DEPARTMENT OF AGRICULTURE

Animal Industry Division

RULES PERTAINING TO CONTROL AND ERADICATION OF SCRAPIE IN SHEEP AND GOATS

8 CCR 1201-16

[Editor's Notes follow the text of the rules at the end of this CCR Document.]

Introduction

The sheep industry has traditionally been an important segment of Colorado’s agricultural industry. While smaller than its historic levels, sheep ranching and lamb feeding remain a significant source of economic activity in the state. Goat production in Colorado is increasing in response to dietary preferences in the changing demographic of the United States.

Scrapie is a transmissible spongiform encephalopathy, akin to similar diseases of cattle, cervids, mink, and humans. This category of diseases causes neurological debilitation followed by certain death. While scrapie is not known to have crossed species from sheep and goats to humans, scrapie is a significant economic cost to sheep producers. Scrapie is less frequently found in goats.

Science has shown that scrapie transmission in sheep is primarily the result of an infected animal’s placenta and amniotic fluid at parturition becoming orally ingested by a scrapie susceptible animal. It is further known that sheep with a particular genetic trait are not susceptible to the disease. The science for scrapie in goats is scant; however certain steps are necessary to reduce the risk of spreading scrapie among goats.

The most promising strategy for the control and eradication of scrapie in sheep is the use of resistant genotype rams to assure that all progeny contains at least one resistant gene, regardless of the dam’s genotype. Using homozygous resistant rams in an infected or source flock will virtually eliminate scrapie transmission. This rule will facilitate surveillance and enable owners of scrapie infected flocks to comply with the provisions to freely sell animals. This rule is compatible with national standards for scrapie eradication.

Part 1: DEFINITIONS

A. “Animal” means a domestic sheep or goat.

B. “Breeding animal” means sheep and goat females and intact sheep and goat males of any age which are sold for reproductive purposes.

C. “Commuter permit” means a permit issued to a producer of animals who routinely uses land in Colorado and a contiguous state(s) to allow movement of a breeding flock and its progeny between Colorado and the contiguous state(s) without complying with the Colorado scrapie import requirements. The permit is valid for 12 months after the animal health officials of the contiguous state(s) and the producer have signed the agreement application provided by the State Veterinarian.

D. “Exposed animal” means any sheep or goat which originated from or transmitted through a flock in which scrapie has been diagnosed and which animals are not considered high risk.
E. “Feeder sheep and goats” means animals under the age of 18 months sold exclusively for feeding and slaughter and not for reproductive purposes. Any sale not specifically designated as a “Feeder sale only” is classified as an “open sale,” where all sexually intact animals presented, regardless of age, are considered breeding sheep. Any “feeder” animal exempt from identification requirements may not be reclassified as a breeding animal (i.e. removed from feeding channels) without official identification showing its birth flock.

F. “Flock” means all animals maintained on any single premises, or multiple premises with animal movement or interchange between the premises. Each use of the term flock shall include the term “herd” where appropriate.

G. “Flock plan” means a written flock management agreement designed by the owner of a flock, an accredited veterinarian, and an APHIS representative or State representative in which each participant agrees to undertake actions specified in the flock plan to control the spread of scrapie from, and eradicate scrapie in, an infected flock or to reduce the risk of the occurrence of scrapie in a flock that contains a high-risk or an exposed animal. Flock plans for infected flocks within Colorado must be approved by the State Veterinarian or his designee prior to implementation. The flock plan must address, but is not limited to: (1) animal identification & record keeping, (2) disinfection and sanitary measures, (3) lambing or kidding management, (4) the classification and disposition of affected and high risk animals within the flock, and (5) animal sales and movements of animals from the flock. Where appropriate, and as a part of a comprehensive flock management plan, 3rd eyelid and other approved live animal tests and genetic tests for scrapie resistance will be used to evaluate the risk status of individual animals within the flock. Susceptible genotype animals shall be destroyed, or sent to a research facility. Flock plans shall include breeding only with homozygous scrapie resistant rams for the duration of the flock plan.

H. “Genetic tests for scrapie resistance” means DNA genotyping of sheep for genes associated with scrapie resistance at Codon 171 and may also include Codon 136. To be used in regulatory activities, all genetic tests must be collected by an accredited veterinarian or State/Federal animal health official, must occur at a laboratory approved for such purposes by the USDA, must be submitted on forms approved by the USDA and must be on animals identified with USDA approved methods. At present, no genetic test for scrapie resistance is valid for goats. At the discretion of the State Veterinarian a second genotyping sample may be required at the owner’s expense. If there is a discrepancy in test results indicating a QQ genotype, the animal shall not be allowed entry into Colorado until the discrepancy is resolved with the approval of the USDA reference laboratory, the National Veterinary Service Laboratory (NVSL).

I. “Genetically resistant animal” means: A sheep that tests RR or QR at Codon 171. Genetically resistant to valine scrapie means a sheep which tests AA at Codon 136. This does not apply to goats.

J. “Genetically susceptible animal” shall mean: All goats, and any sheep which tests QQ at Codon 171. Genetically susceptible to valine scrapie means any sheep which tests VV or AV at Codon 136.

K. “High risk animal” means any goat or a genetically susceptible female sheep which is: (1) the progeny of a scrapie-positive dam; (2) born in the same flock during the same lambing season as progeny of a scrapie-positive dam; or (3) a scrapie susceptible animal that has been present in a flock and has been exposed to amniotic fluid of a scrapie positive dam. Any goat in an infected flock is considered a high risk animal.

L. “Infected flock” means any flock in which the State Veterinarian has determined that a scrapie positive female sheep has resided unless an epidemiological investigation conducted by the State Veterinarian or APHIS representative shows that the ewe did not lamb or abort in the flock. The USDA designation of a “source” flock (meaning an infected animal was born in the flock irrespective of lambing or aborting) shall be included in the infected flock definition for this regulation. The presence of any scrapie positive goat designates the flock as infected. A flock will
no longer be considered an infected flock after its owner has completed the requirements of a flock plan.

M. “Scrapie” means a non-febrile, transmissible, insidious, degenerative disease affecting the central nervous system, and is a transmissible spongiform encephalopathy (TSE) found in sheep and goats.

N. “Scrapie-positive” means an animal that has been diagnosed by USDA accepted testing methods by the National Veterinary Service Laboratory, or another laboratory designated by the State Veterinarian, to have the disease scrapie. This diagnosis may be made through the microscopic examination of the brain or lymphoid tissues of an animal wherein the brain is found to have classical spongiform changes and/or scrapie-associated prion protein fibrils are detected in brain or lymphoid tissues through the immunohistochemical staining techniques. Animals testing positive to the 3rd eyelid test or other USDA approved tests are scrapie positive animals.

O. “State Veterinarian” means the Colorado State Veterinarian or his authorized representative.


Q. “3rd Eyelid Test” means a test utilizing immunohistochemistry to identify Protease Resistant Protein (PrP res ) in lymphoid tissue collected from the gland of the 3rd eyelid.

Part 2. IMPORTATION OF BREEDING SHEEP AND GOATS INTO COLORADO

A. Except as set forth in subparts 2.B. and 2.D., all breeding sheep and goats imported into Colorado must be accompanied by an import permit. The accredited veterinarian who issues the certificate of veterinary inspection shall obtain the import permit from the State Veterinarian. The accredited veterinarian issuing the certificate of veterinary inspection shall record the import permit number on the certificate.

B. No import permit is required for animals going directly to slaughter.

C. The owner or the owner's operator or agent shall place one of the following statements on the certificate of veterinary inspection:

“The sheep or goats listed on this certificate originate from a flock in which scrapie has not been diagnosed within the last five years. The flock of origin has not been identified as an infected or source flock in the last five years. At no time have these animals been on any premises at which scrapie has been diagnosed during the past five years.”

Or “The sheep listed on this certificate originate from a flock that is under a flock management plan approved by the U.S.D.A. All sheep in this shipment are either RR or QR at Codon 171. If said flock has been shown to have valine strain scrapie, the QR sheep are AA at codon 136.”

The owner or the owner's operator or agent shall print and sign his or her name under this statement, attesting to the truthfulness of the statement.

D. Animals entering Colorado from a state contiguous with Colorado without change in ownership and as a part of normal operating procedures may do so by acquiring a commuter permit issued by the State Veterinarian.

E. Required certificates of veterinary inspection for all breeding sheep and goats imported into Colorado shall contain identification numbers for each animal. Acceptable identification includes
the following: 1) eartags and/or microchips approved by the U.S.D.A. for scrapie identification, 2) registration tattoos in goats when accompanied by a matching certificate of registration from a goat breed registration association, or 3) an APHIS assigned tattoo or tattoo for animals that cannot be ear tagged.

Part 3. SHEEP AND GOAT TRANSFER OF OWNERSHIP OR EXHIBITION

A. All breeding sheep and goats, and all sheep and goats over the age of 18 months at any transfer of ownership or for exhibition in Colorado must be identified as set forth herein. Acceptable identification is listed in part 2.E. above.

Part 4. FLOCKS CONTAINING ANIMALS WITH SCRAPIE

A. In any flock in which scrapie is diagnosed, the premises and all sheep and goats on the premises will be placed under quarantine by the State Veterinarian until the following are completed:

1. All sheep and goats are identified and inventoried as to sex, age, breed and species. Such identification shall be by methods approved by USDA as listed in part 2.E. above;

2. The epidemiological tracing is completed as to the origins of animals and the destination of animals moved from the flock; and

3. A flock plan has been developed, signed by all parties, and approved by the State Veterinarian or his representative.

B. A quarantine shall remain in effect until the animals are identified with the appropriate USDA approved methods, epidemiology is completed, and a flock plan has been developed and agreed upon and signed by all parties. The flock plan may be replaced with a post exposure management and monitoring plan developed mutually by the owner, his veterinarian and state or federal officials and approved by the State Veterinarian.

Part 5. INFECTED FLOCKS

A. All flocks designated as scrapie infected flocks with sheep or goats shall be placed under quarantine imposed by the State Veterinarian until the following is completed:

1. All sheep and goats must be identified and inventoried as to sex, age, breed and species. Such identification shall be by methods approved by USDA as listed in part 2.E. above;

2. The epidemiological tracing is completed as to the origins of the animals and the destinations of animals moved from the flocks; and

3. A flock plan has been developed, signed by all parties, and approved by the State Veterinarian or his representative

B. The flock plan will remain in effect until all scrapie susceptible animals have been removed from the flock. After all scrapie susceptible animals have been removed from the flock, and only homozygous scrapie resistant rams are used for breeding in the flock, then the flock plan may be replaced with a post exposure management and monitoring plan developed mutually by the owner, his veterinarian and state or federal officials and approved by the State Veterinarian.

Part 6. EXPOSED ANIMALS

Any animals which originated from or transmitted through a flock in which scrapie has been diagnosed and which animals are not considered high risk are classified as exposed. Owners of exposed animals
will be notified by the State Veterinarian and provided educational materials relating to management of the risk.

**Part 7. TESTING OF INFECTED FLOCKS**

All genetically susceptible animals in the infected flock shall be tested with a validated, USDA approved “live animal” test upon the order of the State Veterinarian. Each positive test animal will be designated as a scrapie infected animal.

**Part 8. STATEMENTS OF BASIS, SPECIFIC STATUTORY AUTHORITY AND PURPOSE**

A. Adopted: February 10, 1999 – Effective: March 30, 1999

B. Adopted October 30, 2002 - Effective January 30, 2003

**STATEMENT OF BASIS AND PURPOSE**

This rule is adopted by the Colorado State Agricultural Commission pursuant to Section 35-50-101, C.R.S. (1998).

The purposes of this rule are to define requirements for the importation into Colorado of breeding sheep and for public sheep and goat sales and define the procedures which will be applicable for scrapie infected, source and trace flocks.

**FACTUAL ISSUES ENCOUNTERED IN DEVELOPING THESE RULES.**

Science has shown that scrapie transmission is primarily as result of a scrapie infected ewe's placenta and amniotic fluid at parturition taken in orally by a scrapie susceptible animal. Further, science has shown that a ewe with a resistant gene R at the 171 codon will not pass the scrapie infective agent when she was intentionally exposed to the infective agent.

The most promising strategy for the control and eradication of scrapie is the use of resistant genotype ram to assure that all progeny contains at least one resistant gene, regardless what the dam's genotype. Using homogeneous resistant rams RR in an infected or source flock will virtually eliminate scrapie transmission. Scrapie infected or source flocks that embrace the resistant genotype strategy as part of the flock plan should be permitted to sell animals that are either QR or RR genotype. However, it is important that all susceptible animals be restricted until eliminated from such flocks by euthanasia and disposal and that only homozygous resistant rams be used for breeding in such flocks, thus assuring that all progeny will be scrapie resistant and that the scrapie agent will not be introduced into other flocks through the movements of scrapie susceptible animals.

**Rule concept:** Sheep or goats originating from a scrapie infected or source flock both intra and interstate shall be allowed to sell in Colorado if the genotype is confirmed to be QR or RR at the 171 codon.

The seller of such sheep shall be responsible to have such sheep genotyped, but an accredited veterinarian or state or federal animal health official must have taken the specimen and submitted it to an official laboratory.

At the discretion of the State Veterinarian a second genotyping sample may be required at the owner's expense. If there is a discrepancy in test results indicating a QQ genotype, the animal shall not be sold in Colorado.

C. Adopted: August 30, 2006 – Effective: October 30, 2006
This rule is adopted by the Commissioner of Agriculture and approved by the Colorado State Agriculture Commission pursuant to Section 35-50-105(3), C.R.S. (2005).

The rule is designed to address the control and eradication of scrapie. Scrapie is a transmissible, degenerative disease affecting the central nervous system of sheep and goats. It is usually transmitted to a susceptible sheep at birth. Goat transmission is not understood as yet. This rule defines the requirements for importing breeding sheep and goats into Colorado, sets forth identification requirements for the transfer of ownership or the exhibition of sheep and goats, and establishes disease protocols for sheep and goat flocks/herds infected with scrapie. This rule is necessary to bring Colorado’s standards into compliance with federal scrapie rules so that Colorado can be deemed to be a scrapie-compliant state. This in turn affects Colorado’s ability to qualify for grants under various federal disease control programs and allows less stringent interstate movement. Genetic testing has shown that ewes with certain resistant genes will not transmit scrapie to their offspring. These genetic tests refer to both a gene type indicated by a capital letter (“R, Q, A or V”) and to a marker or “codon” indicating the location on a strand of genetic material (“codon 171 or 136”). This rule sets forth the combinations of genotypes and codons that are used to determine an animal’s susceptibility to scrapie infection. It is necessary to understand these terms in order to understand the scope of the rule. This rule uses these terms in order to track the federal program addressing scrapie control and eradication in sheep and goats.

Scrapie in sheep is transmitted primarily due to the oral ingestion by a susceptible animal of an infected ewe’s placenta and amniotic fluid at birth. However, testing shows that a ewe with a resistant gene R at the 171 codon will not pass the scrapie infective agent after being intentionally exposed to the infective agent.

In addition, a gene at a second codon may be necessary to provide resistance to a “valine” strain of scrapie. The valine strain although uncommon at present, may be transmitted by a QR individual. Therefore, if valine strain is found, animals with the QR genotype at codon 171 must be tested at codon 136 and have AA to be classed as resistant animals. If they have AV at codon 136, they could be susceptible.

Editor’s Notes

History