

Spider Lamb Syndrome - 1998 Sheep Day Report

The Test for Spider Lamb Syndrome Gene in Sheep

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Background

Spider lamb syndrome is a heritable congenital abnormality caused by a recessive gene that produces a range of skeletal deformities in lambs. The problem, which seemed to have been first observed in the early 1970's, became a topic of serious concern to breeders in the early and middle 1980's. Many of the most popular bloodlines in the Suffolk and Hampshire breeds seemingly carried this damaging gene. Sheep which had tracings in their pedigrees to suspected carriers of this gene were said to possess "grey" pedigrees, whereas those sheep which had no apparent incidence of carriers in their pedigrees were designated as "white pedigreed" sheep.

After the incidence of "spider" lambs in both Suffolk and Hampshire flocks at North Dakota State University, the decision was made to eliminate "grey" pedigreed sheep from these flocks. This could be done with a high degree of confidence because all sheep could be traced in their female lines to original purchases when these flocks were established.

Suffolks traced to many purchases made in western Canada in 1945 and some of the Hampshires could be traced to purchases made as early as 1914. Very few flocks in the U.S. could trace their lines of ancestry to their beginnings in this fashion.

Funded in part by a grant from the National Suffolk Sheep Association, NDSU helped establish the mode of inheritance and the diagnostic procedures for determination of spider lamb syndrome. An outgrowth of these procedures was the establishment of a "test flock" of known spider producing ewes. These ewes were maintained and mated to rams which were introduced into the flock. Occurrence of sixteen "normal" lambs from these matings gave a 99%+ probability that the ram was free of the spider gene. Incidentally, one ram which by pedigree analysis was believed to be "white" pedigree did sire spider lambs from these test ewes. This ram had also been mated to a number of ewes in the main flock. All his progeny were slaughtered and not allowed to go out as breeding stock. This was a fortunate occurrence, because otherwise the progeny might have unknowingly spread the incidence of the spider gene.

NDSU Involvement

Because of NDSU's active involvement in the spider syndrome problem and dedication to production of

genetically sound sheep, it was natural to continue association in efforts to identify the spider gene by DNA analysis. Development of the DNA test was researched by Dr. Michael Bishop, ABS Global, DeForest, Wisconsin; Dr. Jon Beever, University of Illinois; and Dr. Nola Crockett, Utah State University. Substantial numbers of blood samples were supplied to these researchers for analysis in developing the test. Samples from the main flock were used to form the baseline of the non-carriers. Samples from the "test" flocks of known spider producers were analyzed and characterized as the known carrier group.

Test Matings

Test matings of Southdown rams were also done with the NDSU "test" ewes. This provided additional information which Dr. Michael Bishop used in his work on the test. Genotypes of lambs would then be analyzed along with the genotypes of their parents.

Results of these matings were as follows:

Lamb No. Genotype

7417 NS

7418 NS

7419 NN

7420 NS

7421 SS

7425 NN

7426 NS

7428 NS

7429 NN

7430 NN

7431 NN

7432 NN

7433 NS

NN = Normal/Normal

NS = Carrier

SS = Spider Lamb

The lamb 7421 had all the visual symptoms of a spider lamb and this diagnosis was confirmed by Dr. George A. Schamber of the NDSU Veterinary Diagnostic Laboratory.

The development of a DNA test was accomplished and released in June, 1997. Dr. Jon Beever sampled 325 head of sheep which were exhibited at the North American International Livestock Exposition of the Suffolk, Hampshire, Shropshire, Southdown and Oxford breeds. His analysis reported that 28% of those sheep sampled were identified as "carriers" of the spider gene. This illustrates that the incidence of the gene is still rather widespread and a source of concern to sheep breeders. The development of this test, however, improves considerably upon the time and expense required to maintain test flocks and make test matings to check for the gene's occurrence. Also, the test makes it possible for many more breeders to have the confidence that they are using breeding stock which is free of the spider gene.

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