



Best Practices for Specified Risk Material Removal

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Original Document Developed by the National Meat Association: Good Manufacturing Guidelines for the Removal of Spinal Cord
During Slaughter Operations and Sampling and Testing of Advanced Meat Recovery Product for Glial Fibrillary Acidic Protein
Analysis, February 2002

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I. Introduction

In 2007, the USDA/FSIS published the Specified Risk Materials (SRM) Final Rule, and subsequently published additional requirements in 2009 and 2014 specific to non-ambulatory cattle to augment the previous rule. Additionally, 9 CFR 310.22 was issued to state the requirements for SRMs from cattle.

SRMs are considered high-risk for prion contamination, which are associated with transmissible spongiform encephalopathies. The cattle specific disease is bovine spongiform encephalopathy (BSE), also known as mad cow disease while the human version of BSE is known as variant Creutzfeldt–Jakob disease (vCJD).

The removal of SRMs (listed below) are a safeguard against BSE in the US. All SRMs are inedible and prohibited for use as human food. Establishments that slaughter cattle or process carcasses must identify, remove, and segregate SRMs (listed below) as inedible material and divert from human food.

- Cattle of all ages, including veal:
 - Distal ileum of the small intestine
 - The distal ileum describes the terminal or last 80 inches of unstretched small intestine that attaches to the large intestine at the junction of the cecum and colon (large intestine).
 - Tonsils
 - Palatine and Lingual
- Cattle ≥30 months of age:
 - Brain
 - Skull
 - Eyes
 - Trigeminal ganglia
 - The trigeminal ganglia are nodular enlargements of nerve tissue where cranial nerves exit the base of the skull.
 - Spinal cord
 - Vertebral column (excluding the vertebrae of the tail, the transverse processes of the thoracic and lumbar vertebrae, and the wings of the sacrum)
 - Dorsal root ganglia

DRG are nodular enlargements of nerve tissue representing the junction of spinal and peripheral nerves. DRG exit the intervertebral foramina and are usually located anterior and ventral to the transverse vertebral processes in the lumbar region. Note: If all cattle received are considered ≥30 months, no segregation plan to distinguish between cattle < 30 months and ≥ 30 months of age is needed.

The following document lists best practices that could improve process control and assure complete spinal cord removal.

II. Good Manufacturing Practices (GMP's) For the Removal of Spinal Cord

A. OBJECTIVE

To assure the removal of all spinal cord material present in the vertebral column after carcass splitting.

B. SLAUGHTER

1. Remove spinal cord from the entire vertebral bone (butt bone to the end of the neck bone) before the final carcass wash during slaughter. Recommended methods for removing spinal cord include an SRM designated manual-hook, knife or vacuum suction. For ≥ 30 months cattle, the associated "nerve roots" (ganglia) which may partially remain in the channel after the spinal cord is removed will be disposed of during the fabrication process.
2. Carcass splitting and spinal cord removal should be conducted with designated split saw and spinal cord removal equipment when processing cattle ≥ 30 and < 30 months. Carcasses should be identified as ≥ 30 or < 30 month so the equipment operator can use the appropriate ≥ 30 or < 30 month tool. Split saw must be sanitized after every animal either with 180°F water or chemical sanitizer at approved concentrations. In the event that only one saw is in use best practice is to run < 30 month cattle first then run ≥ 30 month cattle, as only normal sanitation between animals would be required. When transitioning from ≥ 30 month cattle to < 30 month cattle it is recommended to open the split saw housing, wash, and sanitize all surfaces of split saw prior to starting to split < 30 month cattle.
3. Establish monitoring and record keeping procedures prior to entering the hot box. This could include identifying and marking "mis-splits" with branding ink or a tag, to be reconditioned later. Correct any incomplete spinal cord removal or identify and segregate vertebral bones that may contain irremovable spinal cord for inedible disposal.
4. Establish a routine verification program on the slaughter floor and/or the hot box to identify miss-splits and verify the complete identification/segregation of all carcasses with incomplete spinal cord removal. Wash, sanitize and inspect all associated equipment prior to resuming operations. Auditing program should include appropriate documentation and corrective actions.
5. Spinal cord material should be disposed of in a designated SRM container, separate from rendering.

C. FABRICATION

1. Examine vertebral column for spinal cord immediately prior to fabrication. Remove any remaining spinal cord or properly identify and segregate all affected sides that may contain irremovable spinal cord. These carcasses/bones may be segregated to a designated area for removal if found prior to fabrication. If found during fabrication, the affected vertebral bones need to be removed and placed into inedible for disposal.

2. For cattle <30 months of age, inspect vertebral bones prior to entering the AMR systems. Remove bones containing *any* spinal cord material for inedible disposal.
3. For cattle ≥ 30 months of age, inspect bones prior to entering the AMR system to ensure there are no vertebral column bones present.
4. When removing edible product from the vertebrae on ≥ 30 month cattle a ≥ 2 inch in diameter whizzard knife should be used to reduce the risk of removing DRG.

Establish a record keeping policy and routine monitoring procedures for bones being processed through the AMR system. If spinal cord is identified, stop production immediately and discard all products to inedible back to last acceptable check. Wash, sanitize and inspect all associated equipment prior to resuming operations. Auditing program should include appropriate documentation and corrective actions.

III. Good Manufacturing Practices (GMP's) For the Removal of Specified Risk Materials

A. SLAUGHTER

In carcasses which have been identified as >30 months SRM materials include:

- Skull
- Brain
- Spinal Cord
- Trigeminal Ganglia (nerves attached to the brain)
- Eyes
- Vertebral Column
- Dorsal Root Ganglia (nerves attached to spinal cord)

All age carcasses SRM materials include:

- Tonsils (Palatine and Lingual)
- Distal Ileum (portion of small intestine)

Brain, skull, trigeminal ganglia, and eye removal procedure for cattle >30 months

Age of cattle should be determined prior to dropping of head from the carcass. Team member that drops head should have a dedicated knife (preferably color coded) to separate the spinal cord from the carcass and head. This knife will be used to sever only spinal cord and should not touch muscle and tissue of carcass. A different knife should be used to cut through the muscle tissue to complete the head drop. Each knife should be sanitized in between carcasses to rinse material off. A designated sterilizer with either $\geq 180^\circ\text{F}$ water or a chemical sanitizer at an acceptable concentration should be used only for knives dedicated to SRMs.

The skull including the brain, trigeminal ganglia, eyes, palatine tonsils of ≥ 30 months cattle must be disposed of as SRM. The removal of the head must be achieved without contamination of the carcass or other meat products with SRM. A head with a ruptured eye should not pass through a wash cabinet to ensure cross

contamination of the eye fluid (aqueous humor) does not occur. Product contact surfaces that have contacted ruptured eye fluid should be sanitized.

It is a best practice to contain the brain within the head of cattle that are designated as ≥ 30 months to prevent brain matter from contaminating other muscles and tissue. This can be accomplished by obstructing the knock hole or inserting a vacuum through the back of the head (atlas joint) or knock hole to remove brain material.

As soon as the head inspection and deboning (as applicable) are complete, the remainder of the head can be sent to inedible disposal for < 30 month cattle. The entire head with brain can be sent to CMPAF disposal or split the skull in half of over thirty-month cattle and remove the brain with a vacuum. This must be done on designated equipment for ≥ 30 month cattle skulls.

Tonsils and the distal ileum are considered SRM for all cattle regardless of age.

Palatine and lingual tonsils are removed from the head of all cattle. These tonsils are considered SRM on all carcasses and must be sent to inedible rendering. Designated equipment will need to be used if cutting through tonsil SRM material. If cross contamination occurs with equipment, that equipment shall be cleaned and sanitized prior to continued use.

Palatine tonsils may be removed as part of the tongue dropping and/or trimming process. Lingual tonsils may be removed as part of the tongue trimming process by either knife cut or a skinner.

The lingual tonsil removal by a knife cut should be made at a point just caudal to the last vallate papillae on the tongue. It is acceptable to make the knife cut at any point closer to the front of the tongue above the last vallate papillae. Lingual tonsil removal with a skinner should be made at the same location but to a depth of at least 5 mm.

Distal Ileum is a portion of the small intestine and is a SRM in all cattle of all ages. A minimum of 80" (SRM) is left on the ileocecal junction on the distal end, which is sent to inedible rendering. The remainder of the small intestine can be saved for edible purposes. This must be removed and disposed as inedible. The separation on distal ileum does not require a dedicated tool for ≥ 30 months cattle when the cut is made 80" past the ileocecal junction from the distal end of the intestine

B. FABRICATION

Carcasses should have the spinal cord completely removed from the vertebral column prior to entering fabrication.

For cattle ≥ 30 months the vertebral column containing the dorsal root ganglia should be disposed of during the de-boning process and collected and rendered as inedible and shall not be used in AMR production.

C. DISPOSAL METHODS

The brain and spinal cord of cattle ≥ 30 months have unique disposal requirements to comply with the revised bovine spongiform encephalopathy (BSE) rule excluding CMPAF (Cattle Material Prohibited from Animal Feed) from animal feed (21 CFR 589.2001 and 21 USC 331(h), 333(c)). This rule was put in place to prohibit the use of certain cattle origin materials in the food or feed of all animals to further reduce the risk of the spread of BSE within the United States.

It is a best practice to have a designated inedible container for CMPAF materials (cattle ≥ 30 months brain and spinal cord). This designated container will be disposed of separate from inedible rendering according to state specific regulations. Brain and spinal cord that are removed from carcasses or fall on the floor should be disposed of in designated CMPAF containers. As mentioned earlier, head splitting of all ≥ 30 months heads once designated for inedible is a best practice to ensure complete and proper disposal of the brain.

All < 30 month cattle SRM materials can be disposed of to inedible rendering. All ≥ 30 month cattle SRM materials (EXCEPT brain and spinal cord) can also be disposed of to inedible rendering.

IV. Resources

R-Biopharm Additional Information: [Food & Feed Analysis - a division of R-Biopharm AG \(r-biopharm.com\)](http://r-biopharm.com)

R-Biopharm Ridascreen® Risk Material Test: [RIDASCREEN® Risk Material 10/5R-Biopharm Inc.](http://ridascreen.com)

G.R Schmidt, K.L. Hossner, R.S. Yemm, B.H. Gould, J.P. Ocallaghan, Journal of Food Protection. Vol 62 No. 4. 1999. Pages 394-397. An Enzyme – Lined Immunosorbent Assay for Glial Fibrillary Acidic Protein as an Indicator of the Presence of Brain or Spinal Cord in Meat.

[Food and Drug Administration Bovine Spongiform Encephalopathy \(BSE\) Rule, 21CFR § 589.2001.](http://www.fda.gov/oc/ohrt/bse/bse_rule_21cfr_589_2001.pdf)

[FSIS Directive 6100.4, Verification Instructions related to Specific Risk Materials \(SRMs\), 09-13-07.](http://www.fsis.usda.gov/FSIS-Directive-6100.4-Verification-Instructions-related-to-Specific-Risk-Materials-(SRMs)-09-13-07)

[9 CFR 310.22, Prohibition of the Use of Specified Risk Materials for Human Food and Requirements for the Disposition of Non-Ambulatory Disabled Cattle.](http://www.fda.gov/oc/ohrt/bse/bse_rule_21cfr_310_22.pdf)

This document was developed by members of the Beef Industry Food Safety Council. Best Practice documents are ever evolving, and as changes or new information becomes available, these documents will be reviewed and updated. Questions or suggestions are welcome and should be addressed to BIFSCO at bifscoco@beef.org.