaughter as of September 30, 2014, was 0.020%. This is a decrease of 51% compared to FY 2013.
- At the end of FY 2014, the percent of cull sheep found positive at slaughter and adjusted for face color was 0.019 percent. This measure increased by 31 percent compared to FY 2013, the increase was not statistically significant due to sample size.
- As of September 30, 2014, there were only six new infected or source flocks identified in FY 2014, compared to 11 in FY 2013 a decrease of 45 percent.
- In FY 2014 there was a 9 percent increase in the number of States meeting their sampling minimums for sheep and goats and notable improvement occurred in most States.

Slaughter Surveillance

- 48,102 sheep and goats (37,028 sheep and 8,285 goats) were sampled in FY 2014, exceeding the number of animals sampled in FY 2013 by 6 percent.

Scrapie Surveillance Plan

- Implementation
 - States with RSSS collection sites will continue to sample all targeted sheep and goats.
 - The annual State-of-origin sampling minimum for sheep is 20 percent of the number required to detect a scrapie prevalence of 0.1 percent with 95 percent confidence or 1 percent of the breeding flock in the State, whichever is less. The objective is to sample sufficient sheep in a 5-year period to detect a scrapie prevalence of 0.1 percent with 95 percent confidence or 5 percent of the breeding flock in the State, whichever is less.
 - The annual State-of-origin sampling minimum for goats is determined based on the States' goat scrapie case incidence.

- If a State has not had a goat scrapie case in the previous ten years, its annual goat sampling minimum is its prorated share of 3,000 samples, based on its proportion of the U.S. goat population as determined by the NASS Sheep and Goat annual report.
- If a State has had a goat scrapie case in the previous ten years, its annual goat sampling minimum is determined using the same method as is used for determining its annual sheep sampling minimum.

Note: These are minimums. Plan is to continue to collect samples from the maximum number of targeted animals given the available budget.

ID Compliance:

- There were two untraceable scrapie positive sheep in FY 2014, reminding us of the importance of monitoring for and enforcing ID compliance.

Proposed Rules Planned for Publication:

- VS plans to publish revisions to 9 CFR parts 54 and 79. The changes are intended to improve the effectiveness and cost efficiency of surveillance and to increase animal identification compliance by addressing gaps in identification and by requiring States to meet reasonable surveillance targets to remain consistent States. States must meet these targets for VS to demonstrate geographically appropriate surveillance to meet the criteria for freedom and have confidence that all of the remaining cases have been found.
- The rule would propose to:
 - Give the APHIS Administrator authority to relieve requirements for sheep and goats exposed to scrapie types, such as Nor98-like, that do not pose a significant risk of transmission;
 - Increase flexibility in how investigations can be conducted and allow the epidemiology in a specific flock to be given more consideration in determining flock and animal status;
 - Add a genetic-based approach to regulation;
 - Make goat identification requirements similar to those for sheep to support ongoing slaughter surveillance in goats (no changes will be made in the consistent State requirements regarding identification of goats in intrastate commerce);
 - Tighten the definition of slaughter channels;
 - Expand the individual identification requirement to all sexually intact animals unless moving as a group/lot (allows mixed-source groups moving in slaughter channels under 18 months);
 - Limit the use of tattoos and implants to animals not moving through markets and not in slaughter channels; and
 - Reduce recordkeeping requirements by making them similar to the current uniform methods and rules compliance guidance.
- APHIS is also revising its scrapie import regulations to bring them more in line with the OIE scrapie chapter. This will ensure that we meet OIE criteria for free status and prevent the reintroduction of scrapie after free status is achieved.

Scrapie Flock Certification Program (SFCP)

- Implementation of the revised Scrapie Flock Certification Program (SFCP) in FY 2014 has increased the efficacy of the program while reducing program costs.
- At the end of FY 2014 there were 455 producers enrolled in the program.

Scrapie research at the National Animal Disease Center

Justin J. Greenlee, DVM, PhD, Diplomat American College of Veterinary Pathologists
 Virus and Prion Research Unit, National Animal Disease Center, Agricultural Research Service, USDA

The Virus and Prion Research Unit at the National Animal Disease Center has ongoing research projects with scrapie in sheep and goats, bovine spongiform encephalopathy, and chronic wasting disease. Several long-term sheep scrapie studies were completed this year and reported on in scientific journals.

Two related manuscripts describe the findings of sheep with enhanced resistance (ARQ/ARR genotype) to scrapie after intracranial inoculation or oral inoculation within the first 24 hours of birth. The first manuscript demonstrates that ARQ/ARR sheep are susceptible to scrapie after intracranial inoculation, but with prolonged incubation times (56 month average) and without distribution of abnormal prion protein to the lymphoid system. The most important finding of the second manuscript is that when ARQ/ARR sheep are orally inoculated within the first 24 hours of life they do not develop scrapie after being monitored for 86 months post inoculation. In addition to these completed studies, there is ongoing work with a herd of goats naturally infected with scrapie. These animals were depopulated from an infected farm in 2014 and brought to the National Animal Disease Center for continued monitoring, serial testing by rectal biopsy and optical coherence tomography, and submission of postmortem samples to APHIS/National Veterinary Services Laboratory for final scrapie diagnosis. Out of 11 does and 17 kids obtained, there have been 3 positive rectal biopsies. One case developed clinical signs and was necropsied. The two additional known cases continue to incubate in containment. One of the positive biopsies is from a kid born in Sept. 2013 with the first positive biopsy obtained at approximately 9 months of age. Finally, an update was given on an ongoing interspecies transmission study where white-tailed deer were inoculated with scrapie from sheep. White-tailed deer are susceptible to scrapie by a combined oral/intranasal inoculation and develop disease in 28-33 months. Interestingly, two molecular profiles are obtained from the abnormal prion protein in these deer when western blots are performed. One pattern is similar to the original scrapie inoculum, but the abnormal prion protein from the lymph nodes and certain brain regions has a different western blot profile. Material from brain regions with each of these patterns was passaged by the intranasal route to white-tailed deer and sheep. These animals will continue to be monitored for up to 3 additional years, but at this point, only two sheep have developed scrapie. Both of these sheep were VRQ/VRQ sheep inoculated with material with a western blot pattern similar to the original scrapie inoculum. Additional VRQ/ARQ and ARQ/ARQ are free from clinical signs and are scrapie negative by rectal biopsy.

2014 USAHA scrapie committee update from ARS-Pullman

David Schneider, DVM, PhD

Animal Disease Research Unit, Agricultural Research Service, USDA

The USDA ARS unit in Pullman, WA, conducts an integrated research program involving studies on scrapie transmission, diagnosis and susceptibility genetics in domestic sheep and goats. In this update, we report on the effects of the relatively highly polymorphic prion protein of goats on immunoassay detection of scrapie, the effects of age and processing of rectal biopsy tissue on the observance of RAMALT follicles, and our progress on adapting a highly sensitive in vitro assay in the detection of scrapie prions on farm surfaces. Regarding scrapie diagnosis, immunoassays (immunohistochemistry, ELISA, and western blot) are widely used to detect accumulation of disease-associated prion protein (PrP-Sc), the sensitivity of which critically depends on the binding of an antibody to its unique epitope on that protein. In the United States, diagnosis of scrapie infection relies on immunohistochemistry using a single antibody (F99/97.6.1). However, detection of PrP by F99/97.6.1 is reduced by a genetic variation in PrP known to occur in some goats. Detection by other anti-PrP antibodies that bind to other epitopes on the protein was not adversely affected. Additional genetic variants that occur in goats were also assessed, two of which interfered with detection by F89/160.1.5 (epitope amino acids 142-145, IHFG). Thus, in the absence of genetic testing, use of a multi-antibody approach may provide more robust detection of PrP-Sc in infected tissues from goats. Regarding rectal biopsy in the antemortem diagnosis of scrapie, we investigated the effects of age and tissue processing on the observance of RAMALT follicles, the anatomic structure in which PrPSc accumulates during disease. The number and density of RAMALT follicles were similarly and sharply reduced with aging, especially starting at about 2 years of age in both sheep and goats. Optimal follicle counts were achieved by sectioning flattened tissue to a mucosa-to-submucosa depth of ~300 um. Finally, we'll report on our progress made in adapting serial protein misfolding cyclic amplification (sPMCA) to the detection of prions on metallic farm surfaces. With further development, sPMCA may provide a much needed tool for environmental risk and mitigation assessments.

Committee Business:

The committee discussed various ways to increase the collection of slaughter samples for scrapie testing. Suggestions included:

- Focus on establishments that slaughter club lambs and goats
- Contact producers or processors that conduct ethnic slaughter and encourage participation
- Visit all custom and state inspected establishments to identify those that are slaughtering targeted animals and offer to collect samples.

One state indicated that some establishments are reluctant to enter into an agreement with the federal government to provide samples even when a reimbursement fee is offered. Dr. Sutton mentioned an alternative in which the USDA could enter into an agreement with the state which would, in turn, provide payment to the establishment for samples. States that are interested in this arrangement should contact their Assistant District Director.

Dr. Sutton indicated that a previous pilot project in which the USDA paid accredited veterinarians to sample targeted animals on the farm had not been successful.

The committee reviewed the USDA Sheep and Goat Health Business Plan which had been e-mailed to all committee members prior to the meeting. The committee had no comments on the Plan during the business meeting. Dr. Sutton noted that written comments on the Plan could be submitted to APHIS via the sheep and goat website by November 1st, 2014.

The final response to the Committee on Sheep and Goats' 2013 resolution that urged the USDA-AHIS-VS to establish a separate funding line item for Sheep and Goat Health was reviewed. Although included in the Presidents proposed budget, Congress chose not to create this separate funding line when it finalized the FY2013 and 2014 APHIS appropriations.

A resolution was introduced that urges the Secretary of Agriculture to quickly publish and finalize the proposed rule amending 9 CFR Parts 54 and 79. This rule has been in clearance for six years and is important to complete the eradication of scrapie. After a brief discussion and minor revisions the resolution was unanimously passed by the committee.

The committee reviewed its mission statement and no alterations were suggested. There was a discussion about whether the Committee on Scrapie and the Committee on Sheep and Goats should be combined. The committee members indicated that at this time the two committees should remain separate. Several members felt that while program changes are still being made, it is important to remain a separate committee. It was agreed that this decision should be reviewed annually.