



PRODUCTION

Managing Livestock Mortalities

Introduction

Death of animals is a normal occurrence and represents a loss to the operator. Even the best livestock producers will have losses between two and three per cent, but higher rates can occur. There are several options for managing livestock mortalities.

Cause of Death

The death of an animal may be an indication of a problem area that needs prompt attention. Cause of death may include disease, predation, poor nutrition or accidents. Analyze the cause of death and identify measures to minimize further losses.

Confirm that feed is providing sufficient nutrition by consulting a private livestock agrologist. If poor feed is contributing to death loss, the agrologist will help improve the feeding regime for fewer deaths and improved herd performance. The Saskatchewan Institute of Agrologists will know of local agrologists, and contact information is available in Appendix A.

Contact a veterinarian if the death rate increases noticeably. The veterinarian will help identify the cause of death and prepare a suitable treatment program if appropriate. Identify the source of infection if the animal died from a transmissible disease. Review bio-security measures, as animals from other herds or barns may carry disease. Rodents, insects and birds may also carry disease.

Verify the cause of death with laboratory analysis. Deliver the animal carcass or tissue samples to an appropriate laboratory. The laboratory will notify the Canadian Food Inspection Agency's (CFIA) District Veterinarian if the cause of death is a reportable disease. A list of reportable diseases (accurate in September 2008) appears in Appendix B. To obtain a current list, contact the CFIA District Veterinarian (Appendix C).

If the mortality is a bovine that fits the BSE surveillance requirements (greater than 30 months of age), submit a sample to CFIA's Bovine Spongiform Encephalopathy (BSE) surveillance program. Contact a CFIA district veterinarian or call 1-877-SASK-BSE (1-877-727-5273).

Moving specified risk materials off premise requires a permit from CFIA. For more information please contact a CFIA District Veterinarian or call 1-800-442-2342.

Rendering

Rendering is the preferred method of managing mortalities. In fact, value added products are produced from the rendering process. Also, the high temperature (about 130°C or 265°F) will destroy most pathogens if any are present. The process temperature, length of retention time and sensitivity of the pathogen affect survival. Evaluate animals that died under suspicious conditions to determine if rendering is an appropriate disposal option (some diseases may not be destroyed by rendering).

Rendering may not be an option for some producers depending on location, type and volume of mortalities. Call the rendering processor to determine if rendering is a viable option. Carcasses must be in good condition, and storage of the carcass and timing of delivery to the rendering processor is important. Contact information is in Appendix A.

In the winter, store animals to prevent access by scavengers prior to pickup. An un-insulated building is ideal for storage, but a fence or bale enclosure also works. In the summer, cold storage will generally be required to hold the carcass before pickup.

Bio-security is an important consideration: be aware that the rendering vehicle usually stops at

several farms on its route. Select a pickup location that is separate from healthy livestock, convenient for both the driver and producer, and screened from public view. Bins may be available from the rendering company to allow the carcass to be loaded easily. Otherwise, equipment such as a front-end loader must be made available.

Incineration

Incineration is an acceptable method of disposal if performed properly. Incinerators are more often associated with poultry and swine, but larger animals may also be incinerated. The capital cost may be prohibitive to some producers, but many operations may find incineration a convenient and economic option. Remember to estimate the cost of energy and fuel when comparing incineration to other disposal options.

Incinerators are regulated by Saskatchewan Environment, and a permit may be required to operate an incinerator. Information that may help to obtain a permit under The Clean Air Regulations is listed in Appendix D. Contact Saskatchewan Environment for further information. Contact information is available in Appendix A.

Fuel type is a consideration. Natural gas is suitable but may not be available in some areas. Diesel will burn hotter than natural gas, and is an option where natural gas is not available. Some incinerators burn propane and others burn wood. For example, air curtain incinerators burn wood and will eliminate many carcasses very quickly.



Fenced enclosure



Air curtain incinerator

Some incinerators require a source of electrical power (usually 220V). Locate the incinerator near an electrical source, or install power at the incinerator location. Although less convenient, a generator is an option in the absence of power lines.

Size the incinerator to handle the largest expected carcass. The incinerator will not operate properly if the incinerator is overfilled because airspace is required around the carcass to achieve a proper burn. If the incinerator is too small, the carcass must be reduced to an appropriate size. Consult the incinerator supplier to select a unit that meets the operation's requirements.

Maintain the operating temperature between 760° and 1090°C (1400° and 2000°F) to limit emissions and achieve thorough and complete incineration, including bones. Following incineration, some bones may appear intact but will crumble easily. The incinerator should have a secondary chamber to ensure complete combustion.

Neighbours will not notice incineration if it is operating properly. Regardless, be aware of wind conditions and the location of neighbours when operating the incinerator. Strong winds help to reduce the travel distance of odour, whereas calm conditions (often dusk or dawn) help odour to travel further distances.

Composting

Although composting is commonly associated with small animals like poultry, large animals like cattle will compost under proper conditions. Control the composting process carefully to promote proper decomposition. Burying a carcass in a pile of straw to rot is not considered composting.

Two common "on-farm" composting systems are bins and windrows. "In-vessel" composters are also available and may be suitable for some operations. "In-vessel" systems are usually produced commercially and reduce the composting time with active aeration and heat.

The bin system requires at least three bins. One bin is filled with carcasses and a "bulking agent" (straw, sawdust, etc.) and then left to compost while a second bin is filled with carcasses and a bulking agent. When the second bin is full, the carcasses are moved from the first bin to a third bin for further decomposition.

Windrow composting is an outdoor system often used to compost manure. The carcasses are layered and covered with a bulking agent to form a pile roughly triangular in cross section. The windrow grows longer as more carcasses are added, and eventually the windrow will be turned to encourage further decomposition.



Insufficient cover material

Compost production requires careful management. Moisture content, temperature and “carbon-to-nitrogen ratio” are important variables. Monitor the process to maintain these variables within an acceptable range. Composting time ranges from six to 18 months, depending on a number of variables: management, size of carcasses, climate and compost pile design. The finished compost product is a stable source of nutrients and is generally weed and pathogen free.

The capital cost of composting includes constructing or adapting existing structures, and grading or earthwork to prevent runoff. Bins could be roofed for control of moisture content. Access to water is important to control moisture content, and access to equipment is required to move animals and compost.

Consider the proximity of surface water, groundwater and neighbours when locating the compost facility. The site should be convenient, accessible in winter and screened from view. Cover the mortalities with sufficient bulking agent to prevent access by scavengers and reduce odour.

For further information, refer to the Saskatchewan Agriculture publication titled *Composting Animal Mortalities: A Producer’s Guide*.

Burial of Normally Occurring Mortalities

Burial of mortalities is a common and appropriate method of disposal if managed properly. The carcass is disposed of quickly, and potential nuisance is eliminated.

Locate the burial pit in clay or till soils. Fortunately, much of Saskatchewan is underlain by till material that extends to a significant depth beneath the surface. Dig test holes to a depth of about four m (13 ft.) with a backhoe and wait 24 hours. If water appears in the test hole, choose an alternate location for a burial pit. Avoid locations with sand and gravel. The burial pit and pit area should not be subject to flooding.

Consider the depth to a useable water source. Maintain at least four m (13 ft.) between the bottom of the burial pit and a useable groundwater water source, depending on site conditions. A good description of subsurface conditions may be available from records of nearby wells. The Saskatchewan Watershed Authority has a record of wells and known aquifer locations. Contact information is in Appendix A.

Winter burial is a challenge. However, burial pits may be prepared in the fall and a final cover placed in the spring. Estimate the winter death loss (Appendix F) and allow 1.5 m³ (two cu. yd.) of burial pit volume per 450 kg or 1,000 lb. of carcass. A lid will protect mortalities from scavengers and prevent snow from filling the pit. The location must be accessible by equipment during winter conditions.

Alternatively, the carcass may be stored until spring at a site that is inaccessible to scavengers. A sheltered building, metal bin or a round bale enclosure with chain link provides good protection.

Burial Pit Management

Puncture the abdominal cavity of large ruminants to prevent bloating. Be careful to avoid contact with abdominal material.

Cover the animals as soon as possible. As the burial pit fills, cover each layer of carcasses with at least 0.3 m (one ft.) of soil. In the winter, 0.6 m (two ft.) of straw is an acceptable interim cover.

Maintain at least one m (three ft.) between the top surface of the carcasses and the natural ground surface. Mound the final soil cover about one m (three ft.) above the surrounding terrain to ensure that water doesn’t pond above the burial pit.

Maintenance of the area around the disposal site may be required for several years until decomposition of the animals has occurred and the soil has finished settling. Fence the site if necessary. Unless the pit is in a cultivated field, seed the top of the burial pit to grass or other vegetative cover to prevent erosion and weed growth.

For assistance in locating a site for disposal of mortalities from your livestock or poultry facility, contact the Agricultural Operations Regional Specialist for your area.

Catastrophic Mortalities

Producers should develop a plan in the event that they suffer a catastrophic event which results in a large number of deaths. This includes events such as fire, flood, building collapse, suffocation or the outbreak of a major disease.



In-Vessel” composter



Burial pit cover

If the death of the animals is a result of a federally reportable disease (Appendix B), the CFIA is the authority responsible for directing the disposal of mortalities. The CFIA will assist in advising on the safe disposal of carcasses.

If a large number of animals or poultry die due to a non-listed infectious disease, a fire, flood or another natural disaster, the appropriate municipal authorities and various provincial government ministries will direct disposal of the mortalities.

If disposal sites are pre-selected and approved, carcass disposal can begin immediately. In some cases where a highly infectious disease is involved, it is desirable and important to dispose of the carcasses quickly to contain the disease and prevent its spread to neighbouring farms. Rapid disposal of the carcasses is also important in hot weather as carcasses start to decompose very quickly and can become a nuisance.

On-site disposal is the preferred option for a catastrophic death loss.

Site Selection for Mass Burial

The selection of a carcass disposal site requires some knowledge of the environmental conditions at the proposed site. Factors such as the topography, depth to useable groundwater, soil type and depth, distance to neighbours and the location of roads are important. A good site will have natural features that protect the environment and minimize future maintenance.

Consider the livestock producer's own land as the first site (particularly land close to the facility) to minimize transportation, allow for timely disposal and control spread of disease.

If the producer has obtained an approval under The Agricultural Operations Act, the test hole logs provide excellent information about the soil type and depth at the site and may provide information on depth to water sources in the area. Well logs which are available from the Saskatchewan Watershed Authority are another excellent source of information on the type of sub-surface soils and groundwater potentially in the area. Contact information is in Appendix A.

Locate the burial pit in an area not subject to flooding. The livestock producer must be aware of any underground utilities located at or near the selected burial site. The site must be accessible by wheeled vehicles. Give consideration to location of neighbours and the prevailing winds in the area. If possible, the site should be screened from public view.

Maintain 100 m (325 ft.) from a watercourse, body of water, source of domestic water, residence, other livestock facilities, property boundaries, primary highways, secondary highways and municipal roads.

If the selected site is not adjacent to the livestock/poultry facility, then determine a route from the facility to the burial pit. Attempt to minimize the travel distance and avoid neighbouring livestock. Choose an all-weather road so access can be achieved regardless of the weather.

Discuss site selection criteria and location with local municipal officials. There may be municipal bylaw requirements.

Land Requirement

As a rule of thumb, allow 1.5 m³ (two cu. yd.) of burial pit volume per 450 kg or 1000 lb. of carcass. Refer to Appendix F for typical carcass weights.

If a producer needed to bury 2,200 cows and planned to use a pit two m (6.5 ft.) wide and three m (10 ft.) deep (two m of useable depth) the pit would be about 1000 m (3300 ft.) long. The surface area of this pit would be 2,000 m² or ½ ac. A pit this size would handle approximately 12,100 feeder hogs.

The configuration of the pit is dependent on the equipment used to dig and deposit the animals, soil conditions and volume of material to be buried. In the above example, 10 trenches 100 m (325 ft.) long spaced six m (20 ft.) apart may be a suitable configuration. Allow sufficient space between the trenches for the spoil and movement of equipment.

A long narrow trench with steep sides allows animals to be dumped out the back of a truck and minimizes the need to move animal carcasses around in the burial pit to achieve an even burial depth.

If the death losses are the result of an infectious disease, it may be necessary to dispose of manure, bedding, feed and milk in the burial pit. Additional space will be required.

Regulations

There may be requirements for carcass disposal under the following legislation. Contact the appropriate authority for further information.

Saskatchewan Health

The Health Hazard Regulations

- Section 14 Subject to The Wildlife Regulations, 1981, when an animal dies or is unintentionally killed, the owner or the person in possession of the animal shall cause the carcass to be removed and buried or disposed of to the satisfaction of the local authority.

Saskatchewan Environment

The Environmental Management and Protection Act, 2002

- Section 4 No person shall discharge or allow the discharge of a substance into the environment in an amount, concentration or level or at a rate of release that may cause or is causing an adverse effect unless otherwise expressly authorized...

The Clean Air Act

- An incinerator for burning carcasses may require a permit.

Saskatchewan Agriculture

The Agricultural Operations Act

- Section 19(2) No person shall manage the waste from an intensive livestock operation that belongs to a class prescribed as a class of intensive livestock operation for which a waste management plan is required, except in accordance with a waste management plan approved by the minister.

The Agricultural Operations Regulations

- A dead animal management plan is required for certain intensive livestock operations.

Agriculture and Agri-Food Canada

Health of Animals Act

- Section 5(1) A person who owns or has the possession, care or control of an animal shall notify the nearest veterinary inspector of the presence of a reportable disease or toxic substance, or of any fact indicating its presence, in or around the animal, immediately after the person becomes aware of the presence or fact.

Glossary

Anthrax: An infectious bacterial zoonotic disease usually acquired by ingestion of *Bacillus anthracis* or its spores from infected pastures by herbivores or indirectly from infected carcasses by carnivores.

Aquifer: An aquifer will yield sufficient volumes of water for domestic or commercial use. An aquifer is a saturated permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients. Hydraulic conductivities in such formations are typically greater than 10-seven m/sec.

Aquitard: Generally restricts or confines the flow of water. An aquitard is a geological formation that does not yield sufficient quantities of water for domestic or commercial use. Hydraulic conductivities are typically less than 10-seven m/sec.

BSE: Bovine Spongiform Encephalopathy, commonly known as mad cow disease.

Till: A mixture of clay, silt, sand, gravel and boulders. Till is typically very good at preventing water movement, because hydraulic conductivities are typically less than 10-nine m/sec.

Topography: Natural or physical surface features of a region commonly shown on a map by contour lines.

Zoonotic: Transmissible from animals to man under natural conditions.

Appendix A – Contacts

1. Saskatchewan Institute of Agrologists –
2. (306) 242-2606
3. Saskatoon Processing Company –
4. (306) 934-4887 or 1-800-803-9714
5. Saskatchewan Environment - Environmental Protection – (306) 787-6169
6. Saskatchewan Watershed Authority - Groundwater Approvals – (306) 694-3980

Appendix B – Reportable Diseases

- | | | | |
|-----|--|-----|-------------------------------------|
| 1. | African horse sickness | 17. | highly pathogenic avian influenza |
| 2. | African swine fever | 18. | hog cholera (classical swine fever) |
| 3. | anaplasmosis | 19. | lumpy skin disease |
| 4. | anthrax | 20. | Newcastle disease |
| 5. | bluetongue | 21. | peste des petits ruminants |
| 6. | bovine spongiform encephalopathy | 22. | pseudorabies (Aujeszky's disease) |
| 7. | bovine tuberculosis (M. bovis) | 23. | pullorum disease (S. pullorum) |
| 8. | brucellosis | 24. | rabies |
| 9. | chronic wasting disease of cervids | 25. | Rift Valley fever |
| 10. | contagious bovine pleuropneumonia | 26. | rinderpest |
| 11. | contagious equine metritis | 27. | scrapie |
| 12. | cysticercosis | 28. | sheep and goat pox |
| 13. | equine infectious anaemia | 29. | swine vesicular disease |
| 14. | equine piroplasmiasis (B. equi and B. caballi) | 30. | trichinellosis |
| 15. | foot and mouth disease (FMD) | 31. | Venezuelan equine encephalomyelitis |
| 16. | fowl typhoid (Salmonella gallinarum) | 32. | vesicular stomatitis |

Appendix C – CFIA District Veterinarians

Battleford

401 - 27th Street, PO Box 1028
Battleford, Saskatchewan, S0M 0E0
Telephone: (306) 937-3633
Facsimile: (306) 937-3338

North Portal

PO Box 38
North Portal, Saskatchewan, S0C 1W0
Telephone: (306) 927-2255
Facsimile: (306) 927-2200

Regina

#301 – 1800 – 11th Avenue, PO Box 8060
Regina, Saskatchewan, S4P 4E3
Telephone: (306) 780-5220
Facsimile: (306) 780-5177

Swift Current

1677 Sidney St. West, PO Box 1235
Swift Current, Saskatchewan, S9H 3X4
Telephone: (306) 778-5030
Facsimile: (306) 778-5035

Yorkton

204 Smith Street East
Yorkton, Saskatchewan, S3N 3S6
Telephone: (306) 786-5300
Facsimile: (306) 786-5310

Moose Jaw

1410B Caribou Street West
Moose Jaw, Saskatchewan, S6H 7S9
Telephone: (306) 691-3450
Facsimile: (306) 691-3455

Prince Albert

1288 Central Avenue, Room 320
Prince Albert, Saskatchewan, S6V 4V8
Telephone: (306) 953-8614
Facsimile: (306) 953-8801

Saskatoon

421 Downey Road, Room 301
Saskatoon, Saskatchewan, S7N 4L8
Telephone: (306) 975-4185
Facsimile: (306) 975-6959

Wynyard

325 Bosworth Street, PO Box 1719
Wynyard, Saskatchewan, S0A 4T0
Telephone: (306) 554-2202
Facsimile: (306) 554-3212

Appendix D – Information for an Incinerator Permit

(From The Clean Air Regulations)

1. Map of the area showing:
 - a. topography of the area including land contours
 - b. location and description of buildings in the area
 - c. property boundaries
 - d. land use of area

2. Information with respect to incinerator installation:
 - type of building or process to be served by the incinerator _____

 - type and quantity of waste to be incinerated _____

 - manner in which incinerator is to be operated _____

3. Incinerator Specifications:
 - I. a) size _____ b) age _____
c) capacity _____ d) design efficiency _____
e) make and model _____
Method of charging waste into the incinerator _____

 - II. Type and size of grate or hearth _____

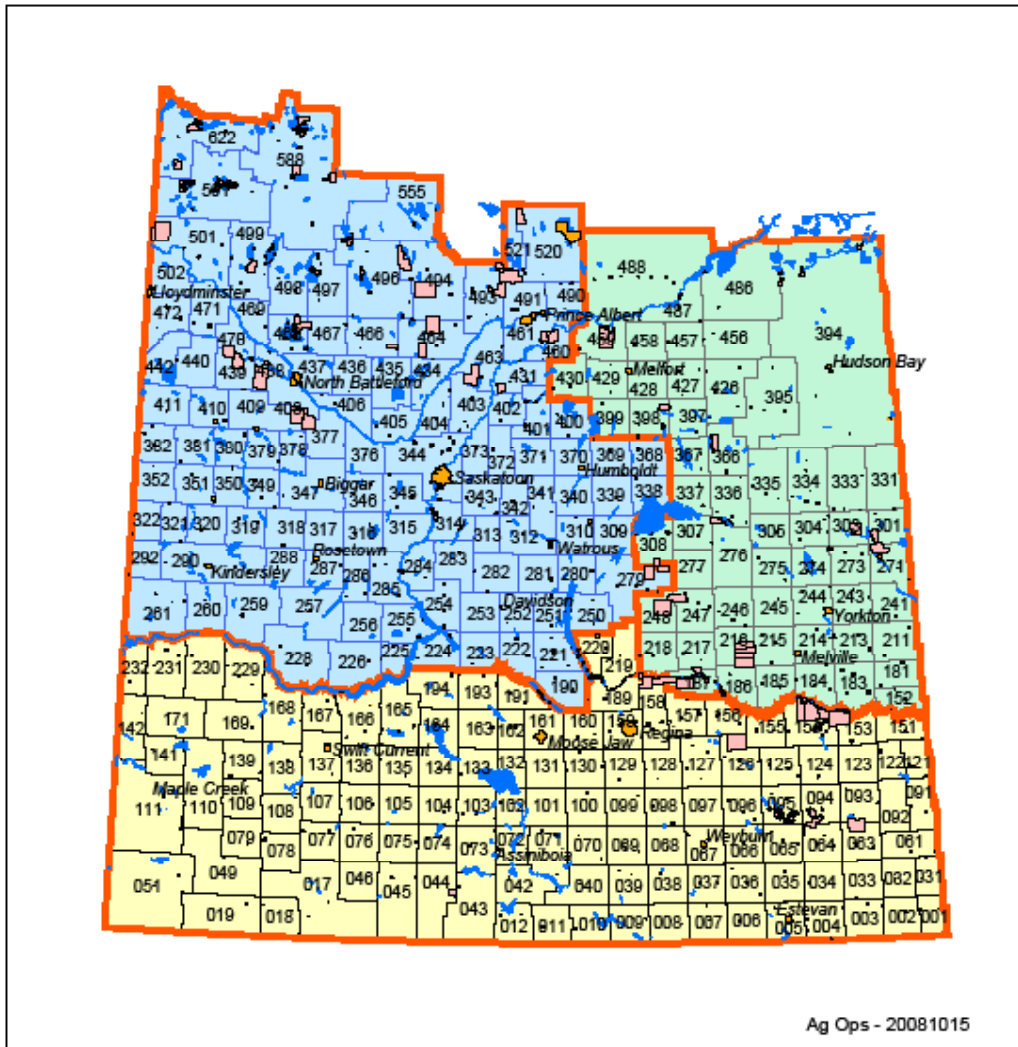
 - III. Maximum operating temperature _____
 - IV. Describe provisions made for supplying fresh air for combustion _____

 - V. Retention time of gases in combustion chamber _____
 - VI. Stack dimensions _____

4. Plans of proposed incinerator:
 - a. Are there a set of plans available for the incinerator? _____
 - b. Is a copy of the plans attached to this application? _____
 - c. Please provide any additional specifications of the proposed incinerator _____

5. Air contaminant control equipment:
 - a. Describe the air contaminant control equipment used on the incinerator _____

Agricultural Operations Regions



Legend

- Saskatoon Region
- Weyburn Region
- Yorkton Region

Agricultural Operations Regional Offices

Saskatoon:	David Cook	933-5322
	Bryce Sundbo	933-5095
Weyburn:	Randy Vopni	848-2379
	Christopher Pinno	848-2326
Yorkton:	Brian Campbell	788-1505

Appendix F – Death Loss

Type	Kind of Animal	Weight	Annual Death Loss (%)
Beef Cattle	Cows and bulls	550 kg or 1212 lb.	1
	Feeder cattle	450 kg or 992 lb.	1.5
	Replacement heifers	360 kg or 794 lb.	1
	Calves	135 kg or 298 lb.	4
Dairy Cattle	Cows and bulls	600 kg or 1323 lb.	4
	Replacement heifers	450 kg or 992 lb.	4
	Calves	135 kg or 298 lb.	8
Hogs	Boars or sows	150 kg or 331 lb.	4
	Feeder pigs	100 kg or 220 lb.	3
	Weanling pigs	16 kg or 35 lb.	1.5
Poultry	Hens, cockerels, capons	1.8 kg or 4 lb.	6
	Chicks, broilers	1.5 kg or 3.3 lb.	2
	Hen turkeys, geese, ducks	8 kg or 18 lb.	5
	Heavy tom turkeys	12 kg or 26 lb.	7
Sheep	Rams or ewes	45 kg or 99 lb.	3
	Lambs	20 kg or 44 lb.	5
Goats	Does or bucks	45 kg or 99 lb.	3
	Kids	20 kg or 44 lb.	5
Horses	Mares and studs	600 kg or 1323 lb.	1
	Replacements	400 kg or 882 lb.	1
	Colts or ponies	135 kg or 298 lb.	4
Bison	Cows or bulls	550 kg or 1212 lb.	0.25
	Calves	135 kg or 298 lb.	1
Elk	Cows or bulls	227 kg or 500 lb.	3
	Calves	113 kg or 250 lb.	5
Deer	Does or bucks	90 kg or 200 lb.	5
	Fawns	23 kg or 50 lb.	10

References

“Composting Animal Mortalities: A Producers Guide”, revised 2005, Saskatchewan Agriculture

Dorland’s Illustrated Medical Dictionary, 27th Edition, W.B. Saunders Company, 1988

“Establishing and Managing Livestock Operations”, 2001, Saskatchewan Agriculture

“Livestock Mortality Management (Disposal)”, Alberta Agriculture, Food and Rural Development

“Manual for Developing a Manure and Dead Animal Management Plan”, 2000, Saskatchewan Agriculture

“On-Farm Composting Handbook”, Natural Resource, Agriculture, and Engineering Service, 1992

Volume 13, Industry Processes and Controls, Rendering, Rendering and Inactivation of BSE, The Inquiry into BSE and variant CJD in the United Kingdom, 2000