

SCRAPIE ERADICATION PROGRAM:
THE STOP OF A DEADLY DISEASE

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Scrapie is a fatal disease in sheep and goats that destroys the central nervous system. The causes of this disease are still unknown, and there are no known treatments or preventions. Scrapie is a severe disease that not many people know about. The Scrapie Eradication

Program, as well as many other organizations, have developed some requirements so that people can be informed of the disease and take the correct precautions to be able to track and learn about the disease.

Scrapie was first recognized in Western Europe more than 250 years ago and has made its way throughout the entire world (Scrapie Fact Sheet, 2001). The first case of scrapie in the United States was found in a flock of sheep in Michigan. From this first case in 1947 until 2001, scrapie has been diagnosed in more than 1000 flocks in the United States alone. Most of those cases have been found in flocks of sheep, but there are also a good number of cases seen in goats.

The United States Department of Agriculture (USDA) has initiated a scrapie eradication program to help control the disease. The program includes two major components: The Accelerated Scrapie Eradication Program (ASEP) and the Scrapie Flock Certification Program (SFCP). In 2001 the regulations required the use of official identification of sheep and goats not in slaughter channels. The Animal and Plant Health Inspection Service (APHIS) provides free and official ear tags to producers and veterinarians (USDA.gov, 2020). Effective tracing of the infected animals to their herd of origin and the tracing and testing of exposed animals is made possible because of these identification requirements.

Transmissible Spongiform Encephalopathies (TSEs) are a significant concern for the economic loss of sick livestock and the potential of human infection. Scrapie is one of those TSEs. Other forms of TSE are mad cow disease in cattle, which is also known as Bovine Spongiform Encephalopathy (BSE), Transmissible Mink Encephalopathy, Feline Spongiform Encephalopathy, Ungulate Spongiform Encephalopathy, and Chronic Wasting Disease in deer (Fletcher, 2018). There have been fewer than twenty cases of scrapie reported in goats in the United States since 1990 (Amundson, 2009, p. 122). The only way to confirm the disease is the

destruction of the suspected animals and postmortem examination. If an animal on a farm is diagnosed with scrapie, all of the sexually intact goats and sheep must be destroyed.

Symptoms of scrapie typically appear two to five years after contraction and include weight loss hypersensitivity, tremors, stumbling, blindness, excess salivation, lip-smacking, intense itching, coma, and death. An infected animal may appear normal if left undisturbed at rest. However, when stimulated by a sudden noise, excessive movement, or the stress of handling, the animal may tremble or fall in a convulsive-like state. Every infected animal may not show every sign (Koester-Loesche, 1996. p.1). Between one and six months after the symptoms appear, the infected animals die (Weaver, 2006, p. 124). The causes of scrapie are not fully understood. However, we do know that genetics and an unidentified infective agent are involved (Sayer, 2011). There are a variety of theories regarding the nature of the agent. It is said to be smaller than the smallest known virus and has not been completely characterized yet. The most widely accepted theory is that the disease is caused by an infectious protein, or prion, that causes the standard cellular version of the protein to change shape so that it can no longer be degraded by the cell, causing the protein to accumulate and damage the cell. This agent is extremely resistant to heat and normal sterilization processes and does not evoke any detectable immune response or inflammatory reaction in host animals. It is thought to be spread most commonly from the mother to offspring through contact with the placenta and placental fluids and through milk and colostrum.

The official test currently used for scrapie diagnosis in the United States is immunohistochemistry. This test involves the process of selectively identifying antigens in cells of a tissue section by exploiting the principle of antibodies binding specifically to antigens in biological tissues. Scrapie research efforts are currently focused on developing a practical live animal test to diagnose infected animals before they show signs of the disease. Animals that

are infected with the disease and sharing the agent with others are rarely identified until clinical signs are seen (USDA.gov, 2020). The only way to prevent the introduction of scrapie onto a farm is to prohibit any movement of sheep or goats into a flock and to practice a closed herd. Having a closed heard can reduce the chances of contracting scrapies and other fatal diseases (Scrapie and Goats, n.d.).

The National Scrapie Eradication Program, coordinated by the USDA and APHIS, has reduced the prevalence of scrapie in adult sheep and goats sampled at slaughter by over 99 percent (Metzger, 2018). The USDA Scrapie Identification Program is continuously changing, but as of the year 2020, all sheep and goats must be identified with official identification approved by the National Scrapie Program to move off a farm in the state of Michigan. There are many different forms of identification that are accepted as official. Michigan State University Extension recommends against buying any animal that does not have the official identification, whether that is tattoos or ear tags (Metzger, 2018). At this time, the USDA provides official metal ear tags for all producers. Each scrapie tag has the flock ID, the production number, and an official US shield. The laws are different for every state, but in Michigan, metal tags are used by the majority of producers as it is a fast and easy way to tag multiple animals in a short amount of time. Another type of identification is tattoos. There is one breed of goat that requires a tattoo because they have what is called gopher ears. Their ears are not always large enough for an ear tag to be placed safely and securely. The tattoo on these goats is placed in the webbing of their tail. Other breeds will have the tattoo placed in the ear, tail web, or flank. The scrapie tattoo must be legible and include both the scrapie flock identification and the unique herd management number (Metzger, 2018). Producers might use microchips for identification, but it is strongly discouraged as it is not allowed as official identification in many areas and organizations.

One of the main reasons for having identification for each animal is if that animal is sold and later is found to have a disease such as scrapie. With that specific farm number on the tag of the animal, the state can trace the infected animal back to the original farm and other farms where it may have contracted the disease. Regulatory Scrapie Slaughter Surveillance (RSSS) is a targeted slaughter surveillance program which is designed to identify infected flocks. This program was started in April of 2003. Samples have been collected from 648,548 animals since the start of the program (USDA.gov, 2020). If there is a suspicion of a positive scrapie test, the owner or a veterinarian must report the suspicion of scrapie on that farm to the Divisional Veterinary Manager (DVM) at your local Animal Health Divisional Office. A veterinary officer will visit free of charge to examine the animal to confirm or rule out the suspicion of scrapie. If scrapie is suspected, the animal will be humanely slaughtered by lethal injection. Samples of the brain and other tissues will then be submitted to a specialist laboratory within the Veterinary Laboratories Agency for diagnosis and research. After all of the needed tissues are collected, the carcass will be incinerated. When the tests are complete, you will be informed whether or not the laboratory examination confirmed scrapie. If the examination by the veterinary officer is inconclusive, the suspect animal will be placed under a movement restriction on the farm where it is examined. These restrictions will remain in place for up to twenty-eight days. The suspect animal is not required to be isolated from other animals unless it is likely to give birth while under restriction. The animal will be seen again by the veterinary officer within a few days. If one goat in a herd is reported to have scrapie, the rest of the goats in the herd may be culled as they are known to be uniformly susceptible to scrapie. The penalties for not reporting suspected cases of scrapie are severe. Under the TSE Regulations, failure to comply can result in substantial fines or imprisonment, or both. It is vital to report scrapie as it provides much-needed materials to support the Government's research program such as: improve knowledge of the

disease, improve control of the disease, protect animal welfare, and prevent financial difficulties for the farmer by preventing loss of animals, including valuable breeding stock.

Veterinarians play a crucial role in the eradication of scrapie. The accreditation standards of veterinarians require reporting of live or dead scrapie suspects to State and Federal authorities. Veterinarians are also the primary source of education about all aspects of the program, including identification, recordkeeping, and movement requirements. They can apply official ear tags and collect and submit samples for official testing (USDA.gov, 2020).

An unfortunate aspect that can't go with not being said is dealing with death in raising livestock. Municipalities have laws regulating carcass disposal. Those rules take into consideration public health and safety, including air or water pollution, the spread of disease, nuisance odors, and pest attraction. Checking with the state Department of Health is one way of learning the approved disposal methods (Amundson, 2009). Burial is the most common when carcass numbers are small. The carcass must be at least three to six feet under the surface to discourage scavengers. A cremation is also an option, but in most areas, open burning is prohibited. Biosecurity risks have decreased the popularity of sending dead livestock to disposal farms for fear of contracting and spreading scrapie. Composting is one method of disposal that is gaining in popularity. It is environmentally friendly, inexpensive, and low risk in terms of biosecurity. When done correctly, composed carcasses give off few odors and present little biohazard (Amundson, 2009).

Why does scrapie matter to someone that is not a producer? Scrapie has not been found to be transmissible to humans. The costs of exportation and production of the scrapie eradication program are at least \$10-20 million. There are many countries including Canada that ban the import of sheep and goats unless the animal comes from a farm enrolled in the scrapie eradication program. European countries have banned all live sheep and goats, semen, and

embryos from being imported from the United States. China and Japan ban the import of sheep and goat bone meal and tallow. Israel, a previously active importer of United States goats, banned their import due to confirmed scrapie cases. Mexico requires all rendered meat to be extensively heat-treated before import. These are all potential markets for breeding stock and market in both the goat and sheep industry. There are a number of human diseases that are similar to scrapie in the respect that they are neurological diseases. Some of those include Creutzfeldt-Jakob Disease, Variant Creutzfeldt-Jakob Disease, Gerstmann-Straussler-Scheinker Syndrome, Fatal Familial Insomnia, and Kuru. Variant Creutzfeldt-Jakob Disease is said to be contracted by eating beef products contaminated with central nervous system tissue, such as brain and spinal cord, from cattle infected with mad cow disease (Lava, 2018). Mad cow disease is another strain of TSEs and is similar to scrapie. It is a transmissible, slowly progressive, degenerative, and fatal disease affecting the central nervous system of adult cattle. There have been six cases of this disease in cattle recorded and reported to the Centers for Disease Control and Prevention (CDC) since 2003 (BSE, 2018). According to the CDC, four deaths from Variant Creutzfeldt-Jakob Disease have been identified in the United States. However, it's believed those cases were caused by the consumption of meat outside the United States (Lava, 2018). There have been measures taken to make sure that all brain and spinal cord tissue are removed from at-risk cattle and that those products never enter the United States food supply. There is a lot of controversy surrounding if scrapie is somehow transmissible to humans. Some scientists say waste sheep parts that were cooked in a process known as rendering and used in animal feed were probably responsible for starting the mad cow epidemic in Britain in the 1980s (Koester-Loesche, 1996. p.1). Cattle parts were also rendered and used in feeds, contributing to the spread of the disease in cattle (Koester-Loesche, 1996. p.1).

Scrapie is a disease that needs to be taken seriously. The USDA, CDC, and other scrapie programs have been put in place to help educate about scrapie and inform producers of the precautions that can be taken to have expert traceability and accountability. This fatal disease impacts both humans and animals, and if the correct precautions are taken, together, we might be able to stop scrapie.

Word Count: 2174

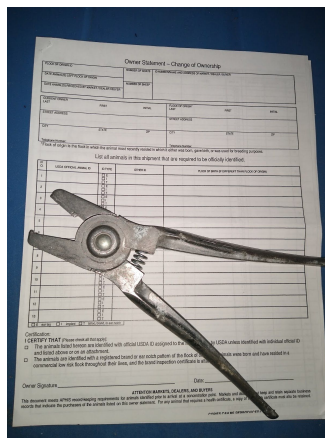


Pictured left: A Goat with the disease of scrapie

Pictured right: The required USDA scrapie ear tags

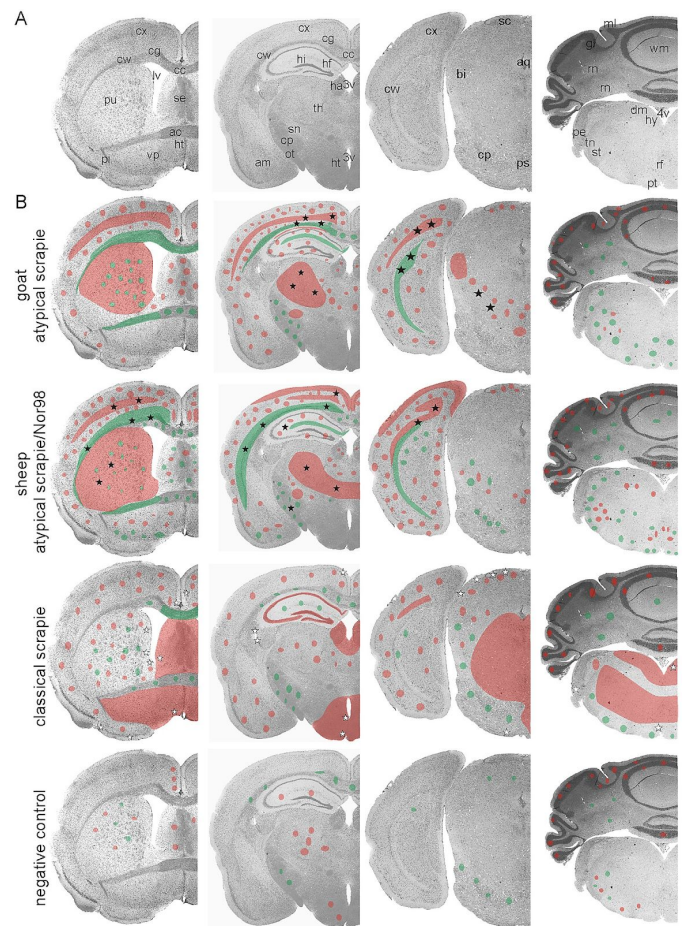


Pictured left: The proper placement of a tattoo for scrapie identification



Pictured middle: The USDA livestock ownership record log and ear tag gun

Pictured right: Pictures of the brain showing negative to positive in classical and atypical scrapie



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