Dealing with Deadstock: A Cattle Producers Dilema.

May 22, 2013

The Deadstock Subcommittee was given direction by the Alberta Beef Producers Board to study the issue of the deadstock removal from Alberta's beef farms and feedlots[1]. The study was to have sufficient information to find transition funding for this process.

Part of the problem occurred after BSE in 2003 with a change in regulations dealing with Specified Risk Material (SRM) going into rendered products. After that date SRM was required to be removed from rendered material.

Considerable information is available in North America dealing with this issue. In most jurisdictions producers are faced with this problem. Prior to this the rendering company would remove carcasses for the ability to obtain feedstock
as part of their process. Since then renderers are required to remove SRM before rendering the carcass: this presents a cost to them.

As present the rendering company charges producers $0.09 cents per pound with a minimum charge of $75 per head. This is in areas of the province where they service; other areas do not have the service. To date the number of head picked up is about 45 percent of the volume prior to BSE.

Most recommendations about ways to handle deadstock deals with:

a) Natural Disposal
b) On-farm Burial
c) Incineration
d) Burning
e) Biodigestion, and
f) Composting

The choice left to the producer usually comes down to cost. In many cases producers feel that this cost should be handed off to government. To date provincial governments have never paid for farm carcass removal; however, a few municipalities have offset part of this cost in some way. Some grant money from the provincial government has gone into these projects as pilot studies.

This report does not present any cost differences between methods for handling. Neither does it offer any real cost-free solution, other than natural-disposal that has its own of downside.

The following articles are examples of the recommendations in the literature with some specifics about them. There is much duplication among these reports, but some specific points are sometimes described differently in one over the others.

[1] ABP Board of Directors Meeting, April 26, 2013.

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These are indexed for access. Other articles are also available in the literature. Any internet references in the articles can be readily found, if on-line in the report, by pointing to them with your mouse and accessing them.

Indexed. Point to red line. Access Report.

Articles with this series:

1. Alberta Beef Producers Deadstock Review, 2013.
2. Biosecurity In Practice Manual, Alberta Veterinary Medical Association, 2011. Includes legislation in place to deal with deadstock with Health of Animals Act and Regulations (Federal Government), and Alberta Animal Health Act and Regulations (Government of Alberta).
3. On-farm Carcass Disposal Options for Dairies, 2006.
4. Deadstock Disposal Resources from Other Jurisdictions- Ontario, 2011.
5. Livestock Mortality Management (Disposal), Government of Alberta, 2011. Includes Appendix on The Act and Regulations, and Advantages and Disadvantages of Each Method.
6. Large Animal Mortality Composting, Government of Alberta, 2011. Includes Act and Regulations with restrictions; Composting Bin Design; Windrow Design; and specific calculations for mortality material to be handled and sawdust amounts needed.
7. Managing Livestock Mortalities, Government of Saskatchewan, 2011. Includes various ways to handle deadstock; Information for an Incinerator; and Expected Death Loss by livestock type and size for a production unit per year.
8. Composting Animal Mortalities, A Producer's Guide, Government of Saskatchewan, 2011. They get into site location, using temperature measurements, expected days for primary composting and a Troubleshooting Guide.
9. Low Maintenance On-Farm Cattle Composting, Government of Manitoba, about 2012.
10. Dead Livestock Composting, Presentation 2011. Regional and Municipal Community Projects; facility design and the compost process.

Deadstock Subcommittee

Alberta Beef Producers
Deadstock Working Group
Program Development March 7, 2013

WHAT IS HAPPENING TO THE SRM STATUS?

Specific Risk Material (SRM) for beef was regulated by the Government of Canada in 2003 through the *Health of Animals Act and Regulations*. The federal agency Agriculture and Agri-food Canada administers the Act and Regulations that Canadian Feed Industry Agency (CFIA). In Canada there is a variation to the definition compared with the US, Europe and Japan[1]. This has been associated with a value differential compared with that in the US[2]. Legislation around SRM in Canada will probably not be changed in the near future.

HOW CAN DEAD CATTLE BE HANDLED ON FARM?

Livestock that have died in Alberta from natural causes is covered under Alberta's *Animal Health Act and Regulations*. They are potentially assessed as having died from natural causes and not from some federally regulated disease unless proven otherwise. This stock cannot enter the food or feed chain. Livestock mortality management is to be handled as defined in the *Animal Health Act, Destruction and Disposal of Dead Animals Regulation*. Dead animals must be disposed of in an acceptable manner within 48 hours of death. Management of these can be as follows[3]:

- Incineration
- Livestock Burial
- Rendering
- Composting
- Natural Disposal

WHAT IS THE SITUATION WITH DEAD ANIMAL MANAGEMENT WITH RENDERER PICK-UP?

Prior to 2003 dead management was handled in many cases with free farm pick-up by rendering companies. Prior to this renderers could use the entire carcass for processing. For this access they usually picked up at no cost to the producer. Since 2007 cattle deadstock have little value to renderers except for the hide and some tallow. All proteins must be disposed. It has been suggested that the number of pick-ups has decreased by 50 percent compared with pre 2003. In most cases, they would charge a producer 13 cents per pound, minimum $75 for their service. Most producers feel this is too expensive; they usually use some other process, in most cases natural disposal.

WHAT IS THE PROBLEM WITH NATURAL DISPOSAL?

A good, short review of this and other methods is attached[4].

Natural disposal of carcasses usually involves scavengers in the field. This is a permitted method in Alberta. However, because it has a very high probability of spreading disease and creating a public nuisance, the method is not recommended.

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[1] INTERNATIONAL FORUM FOR TRANSMISSIBLE ANIMAL DISEASES AND FOOD SAFETY: TAFS Position Paper on Specified Risk Materials, 2009.
[2] The Regulatory Environment in the Canadian and US Beef Industry: An Environmental Strategic Intelligence Scan and Comparative Analysis. Prepared for the Alberta Livestock and Meat Agency (ALMA): Serecon Management Consulting Inc. and Toma & Bouma, 2012.
[3] Livestock Mortality Management (disposal), Government of Alberta, Agdex 400/29-1, 2011.
[4] Kim Stanford and Brian Sexton. On-Farm Carcass Disposal Options for Dairies. WCDS Advances in Dairy Technology (2006), 18:295-302.

Wildlife becomes involved in the process. Coyotes, wolves, bears and others remove bits and pieces of the disposed carcasses that can be spread around in the area. This can become a hazard in itself. As well, having carcasses around tends to attract scavenging to the area. This can also compromise producer/livestock-wildlife issues.

WHAT ABOUT BURIAL, INCINERATION, OR COMPOSTING?

This has been discussed in the attached article. A major factor is availability and cost depending on the process. As well, some municipalities provide landfills for animal carcasses. This arrangement depends on landfill classification and agreement by the region. As defined in the Waste Control Regulation (AR 192/96), landfills that are willing to accept the dead animals may be used if the site has a full-time operator who agrees to immediately bury the dead animal. See (see Appendix 1).

WHAT CAN BE DONE TO ADDRESS DISPOSAL PROCESSES?

There is a considerable amount of literature dealing with the practicality of handling carcass disposals published in Canada, the US and other regions. For review some of this has been compiled by the Ontario Ministry of Agriculture and Rural Development (OMAFRA) available on their website:

http://www.omafra.gov.on.ca/english/livestock/deadstock/facts/other_jur.htm

WHAT HAS BEEN DONE IN ALBERTA TO ADDRESS CARCASS DISPOSAL?

The Government of Alberta has developed manuals outlining the Regulations and processes for livestock producers. The major document is Livestock Mortality Documents that includes:

- Large Animal Mortality Composting Agdex 400/29-4

Website: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex13509/$file/400_29-4.pdf?OpenElement

- Livestock Mortality Burial Techniques Agdex 400/29-2

Website: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/agdex5310/$FILE/400_29-2.pdf

These documents can also be made available from the Alberta Beef Producers office.

WHAT ABOUT SOME RECENT PRACTICAL PROGRAMS?

Many livestock producers find the cost of burial or composting as an option becomes too expensive for them to individually initiate. The next step is something at a county or municipal level to take on as a project for the community. Some municipalities in Southern Alberta have developed composting projects to deal with the situation. Most of these deal with predator management problems affecting livestock producers and their cattle. These include:

Program or Pilot Project	Region	Contact
Predator Control: Carcass disposal bin, provided by Alberta BearSmart. Support from Alberta Fish and Wildlife, a number of predator-proof "deadstock bins" were fabricated and installed in 2008 and 2009. Ranchers bring their dead calves to the centrally located bins and the bins are regularly emptied by a rendering company. Deadstock can be removed before they become an attractant to large carnivores.	Southern Alberta MD of Pincher Creek	Tony Bruder, Drywood Yarrow Conservation Partnership, Jeff Becktell, Waterton Biosphere Reserve Association (WBR) Working Carnivore Group or Jeff Porter, Southern Alberta Conservation Partnership. WBR received a $223K grant in the fall of 2011 from ESRD to support community-based, landowner driven project initiatives to reduce human-carnivore conflict issues in southwestern Alberta, with a specific focus on grizzly bears, black bears and wolves. Tony Bruder Tel (403) 627-5425

Program or Pilot Project	Region	Contact
"Dead-stock Removal Pilot/Predator Management Project". WBR is partnering with Cardston County to seek funding to build a deadstock composting facility.	Cardston County Reported an increase in deposits to its calf bins, going from 3 to 4 bodies per week to 30 to 40 per week.	Rod Foggin, Ag Fieldman Cardston Tel (403) 382-8236
Deadstock Removal Program- planned to be subsidized by the Municipality. Started with a 100% reimbursement to a maximum of $10,000 for area producers. Producers bring receipts from West Coast Reductions in to the administrative office for reimbursement.	Municipal District (MD) of Ranchland	Carla Bick, Ag Fieldman Nanton Tel (403) 646-3131
Blackfoot Challenge: Living with Bears, Wolves and Elk *carcass removal *Turbo fladry- Electric fencing permanent and portable – 50,000 ft of electric fence installed. *Range rider program	Montana Dead livestock and composting program – 1,700 livestock carcasses removed. Reported an 85% reduction in human/large carnivore interactions over three years. Removing carcasses from ranches during the calving season is a practice that is effective in reducing human-bear conflicts in Montana, Wyoming and other regions.	Gary Burnett, Executive Director, PO Box 103, Ovando, MT 59854 USA Tel 406-793-3900
A Class I or Class II landfill, as defined in the Waste Control Regulation (AR 192/96), that is willing to accept the dead animals may be used if the site has a full-time operator who agrees to immediately bury the dead animal. See Appendix 1. Class I and II Landfills: only a few class sites available in Alberta.	Ryley Landfill: requires 24 hour notice. Flagstaff County Concerns over liability/ licencing have few facilities interested in accepting carcasses - to be covered within 24 hours to prevent scavenging. An exhaustive review of sites was not made.	Beaver Municipal Solutions, 780-663-2038. County Office 1-877-387-4100

WHAT CAN BE DONE BY ALBERTA BEEF PRODUCERS TO ASSIST LIVESTOCK PRODUCERS IN THEIR REGIONS?

To be reviewed.

Appendix 1. Landfill Classification

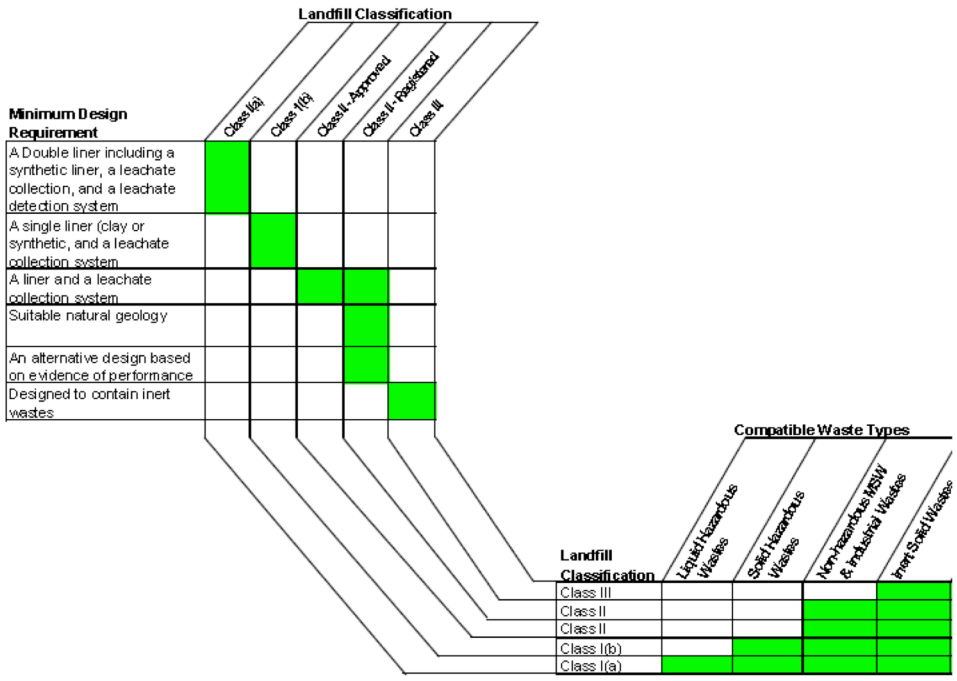
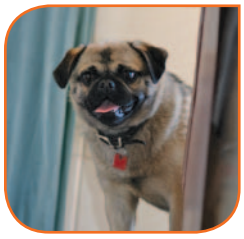


Figure 1. Land-fill Classifications in Alberta

AB.VMA
Alberta Veterinary Medical Association

BIOSECURITY
in Practice



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A federal-provincial-territorial initiative

Biosecurity in Practice

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Introduction

The Alberta Veterinary Medical Association (ABVMA) is the regulatory organization governing the practice of veterinary medicine in Alberta under the Veterinary Profession Act. As a self-regulating profession, the ABVMA is required to perform its regulatory and professional functions in accordance with the law, and in a manner responsible to the public of Alberta through the Government of Alberta Employment and Immigration.

In addition, the ABVMA is a member services organization for over 1250 registered veterinarians and over 1150 Animal Health Technologists (AHTs) practicing in excess of 424 certified veterinary clinics within Alberta[1] . The ABVMA is responsible for ensuring that all veterinarians and animal health technologists in the province are qualified to practice veterinary medicine in a skilfull and professional manner.

Effective biosecurity is about people working together

Provisions are in place to ensure ongoing education and training of members and the regular inspection of veterinary facilities to ensure compliance with accepted practice standards. As part of ongoing education and training of registered veterinarians and animal health technologists, the ABVMA has developed this guide to elevate the awareness of veterinary team members to the importance of biosecurity and its daily application. It is a disease control and prevention "how to" manual for veterinary clinics, animal production enterprises and animal owners.

Introduction

Biosecurity in Practice will assist veterinary clinic teams with the assessment and application of biosecurity practices in veterinary facilities. The manual will also equip veterinary healthcare workers with tools to assist clients to understand and adopt biosecurity practices as part of animal care. Although the basic principles of biosecurity are universal in scope, some information within this guide is specific to Alberta.

Biosecurity is everybody's business

The foundation of biosecurity is risk management; and team work is the foundation of risk prevention. Preventing the risk of disease in people and animals in veterinary practices involves all staff and customers.

Biosecurity practices play a critical role in managing disease risks in companion, equine and food animal practices. Knowing what risks people face in the day-to-day business of veterinary practice is necessary; having plans to address them, essential.

Good biosecurity happens everyday

Breaches in biosecurity that result in the introduction and transmission of disease are generally unintended. Much can be said about handling health risks by preventing mistakes that jeopardize well-being.

The ABVMA has structured this manual to help veterinary practices accomplish four things:

- Reach a common understanding about the importance of biosecurity, because "doing" starts with "understanding"
- Create a library of practical biosecurity reference material for practicing veterinarians, animal health technologists and all clinic staff
- Assist practices in developing or updating, documenting and implementing biosecurity program(s) in the Veterinary Practice Entity (VPE)
- Assist practices in training staff, clients and the general public about biosecurity

As our knowledge of disease prevention progresses and as new risks related to animal health emerge, changes to this manual will be required. The ABVMA will make efforts to inform and update members about changes as they occur.

ABVMA Biosecurity Website

Information and resources relevant to biosecurity in veterinary practices and in animal production sectors are constantly evolving. New resources such as commodity-specific risk assessment checklists, published industry biosecurity standards and articles and manuals are released on a regular basis.

Biosecurity is about understanding risk and doing small things right all the time

[1] Based on 2010 ABVMA Registration and Renewal Statistics

In an effort to champion biosecurity and promote adoption of biosecurity programs across the profession, the ABVMA has developed a one-stop website to help keep veterinary team members updated with current biosecurity information.

Biosecurity is a way of doing business. It's seldom complicated. It's a matter of doing simple things right all the time.

The website houses a library of practical resources developed specifically for veterinary practices including planning and risk assessment tools, a collection of in-clinic and commodity- specific biosecurity protocols, sample documents that can be adapted for many uses, client training resources, notes on legislative requirements and biosecurity team member job descriptions. For guidance on biosecurity, visit *www.abvma.ca/biosecurity*, and browse the available and downloadable resources.

What is biosecurity?

Defining biosecurity

A clear, single definition for "biosecurity" does not exist. Definitions appearing on the Web and in published scientific literature vary widely. The word "biosecurity" is a relative newcomer to the history of language and, as a term, conveys different things to different people.

The span of subjects covered using the term "biosecurity" is all encompassing and ranges from mitigation of international bioterrorism to standards in laboratory operating procedures. In veterinary medicine, the term "biosecurity" is frequently associated with prevention of foreign animal disease, but "biosecurity" principles extend to managing and preventing everyday disease risks faced in animal health services. Therefore, any elaboration of "biosecurity" should be preceded by a definition that helps establish limits on the content and tone of discussion.

The terms **"biosafety"** and **"biocontainment"** occasionally appear in **Biosecurity in Practice** and are defined in the Glossary. Clarification about their use is provided as needed.

BIOSECURITY, the fundamental theme of this manual, is the outcome of all actions taken to manage the risk disease represents to the health of animals and humans.

Biosecurity minimizes transmission of disease between animals and people

BIOSECURITY includes:

1. Precautions taken to reduce the risk of *exposure* to disease
2. Preventing *introduction* of infectious disease
3. Minimizing the risk of disease *transmission*:
   - ✓ between animals
   - ✓ between premises
   - ✓ between contiguous regions
   - ✓ between species of animals, including humans

BIOSECURITY impacts:

- Animal health and welfare
- Human health
- Food safety
- International trade
- Good business practices
- Legal accountability
- Economic sustainability

Biosecurity works best when people work together

Why is biosecurity important?

Disease prevention and control is the basic business of veterinary medicine. It is the backbone of each encounter with clients and patients, the impetus for wellness visits, herd health appointments and medical concerns.

Our role in veterinary medicine, whether a veterinarian, animal health technologist, hospital manager or support staff comes with moral and ethical obligations to co-workers, clients, patients and the public at large. There too, are legal commitments prescribed in federal and provincial legislation. Biosecurity and the system of rules inherent in it touch a broad range of professional responsibilities.

Sound biosecurity practices reduce the risk of introducing a host of foreign animal diseases (FAD), like foot and mouth disease. Many FADs spread quickly in naïve populations and generally result in the immediate loss of export markets with severe economic hardship on national livestock industries. An important and often overlooked part of FAD outbreaks is the collateral damage to society as a whole. Strict adherence to biosecurity practices becomes instrumental in all control efforts following incursion of a FAD.

Biosecurity measures prevent the spread of production diseases already found in Alberta. Examples include circovirus infections in swine, Johne's disease in dairy cattle and bovine virus diarrhea in beef cattle. Uncontrolled, many production diseases represent significant barriers to sustainable livestock production.

The lack of due diligence regarding biosecurity by veterinarians in field services/ambulatory practice or as clinic owners comes with very clear legal liabilities.

Awareness and adoption of sound biosecurity practices protect clinic staff, clients and patients from zoonotic diseases. Examples include salmonella, *E. coli* 0157:H7, campylobacter, psittacosis and rabies.

Biosecurity programs are beacons of professional commitment to the health of the companion animal patient, and to the health and well-being of clients served by veterinary practices, including primary producers and the animals they care for. Through active participation in biosecurity, clinic owners visibly engage in the responsibility they have assumed for staff safety, public safety and of course the safety of patients in their care. The sections below briefly address the scope of these responsibilities, sometimes viewed as another dimension of biosecurity. As well, there are challenges around animal welfare, prudent use of antimicrobials, residue avoidance and food safety that can be linked to the adoption and implementation of biosecurity practices. Where indicated, more detail is provided in the **Biosecurity Tool Kit** posted on the ABVMA website under *Biosecurity in practice*.

Biosecurity is important for anybody in contact with animals

Take personal and professional responsibility to limit the introduction, spread and recycling of disease.

Responsibility to Veterinary Healthcare Workers

Zoonotic disease - What you don't know can hurt you!

Veterinary healthcare workers (VHCWs) include veterinarians, animal health technologists, veterinary medical receptionists, veterinary medical assistants, animal care attendants, hospital managers, kennel staff and anyone else involved in the day to day delivery of veterinary services.

As employers of VHCWs , obligations lie predominantly in ensuring workplaces are safe for employees. This includes:

- Identifying hazards in the workplace
- Implementing risk management strategies and hazard controls
- Hiring appropriately educated staff and outlining employer expectations and employee obligations
- Providing training for staff to ensure they understand adequately follow protocols
- Supplying equipment that minimizes occupational hazards

Biosecurity minimizes the introduction and incidental spread of disease

Veterinary staff deserves to work in a workplace where hazards from zoonotic diseases are clearly outlined and adequately addressed. They must have access to clinic specific and industry required biosecurity and workplace safety information. VHCWs have the right to expect adequate and regular training relevant to their workplace and the practice's area of veterinary focus.

Responsibility to Clients and Patients

Clients, whether they visit the veterinary hospital or we visit them on farm or in their homes, deserve access to care that will not put themselves, their families, pets and livestock or industry at risk of contracting and spreading disease. They rely on veterinary practitioners to safeguard animal health and food safety.

Veterinary practitioners can offer clients :

- Access to professional guidance in establishing biosecurity programs
- Advice on implementing disease transmission and risk management strategies
- Training about minimizing the risk of disease transmission
- Ensuring veterinary staff are properly trained in biosecurity practices
- Working with veterinary practitioners that promote the use of principles, practices and equipment that minimizes occupational hazards in their workplace

Biosecurity reduces the impact of disease

In April 2011, a previously healthy and vibrant 23-year old woman contracted cryptococcal meningitis, leaving her permanently blind and confined to a wheelchair. Doctors suspect she contracted the disease from pigeon feces infected with Cryptococcus. (Edmonton Journal, April 26, 2011)

Zoonotic Disease in the Veterinary Workplace

Zoonotic diseases are an ever-present reality in veterinary practice. Both food animal and companion animal practitioners have pivotal roles to play in reducing the risk of disease transmission between animals and people. At the nub of that obligation is mentoring owners about the often unobserved and hidden danger of zoonotic diseases. No other profession works so intimately with people and animals or possesses the intellectual capability to perform this role so ably.

Awareness of the constantly expanding inventory of emerging diseases, many of them zoonotic in nature, cements the veterinarians' placement in the cycle of disease between animals and people.

When a veterinarian sees or suspects a zoonotic disease, the responsibility of the veterinarian to alert the owner of the potential for disease spread to humans is foremost. Often there is a legal responsibility to report the incident to either federal or provincial regulatory authorities. Failure to do either immediately creates a quandary of potential liability for the veterinarian and practice owner. Veterinarians have a moral and legal responsibility to provide a safe workplace for employees and coworkers who may not know how to recognize and protect themselves from zoonotic disease.

Approximately 868 of 1,415 (61%) known human pathogens are zoonotic, and approximately 132 of 175 (75%) emerging diseases that affect humans are zoonotic. There are more than 50 zoonotic diseases of importance in the United States. Documented zoonotic infections in veterinary personnel include: salmonellosis, cryptosporidiosis, plague, sporotrichosis, methicillin-resistant Staphylococcus aureus, psittacosis, dermatophytosis, leptospirosis, cryptococcosis and Q fever.

Examples of pet-associated organisms that pose a risk to people are:

Bacterial species: *Campylobacter, Salmonella, Leptospira, Bordetella, Capnocytophagia, Chlamydia, Mycobacterium, Bartonella* (Cat Scratch Disease), *Staphylococcus aureus* (MRSA), *Clostridium difficile,* Lyme disease (Borrelia)

Parasite species: *Cryptosporidium, Giardia, Toxoplasma,* roundworms *(Toxocora)*, tapeworms, hook worm *(Ancyclostoma spp)*, *Trichuris*, mange

Viruses: Rabies, Hanta virus

Fungi: Histoplasmosis, blastomycosis, *Cryptococcus sp., dermatophytosis (Microsporum spp, Trichophyton spp)*

Examples of food-animal associated organisms that pose a risk to people are:

Bacterial species: anthrax, *Brucella, Mycobacterium, Campylobacter, Salmonella, Q Fever (Coxiella spp) , E. coli O157:H7, Clostridium difficile, Leptospira*

Parasite species: *Trichuris, Cryptosporidia, Babesia*

Viruses: Influenza A; rabies, equine encephalitis *(Togaviridae)*

Fungi: dermatophytosis *(Microsporum spp, Trichophyton spp)*

Biosecurity involves all animal types and places where they are housed

Legislation, Programs and Policies

Making sense of biosecurity infers understanding important pieces of legislation governing the control of highly contagious animal diseases and zoonotic diseases that pose a serious threat to human health. Enabling legislation at both federal and provincial levels allows agencies charged with maintaining animal and human health the legal oversight to:

1. Name diseases and prescribe control measures for the public good
2. Impose regulations regarding movement, quarantine, control and destruction (in the case of animals and animal products) of infected material
3. Pass laws governing international import and export of animals and animal products
4. Protect people from risks associated with animal care in all aspects of veterinary medicine and food animal production
5. Protect animal health and welfare
6. Mitigate the negative effect of animal diseases on commerce
7. Ensure food safety so that food does not become an unintended part of disease transmission

By definition within the context of legislation, an **"Act"** is the legal provision that confers on appropriate officials the power to implement or enforce the law. An act represents the enabling authority to set regulations. A **"Regulation,"** on the other hand, is a rule, order or by-law that governs practice or procedure in the execution of power conferred by an act. What follows is an overview of various acts and regulations within the purview of the Canadian Food Inspection Agency (CFIA) and the Regulatory Services Division of Alberta Agriculture (RSD).

Biosecurity, as defined in this manual, is an integral part of programs and policies created in response to the legislated mandate around disease control specifically involving animals and, in broader terms, at the animal-human interface.

The *Biosecurity in Practice* manual provides a sketch of key regulatory documents containing significant components related to biosecurity. The companion *Biosecurity in Practice* webpage contains hyperlinks to complete documents and explanatory directives as posted on the Internet.

All Acts and Regulations relevant to veterinary medicine and biosecurity may be found on the Alberta Veterinary Medical Association's Member's Only section of their website. Refer to the official legislation, either Acts or Regulations, for the full intent and complete wording of provincial or federal Acts or Regulations or Codes listed below. This summary is not intended to replace the official legislation.

Health of Animals Act and Regulations[2]

Contact agency: Canadian Food Inspection Agency

Legislative intent: "An Act respecting diseases and toxic substances that may affect animals or that may be transmitted by animals to persons, and respecting the protection of animals."

The complete text of the *Health of Animals Act* is available on line. Links to other federal legislation and associated regulations can be accessed at: *Canadian Food Inspection Agency - Acts and Regulations.*

The *Health of Animals Act* encompasses:

- The ability to name diseases and toxic substances subject to control by federal authorities
- The legal responsibility assigned individuals to report and control movement of animals suspected of having a reportable disease
- The ability to set regulations governing the import and export of animals and animal products
- The power to declare areas as infected places, establish quarantines and disease control areas
- The power to appoint inspectors and officers
- The ability to order infected and exposed animals and things in contact with such animals destroyed and/or cleaned and disinfected
- The ability to pay compensation for things ordered destroyed
- The ability to set fees for services provided
- The ability to establish regulations, describe offenses and prescribe punishment related to the act and regulations

[2] Health of Animals Act and Regulations Link: http://laws-lois.justice.gc.ca/eng/acts/H-3.3/FullText.html;http://www.inspection.gc.ca/english/reg/rege.shtml

Relevant excerpts related to biosecurity in veterinary medicine include:

Section 5(2) Veterinary staff must immediately notify a veterinary inspector if they suspect an animal is affected or exposed a reportable disease.

Section 7(1) Owners or persons who have care or control of an animal where a controlled disease is believed to exist shall post signage forbidding entry without the owner/caretakers permission at the entrance to the building or enclosure where the animal(s) are kept.

Section 8 No person shall conceal the existence of a reportable disease or toxic substance among animals.

Sections 10-13 address the selling and destruction of animals with a reportable disease or disease. In summary, persons may not sell or transfer ownership of animals, throw carcasses into water, or dig up carcasses affected or contaminated by a disease.

Sections 14-19 outlines ministerial and public requirements to import and export animals and include allowing the minster to make regulations of such.

Section 22-26 gives authority to an inspector or officer to declare a place as infected and identify the disease or toxin that is believed to exist and lift such a declaration. It also allows a 5 km radius to be declared infected to prevent the spread of disease. The declaration is a statement of quarantine as no animal or thing is to be removed from the property without expressed written permission in the form of a license issued by the inspector. Further, Section 27 allows the minister to make regulations regarding control areas and disposal or treatment of animal or things within the control area.

Section 48 and 49 give authority to the minister to treat or dispose of affected or contaminated animals, samples and things.

Section 51-63 details compensation rights and responsibilities of the minister and the parties involved in a reportable disease outbreak or toxin substance release. The Minster may award compensation for animals ordered destroyed or losses to property as a result of disease control activity, withhold compensation, request that compensation be forfeited, make regulations related to how compensation is calculated and how decisions can be appealed, and how the Crown may recover fees, charges and costs related to control areas from liable person(s).

Section 64 reads "The Governor in Council may make regulations for the purpose of protecting human and animal health through the control or elimination of diseases and toxic substances and generally for carrying out the purposes and provisions of this Act," it then goes on to make an extensive list of circumstances where such regulations may be made.

Regulations

Regulations under the *Health of Animals Act* appear in two documents: the Health of Animals Regulations[3] and the Reportable Diseases Regulations[4]. The allied documents came into effect when reportable disease lists were being modified internationally by animal health agencies to better reflect disease control and notification priorities.

Federally Reportable Diseases

Reportable diseases listed in the *Health of Animals Act* and *Regulations* include those of significant importance to human or animal health and to trade. Animal owners, veterinarians and laboratories are required to immediately report the presence of an animal that is exposed or suspected of being exposed to one of these diseases to a CFIA district veterinarian. Control or eradication measures are immediately applied in the case of reportable diseases.

The reportable disease list includes:

African swine fever
Anaplasmosis
Anthrax
Bovine spongiform encephalopathy
Bovine tuberculosis *(M. bovis)*
Brucellosis
Chronic wasting disease of cervids
Contagious bovine pleuropneumonia
Contagious equine metritis
Equine infectious anemia
Equine piroplasmosis (B. equi and B. Caballi
Foot and mouth disease (FMD)
Highly pathogenic avian influenza
Hog cholera (classical swine fever)
Lumpy skin disease
Newcastle disease
peste des petits ruminants
Pseudorabies (Aujeszky's disease)
Pullorum disease (S. pullorum)
Rabies
Rift Valley fever
Rinderpest
Scrapie
Sheep and goat pox
Swine vesicular disease
Trichinellosis

[3] Health of Animals Regulations (C.R.C., c. 296); http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.%2C_c._296/index.html
[4] Reportable Diseases Regulations (SOR/91-2); http://inspection.gc.ca/english/anima/disemala/guidee.shtml

Venezuelan equine encephalomyelitis
Vesicular stomatitis

The Health of *Animals Reportable Disease Regulations* may be amended to change the status of any disease listed or add diseases. A change in status may be from a reportable disease to an immediately notifiable disease, thereby requiring labs to report the diagnosis of such a disease.

Importation of Animal Pathogens

The *Health of Animals Act and Regulations* govern the importation and use of animal and zoonotic pathogens. Facilities working with animal or zoonotic pathogens must comply with the *"Containment Standards for Veterinary Facilities*[5]

Alberta Animal Health Act and Regulations[6]

Regulatory Intent

The intent of legislation is to establish the necessary infrastructure, including traceability systems, designed to enhance response capability to threats of disease affecting animal health. The Office of the Chief Provincial Veterinarian of Alberta (OCPV) is given authority to take a lead role in animal disease response and animal health programs.

The act places the onus to advise the OCPV of any reportable or notifiable diseases on an owner of an animal or authorized person. "Reportable" and "notifiable" are terms representing diseases considered threats to animal health, public health, food safety, and the economic interests of the animal industry. Additionally, the OCPV has the authority to examine animals that have come into contact with reportable or notifiable diseases.

Response mechanisms are designed to prevent, control and eradicate disease. Response mechanisms include biosecurity measures that minimize the risk of introducing disease or limiting its spread when disease incursions happen. Disease response activities include: inspection; quarantine, the establishment of a surveillance zone or a control zone. If necessary, the OCPV may order destruction of diseased animals, animal products or by-products, or property that has been contaminated as a result of coming into contact with a diseased animal or a disease-causing agent. Examination of diseased, dead animals may also be made.

Regulatory Services Division, Alberta Agriculture and Rural Development administers and enforces the *Destruction and Disposal of Dead Animals Regulation* and *Livestock Market and Livestock Assembling Station Regulation.* A complete list of legislation under the purview of the **Regulatory Services Division** is available at: *Overview of Acts and Regulations Assigned to RSD*

[5] http://www.inspection.gc.ca/english/sci/bio/bioe.shtml
[6] Alberta Animal Health Act; http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts12272

Role of Alberta Agriculture and Rural Development (ARD)

Alberta Agricultural and Rural Development (ARD) provides leadership and support for animal health programs, safe food production systems and global market access for Alberta's agriculture and food industry through information, services and administration of legislation.

Compliance with regulatory requirements is ensured by investigating food safety complaints, providing information and proceeding with prosecution if appropriate.

Alberta Animal Health Act

The *Animal Health Act* governs disease control responsibilities of provincial government officials, particularly the Chief Provincial Veterinarian (CPV) and his/her delegates, registered veterinarians, veterinary staff and members of the public in Alberta. *The Animal Health Act* replaced the *Livestock Diseases Act* in 2008.

Below are specific *excerpts* and/or summaries of sections that apply to biosecurity principles in veterinary medicine. From the perspective of disease control, the *Animal Health Act* is very relevant to the day-to-day operation of a veterinary facility and all veterinary staff should be familiar with it.

Section 3: Reportable Disease
A reportable disease:

i) In the opinion of the Chief Provincial Veterinarian requires the implementation of control or eradication measures to minimize the risk of the disease transmission through either direct or indirect contact with the animal carrying disease or through animal products or animal by-products from infected animals that:

- may be unsafe or unfit for use or consumption,
- may be a threat to animal health, public health or the health of other living organisms,
- may be a threat to the economic interests of the animal industry
- may be transmitted between animals and humans

Section 4: Notifiable Disease A notifiable disease is a disease that requires monitoring because:

a) Its presence or the location of the disease may affect domestic or international trade,

b) It is a new disease to the province and the potential effects of the disease on animal health or public health are not known,

c) An endemic disease-causing agent has changed and the effects of the change and the potential effects of the change on animal health or public health are not known, or

d) It requires monitoring for any other purpose

Section 9: Duty to Report Section 9(1) states that subject to the regulations, an owner of an animal or an authorized person who knows or ought to know that a *reportable* disease prescribed in the regulations is, or may be, present in an animal must report it to the Chief Provincial Veterinarian within 24 hours.

Section 9(2) states that subject to the regulations, an owner of an animal or an authorized person who knows or ought to know that a *notifiable* disease described in section 4 is, or may be, present in an animal must report it to the CPV within 24 hours.

Section 12: Quarantine. This section outlines the Chief Provincial Veterinarian's obligations in circumstances where a reportable disease is suspected.

Section 16: Movement from Quarantine Premises: A person may move an animal or related animal products or by products or vehicles from the premise only after giving the inspector 12 hours' notice PRIOR to the move and by providing a copy of the quarantine certificate to the person taking care and custody of the said item(s). There are consequences for not following quarantine restrictions as outlined in Section 17: Failure to Comply.

Section 22: Gives legislated authority to CPV to establish a Surveillance Zone with a maximum radius of 10 km around the quarantined premises and to carry out specific duties within the surveillance zone such as, but not limited to, vaccination of all animals, sample collection, requiring owners to report unusual occurrences of sickness or death within the surveillance zone etc.

Part 6: Section 28 and 29 deal with the CPV obligations and rights regarding ordering the destruction of animals or property in the event of a reportable disease outbreak. Regulations governing compensation for animals ordered destroyed appear here.

Part 7: Section 31 to 35 covers establishment of control zones and OCPV obligations when implementing a control zone. They also outline publicizing notice of the control zone, failure to comply with that order, amending and revoking a control zone order.

Part 11: Section 52 identifies requirements of owners and authorized persons to keep records for a minimum of **10 years**, including one or more of the following:

(a) Birth records for an animal

(b) Parentage records for an animal

(c) Identification of animals

(d) Identification of premises

(e) Records of the number of animals kept on the premises

(f) Records of the date each animal arrived on the premises

(g) Records of the date of sale or purchase of each animal

(h) Records of the premises each animal, animal product or animal by-product came from

(i) Records of any change in the use of premises

(j) Records of any change in the type of species kept on premises

(k) A daily log of

(i) Premises visits by a registered veterinarian,

(ii) Examinations of animals made in a registered veterinarian's clinic or in a veterinary hospital

(l) Records of where prepared feed was produced and purchased from

(m) Records of whom prepared feed was sold to

(n) Records of whether an animal has been treated with medicine

Section 60: Biosecurity measures: The minister may, in accordance with the regulations, establish biosecurity measures to be implemented for general disease control or for specific diseases.

Section 63: Traceability: This section empowers the minister to develop and administer a tracking and traceability system using information collected under Section 12. It also outlines owner responsibilities regarding animal identification and premise identification. The system may include the following:

In accordance with Section 63(2), a traceability system may include the following information:

(a) Premises identification, indicating:

(i) The location of premises

(ii) The name, address and telephone number of the owner of premises

(iii) The type of premises and the business name of premises, and

(iv) The number of each species of animals raised, kept, displayed, assembled and disposed of each year

(b) Identification of animals

(c) A tracking system for recording the movement of animals

(d) A tracking system for recording the movement of animal products and animal by-products

(e) Any other information prescribed in the regulations

In accordance with Section 63 (3), an owner may be required by the regulations to obtain a unique identification number for an animal, an animal product, an animal by-product, premises, a vehicle, a railway car, an aircraft or a watercraft that transports animals, animal products or animal by-products.

Notes

Alberta Animal Health Regulations

Alberta Animal Health Regulations include seven pieces of legislation:

1. *Traceability Premises Identification Regulation*
2. *Traceability Cattle Identification Regulation*
3. *Production Animal Medicine Regulation*
4. *Destruction and Disposal of Dead Animals Regulation*
5. *Reportable and Notifiable Diseases Regulation*
6. *Livestock Disease Control Regulation*
7. *Livestock Market and Livestock Assembling Station Regulation*

Overviews of Animal Health Regulations as part of enabling legislation are accessible from Alberta Agriculture's Animal Health Act webpage: *http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts12272*

Traceability Premises Identification and Traceability Cattle Identification Regulations

Alberta's robust traceability system is made up of three key components: premises identification, animal identification and animal movement tracking. Together, these enable the Office of the OCPV or other emergency management officials to pinpoint and isolate specific sites of concern and target resources in the event of a threat to animal or human health as a result of a natural disaster. The integrity of this system also translates into opportunities for Alberta's livestock and meat industries to differentiate their products.

Amendments to *Alberta's Animal Health Act* and the two new *Traceability Regulations* came into force January 1 2009, to support the agri-food sector's viability and to provide a competitive edge in an increasingly aggressive global marketplace. Alberta has also strengthened the Animal Health and Food Safety legislation with the introduction of new regulations, which came into effect March 1, 2010.

Alberta recognizes the efforts of cattle producers in establishing internationally recognized traceability and age-verification systems to promote food safety and animal health. To assist producers in adopting new traceability requirements, the Age-Verification Incentive Program was established. The three-year program valued at $15M offers an incentive based on demonstrated age verification best practices, including the entering of animal birth dates in the Canadian Cattle Identification Agency (CCIA) Canadian Livestock Tracking System (CLTS).

The Premise Identification Application form can be downloaded at: *http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/trace12354/$FILE/Premises_Identification_Application.pdf .*

This form is used to apply for both a premise identification account (for the animals) and for a premise identification number (for the location).

An owner of a recordable animal must obtain a premise identification account within 30 days of assuming ownership of the animal. The application must include at least one location for the animal(s). Premise identification number, a legal land description or geo reference coordinates can be used for location. The application form provides all the options that can be used for location identifiers. Recordable animals include:

- Alpacas
- Asses
- Bees
- Bison
- Cattle
- Domestic cervids
- Doves in captivity
- Ducks in captivity
- Fish acquired, propagated, reared or kept in accordance with a class A commercial fish culture license or a class B commercial fish culture license issued under the Fisheries (Alberta) Act
- Fur-bearing animals as defined in the Fur Farms Act

- Geese in captivity
- Goats
- Guinea fowl in captivity
- Horses
- Llamas
- Mules
- Peafowl in captivity
- Pheasants in captivity
- Pigeons in captivity
- Poultry in captivity
- Quail in captivity
- Rabbits raised for the production of meat
- Ratites (such as emus, ostriches, rheas)
- Sheep
- Swine
- Wild boars
- Wild turkeys in captivity
- Yaks

Commingling site operators must also apply for a premise identification number and make that available to any animal owner who has animals in that location. Commingling sites include:

- An abattoir under the Meat Inspection Act
- Animal artificial insemination centers
- Animal embryo transfer stations
- Assembling stations
- Carcass disposal sites
- Boarding stables
- Community pastures
- Fairs and exhibitions
- Feedlots
- Livestock markets
- An establishment operating under the Meat Inspection Act (Canada)
- Meat facilities under the Meat Inspection Act
- Race track
- Renderers
- **Veterinary clinics**
- **Veterinary laboratories**
- **Veterinary hospitals**

Production Animal Medicine Regulations[7]

The Production Animal Medicine Regulation (PAM) regulates the sale of medicines for use in or on production animals. Retail businesses offering these medicines for sale to the public are licensed under this legislation.

A "production animal" is defined as:

(i) a species of animal that may be used for human consumption or whose products may be used for human consumption

(ii) a fur-bearing animal referred to in section 1 of the Fur Farms Regulation (AR 299/96), or

(iii) a species of animal used for crop pollination.

Provincial Licensing

A business intending to sell production animal medicines to the public must first obtain a license issued by ARD. The annual license is not transferable if the ownership of the retail business changes.

To "sell" medicines includes offering for sale, exposing for sale, and having in possession for sale and distribution. Distributing medicines without receiving compensation is also considered "selling" medicines. Therefore, a license is required even when medicines are distributed free of charge.

A licensee may only sell medicine over the counter at the licensee's permanent place of retail business. Licensees cannot solicit the sale of medicine by mail order, Internet communication or at a place other than the licensee's permanent place of retail business. The sale of disinfectants, udder washes, and teat dips and sanitizers are exempted from this on-site requirement.

A person selling medicated feeds, prepared either in accordance with federal feed legislation or according to a prescription issued by a registered veterinarian, does not need to be licensed under the PAM regulation.

For further information on the Premises Identification Program contact the Ag-Info Centre at **310-FARM (3276)** or the nearest hub office.

[7] PAM Regulations; http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/rsb10370

Provincial Certification

Each retail business licensed to sell production animal medicines must employ a staff member who has been issued a qualification certificate. A licensee shall refer customers to a certified staff member to respond to any questions regarding the safe and proper use of production animal medicines.

There must be at least one certified staff member on duty during regular business hours in order for a PAM licensee to sell medicine. The licensee must notify ARD of all staff members who hold a qualification certificate.

An applicant may be issued a qualification certificate after successfully passing an ARD examination and submitting the appropriate fee. The examination tests the applicant's training in the proper handling of medicine. The qualification certificate is issued for a five year term.

Permitted Medicines

PAM licensees may sell the following production animal medicines:

a) Injectable biologicals for the prevention or treatment of disease

(b) Specified antibiotics for administration to production animals and sulfonamides and their salts and derivatives detailed in the Food and Drug Regulations (Canada)

(c) Preparations for the control of external and internal parasites and insect pests

(d) Preparations labeled by the manufacturer for: the prevention or treatment of digestive system diseases; for the treatment of surface wounds and lacerations, wire cuts and burns; and for the treatment of skin diseases

(e) Vitamins for injection or oral administration to production animals, with injectable vitamin A not to exceed 500,000 I.U./ml, and injectable vitamin D not to exceed 75,000 I.U./ml

(f) Preparations containing minerals for oral administration, and selenium and iron for injection

(g) Labeled growth promotants in the form of implants and feed additives

(h) Injectable epinephrine for treatment of anaphylactic reactions

(i) Dextrose, calcium, phosphorus and magnesium preparations and propylene glycol for the treatment and prevention of acetonemia and hypocalcemia, as well as preparations intended as an aid in the supportive treatment of nutritional deficiencies

(j) Anti-cannibalism compounds for poultry

(k) Topical preparations (liniments, counter-irritants or poultices)

(l) Oral or topical preparations labeled by the manufacturer as antitussives, decongestants, bronchodilators or expectorants

(m) Acetylsalicylic acid boluses; and

(n) Disinfectants, udder washes, and teat dips and sanitizers.

Agriculture and Rural Development's (ARD) Role

ARD provides leadership and support for safe food production systems and global market access for Alberta's agriculture and food industry through information, services and administration of legislation.

Compliance with regulatory requirements is ensured by investigating food safety complaints, providing information and proceeding with prosecution if appropriate. Pursuant to the *Production Animal Medicine Regulation*, an inspector has the authority to inspect the medicines and premises of the licensee. The inspector may seize and dispose of any unlawful medicine or order the licensee to return the medicine to the supplier.

To obtain additional information regarding PAM licensing and certification contact Alberta Agriculture and Rural Development, Regulatory Services Division at 403-340-7172

Destruction and Disposal of Animals Regulation[8]

While in the business of producing marketable meat products, every livestock producer must face the reality of carcass disposal, regulated by the *Destruction and Disposal of Dead Animals Regulation* of the *Animal Health Act*, Appendix A. Dead animals must be disposed of in an acceptable manner within 48 hours of death. Mortalities can be composted, incinerated, buried, rendered or disposed of naturally.

Proper disposal of carcasses is important for both the prevention of livestock disease transmission and the protection of air and water quality. Access to carcasses by scavengers is only permitted under the guidelines for natural disposal. Environmental concerns associated with improper disposal include:

- Odor caused by decomposition of organic matter, especially under anaerobic conditions.
- Uncontrolled scavenging may promote transmission of disease by birds, animals and insects like ravens, magpies, coyotes, rodents and flies can transmit disease, plus it often represents a nuisance.

[8] Overview from ARD website http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/rsb10366

- Some pathogens, especially those producing resistant spores remain viable e.g. anthrax.
- Carcasses can be a source of nutrient contamination e.g. nitrogen
- Visible carcasses and bones fuel social issues

An on-line E-book, *Livestock Mortality Management (Disposal)*, is available as an interactive document and downloadable PDF.

Regulatory requirements cover five accepted methods of disposal. Additional information is available through Alberta Agriculture and Rural Development, Regulatory Services Division.

Method 1: Natural Disposal

Natural disposal means disposing of the dead animal in order to allow for scavenging. A dead animal may be disposed of by natural disposal if all the conditions are met:

- The animal is disposed of on property owned or leased by the owner of the animal
- The animal was not euthanized with drugs or other chemical substances
- The total weight of the animals being disposed of at any one site does not exceed 1,000 kg
- There is a distance of at least 500 meters between disposal sites
- The disposal site is at least 500 meters from wells or other domestic water intakes, streams, creeks, ponds, water wells, springs and high water marks of lakes and at least 25 meters from the edge of a coulee, major cut or embankment
- The disposal site is at least 400 meters from any:
  - ✓ Livestock facilities, including pastures, situated on land owned or leased by another person
  - ✓ Residences
  - ✓ Road allowance; and
  - ✓ Any provincial park, recreation area, natural area, ecological reserve, wilderness area or forest recreation area; and
  - ✓ Disposing by natural disposal does not create a nuisance.

An animal that is confirmed or suspected to have died from an infectious or a reportable disease must be disposed of under the direction of an inspector appointed under the *Health of Animals Act* (Canada) or a veterinary inspector appointed under the *Livestock Diseases Act* (Alberta). The animal cannot be disposed of by natural disposal.

Method 2: Burying

A farm burial pit may be used if it meets all of the following conditions.

1. The weight of dead animals in the pit must not exceed 2,500 kg. In the case of a disaster (fire, flood, etc.), this first condition may be waived in accordance with the direction of a veterinary inspector appointed under the *Livestock Diseases Act.*
2. The pit must be located at least:
   - 100 meters from wells or other domestic water intakes, streams, creeks, ponds, springs and high water marks of lakes and at least 25 meters from the edge of a coulee, major cut or embankment
   - 100 meters from any residences
   - 100 meters from any livestock facilities, including pastures, situated on land owned or leased by another person
   - 300 meters from a primary highway
   - 100 meters from a secondary highway; and
   - 50 meters from any other road allowance
3. The pit must be covered with:
   - A minimum of one meter of compacted soil; or
   - A wooden or metal lid that is designed to exclude scavengers, if quicklime is applied to the dead animal in sufficient quantities to control flies and odor
4. The bottom of the pit must be at least one meter above the seasonal high-water table.

A Class I or Class II landfill, as defined in the Waste Control Regulation (AR 192/96), that is willing to accept the dead animals may be used if the site has a full-time operator who agrees to immediately bury the dead animal.

Method 3: Composting

Composting means decomposing the dead animal to result in a stable humus-like material. Composting a dead animal may be done in a farm open compost pile if all the following conditions are met. The farm open compost pile must be:

- Located at least 100 meters from wells or other domestic water intakes, streams, creeks, ponds, springs and high-water marks of lakes and at least 25 meters from the edge of a coulee, major cut or embankment
- Located at least 100 meters from any residences
- Designed in a manner that will exclude scavengers; and
- At least 100 meters from any livestock facilities, including pastures, situated on land owned or leased by another person.

In using the farm open compost pile:

- The maximum volume of the animals or parts of them must not exceed 25 per cent of the total compost pile; and
- The animals or parts of them must be covered by at least 15 cm of composting material.

Composting a dead animal may also be done in a Class I compost facility, as defined in the Waste Control Regulation (AR 192/96). Please contact Alberta Environment for additional information about the requirements associated with composting.

Method 4: Burning

Burning of the dead animal may occur if done in accordance with the Substance Release Regulation (AR 124/93) or the Code of Practice for Small Incinerators. Please contact Alberta Environment for additional information about the requirements associated with burning. Contact your municipal district office regarding burning permit requirements.

Method 5: Rendering

A dead animal may be transported to a licensed rendering plant for disposal. The operator of the rendering plant shall ensure that the rendered dead animal is free from all viable pathogenic organisms. As well, the operator shall ensure that microbiological quality assurance processes are in place.

Regardless of Which Method is Used

The owner of a dead animal must dispose of the animal within 48 hours of its death. The owner may store the dead animal for more than 48 hours after its death if it is stored according to any of the following conditions:

- For not more than one week in an enclosed structure constructed for this storage purpose; or
- Outside during winter months when the ambient temperature is low enough to keep the dead animal completely frozen; or
- In a freezer unit; or
- In accordance with the directions of an inspector appointed under the *Health of Animals Act* (Canada) or under the *Livestock Diseases Act*.

No person shall feed a dead animal to other food-producing animals unless:

- The material from the dead animal has been properly rendered at a licensed rendering plant and the prohibition to feed prohibited material to ruminants under the Health of Animals Regulation (Canada) is complied with, or
- The feeding of the material is a recognized means of stimulating natural immunity for specific disease conditions and the prohibition to feed prohibited material to ruminants under the Health of Animals Regulation (Canada) is complied with.

Enforcement of the regulation is the responsibility of the Regulatory Services Division. For questions or concerns, please contact Alberta Agriculture and Rural Development.

Reportable and Notifiable Diseases Regulation[9]

Anyone who suspects a reportable disease in an animal MUST report that fact to the Office of the Chief Provincial Veterinarian within 24 hours by calling 1-800-524-0051.

Provincially Reportable Diseases

For cattle and yaks:

1. Disease caused by *Salmonella dublin*
2. Disease caused by *Salmonella typhimurium*
3. Bovine spongiform encephalopathy
4. Disease caused by any toxic substance that is a threat to animal or human health; and
5. Foot-and-mouth disease

For swine and wild boars

1. Transmissible gastroenteritis
2. Foot-and-mouth disease
3. Classical swine fever; and
4. Disease caused by any toxic substance that is a threat to animal health or human health

[9] Overview from Alberta Agriculture and Rural Development http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/afs12455

For domestic chickens, bantams, pheasants and peafowl

1. Infectious laryngotracheitis
2. Disease caused by highly pathogenic strains of avian influenza or all strains of H5 or H7 strains of avian influenza
3. Exotic Newcastle disease
4. Disease caused by *Salmonella gallinarum*
5. Disease caused by *Salmonella pullorum*
6. Disease caused by *Salmonella enteritidis*

Reportable diseases require action to control or eradicate because of the threat to animal or human health, food safety or the economy. Notifiable diseases simply require monitoring for trade purposes, or to understand disease trends in Alberta.

7. Disease caused by *Salmonella heidelberg*
8. Disease caused by *Salmonella typhimurium*; and
9. Disease caused by any toxic substance that is a threat to animal health or human health

For any of the following birds when kept in captivity: domestic turkeys, ostriches, emus, rheas, pigeons, doves, quail, guinea fowl and wild turkeys

1. Disease caused by highly pathogenic strains of avian influenza or all strains of H5 or H7 strains of avian influenza
2. Exotic Newcastle disease
3. Disease caused by *Salmonella gallinarum*
4. Disease caused by *Salmonella pullorum*
5. Disease caused by *Salmonella enteritidis*
6. Disease caused by *Salmonella heidelberg*
7. Disease caused by *Salmonella typhimurium*; and
8. Disease caused by any toxic substance that is a threat to animal health or human health

For domesticated ducks and domesticated geese

1. Disease caused by highly pathogenic strains of avian influenza or all strains of H5 or H7 strains of avian influenza
2. Exotic Newcastle disease
3. Disease caused by *Salmonella enteritidis*
4. Disease caused by *Salmonella heidelberg*
5. Disease caused by *Salmonella typhimurium*; and
6. Disease caused by any toxic substance that is a threat to animal health or human health

For farmed bison

1. Foot-and-mouth disease; and
2. Disease caused by any toxic substance that is a threat to animal health or human health.

For sheep and goats

1. Scrapie
2. Foot-and-mouth disease; and
3. Disease caused by any toxic substance that is a threat to animal health or human health.

For domestic cervids

1. Chronic wasting disease
2. Foot-and-mouth disease; and
3. Disease is caused by any toxic substance that is a threat to animal health or human health.

Occupational Health and Safety (OHS)

In Alberta, the requirements for occupational health and safety are outlined in the *Occupational Health and Safety Act (OHS Act), OHS Regulations,* and *OHS Code*. The *Act, Regulation, and Code* are available for viewing or downloading on the Alberta employment and immigration, Workplace Health and Safety (WHS) website at: *http://www.employment.alberta.ca.*

The Alberta Occupational Health and Safety Act, Regulation, and Code collectively establish the legal requirements that employers must meet to protect the health and safety of workers. These are **minimum** requirements.[10]

The OHS Act, Regulation, and Code are available for viewing or downloading on the Alberta Employment and immigration, Workplace Health and Safety website at **www.employmentalberta.ca**.

[10] OHS Act, Section 2, OHS code, Part 2

Overview of employer and employee responsibilities

General Responsibilities

- Employers must ensure, as far as reasonably practicable, the health and safety of all workers at their work site
- Workers must take reasonable care and co-operate with the employer to ensure the health and safety of themselves and others

Employers must:

- Assess a work site and identify existing or potential hazards
- Prepare a written and dated hazard assessment
- Take measures to eliminate or control identified hazards involve workers in the hazard assessment
- Make sure workers are informed of the hazards and the methods used to control the hazards

Workers must:

- Take reasonable care to protect the health and safety of themselves and other workers
- Cooperate with their employer to protect the health and safety of themselves and other workers

Exposure to harmful substance[11]

In the absence of established occupational exposure limits to harmful substances used in the workplace, the OHS Code requires that exposure be kept as low as reasonably/ practicably achievable.

New Legislation Regarding Sharps

Legislation specific to handling sharps in the workplace became effective July 1, 2010 and summarized below:

Medical sharps[12]

525.2(1) Subsections (2) and (3) come into effect on July 1, 2010.

525.2(2) An employer must provide and ensure that any medical sharp is a safety-engineered medical sharp.

525.2(3) Subsection (2) does not apply if,

(a) Use of the required safety-engineered medical sharp is not clinically appropriate in the particular circumstances, or

(b) The required safety-engineered sharp is not available in commercial markets.

525.2(4) An employer must develop and implement safe work procedures for the use and disposal of medical sharps if a worker is required to use or dispose of a medical sharp.

525.2(5) An employer must ensure that a worker who is required to use and dispose of a medical sharp is trained in the safe work procedures required by subsection (4) and such training must include:

(a) The hazards associated with the use and disposal of medical sharps

(b) The proper use and limitations of safety-engineered medical sharps

(c) Procedures to eliminate accidental contact with medical sharps, and

(d) Any other relevant information

525.2(6) A worker must use and dispose of a medical sharp in accordance with the training provided by the employer

Personal Protective Equipment (PPE)

Employers Must:

- Identify what personal protective equipment is required and when it is required based on the hazard assessment
- Ensure workers are trained in personal protective equipment use
- Ensure workers wear it and use it properly
- Ensure personal protective equipment is maintained and kept in good condition to perform the function for which it was designed
- Ensure personal protective equipment meets standards listed in the OHS code
- Ensure the use of personal protective equipment does not itself endanger the worker

[11] OHS Act, Section 2; OHS code, Part 4
[12] OHS code, Part 35

Workers must:

- Use personal protective equipment according to the training and instruction they receive
- Inspect personal protective equipment prior to use and not use the personal protective equipment if found to be in a condition that makes the personal protective equipment unsuitable for use

OHS legislation specific to respirators:

OHS Code, Section 244: if a worker is or may be exposed to exposure to an airborne biohazardous material, the employer must assess the work site to determine if workers need to use respiratory protective equipment (RPE) and provide worker the appropriate RPE where indicated. For more information refer to: *http://employment.alberta.ca/documents/WHS/WHS-LEG_ohsc_p18.pdf OHS Act*, Section 33 and OHS code, Part 18: The employer must consider the nature and the exposure circumstances of any contaminants or biohazardous material. The employer must provide and ensure the availability of RPE appropriate to the worker's exposure circumstances.

Where the hazard assessment identifies the need for RPE some of the requirements include:

Training

Employer must ensure all workers receive appropriate education, instruction or training with respect to hazards they may be exposed to and procedures and controls used to reduce exposure.

Code of Practice

If respiratory equipment is used at a work site, an employer must prepare a code of practice governing the selection, maintenance and use of the RPE. In the case of a health care worker who may be exposed to airborne biohazardous material, the code of practice includes training, done on at least an annual basis, on:

- Information about the airborne biohazardous materials that workers may be exposed to including their potential health effects
- The particular respiratory protective equipment used chosen, including information about its capabilities and limitations and how to test for a satisfactory fit
- How to properly put on and take off the RPE without contaminating oneself or other workers

Approval of Equipment

Employer must ensure that RPE required at a work site is approved by National Institute for Occupational Health and Safety (NIOSH) or another standard setting and equipment testing organization, or combination of organizations, approved by a director of Occupational Hygiene.

Effective Face Seal

Employer must ensure that RPE that depends on an effective facial seal for its safe use is correctly fitted and tested in accordance with Canadian Standards Association (CSA) Standard (Z94-4-02).

OHS Code, Section 244: if a worker is or may be exposed to exposure to an airborne biohazardous material, the employer must assess the work site to determine if workers need to use respiratory protective equipment and provide worker the appropriate RPE where indicated. For more information refer to: **http://employment.alberta.ca/documents/WHS/WHS-LEG_ohsc_p18.pdf**

For further information on Workplace Hazard Assessment and Control:

- See volume 1 – overview of Best Practices in Occupational Health and Safety in the Healthcare industry: http://employment.alberta.ca/SFW/6311.html
- Access the Alberta Government's Hazard Assessment & Control eLearning Program at: http://employment.alberta.ca/whs/learning/hazard/Hazard.htm)

Dangerous Goods Transportation and Handling Act

The purpose of the *Dangerous Goods Transportation and Handling Act* is to ensure the safe transportation of hazardous materials in compliance with the *Transportation of Dangerous Goods (TDG) Act and Regulations*; International Air Transport Association(IATA); other government agencies; and internal policies and procedures of employers.

Scope

This applies to all persons who may be involved in the shipping, transport, handling, and receiving of dangerous goods. Dangerous Goods are categorized by the following classifications: Class 1, Explosives; Class 2, Gases; Class 3, Flammable Liquids; Class 4, Flammable Solids; Class 5, Oxidizing Substances and Organic Peroxides; Class 6, Toxic and Infectious Substances; Class 7, Radioactive Materials; Class 8, Corrosive Substances; Class 9, Miscellaneous Dangerous Goods (including, but not limited to, Dry Ice, Genetically Modified Micro-Organisms or Genetically Modified Organisms, Chemical and First Aid Kits).

Responsibility

It is the *employer's responsibility* to ensure that all employees involved in the shipping, handling, offering for transport or receiving of dangerous goods are trained and certified, and re-certified, as prescribed by the *TDG Regulations*.

If you ship, receive, or transport dangerous goods, you must be trained and carry a valid *Certificate of Training* (issued and signed by your employer), or work under the direct supervision of someone who is trained. The specific training/certification requirements for the shipping/receiving/handling/offering for transport of dangerous goods by ground and by air are different and exclusive. Certification is not transferable. Certification of training expires and must be periodically updated in accordance with the TDG regulations. Failure to comply with all TDG Regulations could result in fines and possible imprisonment for receiving, shipping, and transporting hazardous materials improperly. Please contact *Environmental and Occupational Health Support Services* to determine your specific training requirements.

General

All shipments of dangerous goods must be classified, packaged, marked, labeled, documented, placarded, and shipped in accordance with the *TDG Regulations*. Most businesses and institutions have internal policies and protocols regarding the shipment of dangerous goods. If you are exporting dangerous goods, it is your responsibility to determine if an *Export Permit* is required. Failure to obtain the required export permit could result in the seizure and forfeiture of your goods, and/or fines/penalties including imprisonment. Additional information regarding exporting can be found on the CBSA website under *Exporting Goods from Canada – A Handy Guide for Exporters*, and the *CBSA* website.

Institutions are registered with the Canadian Transport Emergency Centre (CANUTEC). CANUTEC is operated by Transport Canada to assist emergency response personnel in handling dangerous good emergencies. Federal regulations require that CANUTEC must be contacted in the event of an incident or accident involving radioactive materials, infectious substances, or chemical spills. This is in addition to any reporting that must be done by provincial or municipal statutes. The information number is 613-996-6666. The Customs and Traffic Division will reference CANUTEC's telephone number on all Shippers' Declarations For Dangerous Goods completed by their office, and fax a copy of the documents to CANUTEC prior to sending the shipment.

Infectious Substances

Infectious substances are defined as substances, which are known or are reasonably expected to contain pathogens. Pathogens are defined as micro-organisms (including bacteria, viruses, rickettsiae, parasites, fungi) and other agents such as prions, which can cause disease in humans or animals.

Infectious substances are classified according to whether they affect both animals and people (UN 2814 Infectious substance), animals only (UN 2900 Infectious substance) or as biological substances (UN 3373 Biological Substances). Please refer to International Air Transport Association (IATA) Guidelines: *http://www.emro.who.int/stb/pdf/SAMPLEISSG7THED.pdf*

Infectious substances are further divided into **Category A and Category B** pathogens.

Category A includes an infectious substance which is transported in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals. Some examples include Escherichia coli, verotoxigenic (cultures only), rabies virus (cultures only), and human immunodeficiency virus (cultures only). Infectious substances meeting Category A criteria must be assigned to either UN 2814 or UN 2900.

Category B includes an infectious substance, which does not meet the criteria for inclusion in Category A. Infectious substances in Category B must be assigned to UN 3373 Biological Substance, Category B.

Biological Products

Biological products are defined as those products derived from living organisms which are manufactured and distributed in accordance with the requirements of appropriate national authorities, which may have special licensing requirements, and are used either for prevention, treatment, or diagnosis of disease in humans or animals, or for development, experimental or investigational purposes related thereto. They include, but are not limited to, finished or unfinished products such as vaccines. Biological products are assigned to UN 2814, UN 2900 or UN 3373, as appropriate.

Cultures

Cultures are defined as the result of a process by which pathogens are intentionally propagated.

Patient Specimens

Patient Specimens are defined as samples collected directly from humans or animals including, but not limited to, excreta, secreta, blood and its components, tissue and tissue fluid swabs, and body parts being transported for purposes such as research, diagnosis, investigational activities, disease treatment and prevention.

Patient specimens must be assigned to UN 2814, UN 2900 or UN 3373, as appropriate, except if they comply with certain exceptions as outlined in the International Air Transport Association Regulations. Please contact the Customs and Traffic Division for additional information.

Patient specimens for which there is minimal likelihood that pathogens are present are not subject to the TDG regulations if the specimen is in a package which will prevent any leakage and which is marked with the words "Exempt human specimen" or "Exempt animal specimen". These labels are available from HSC Stores-4N43, ABB Stores-B166. Also, the packaging must meet the following conditions:

- A leak-proof primary receptacle(s)
- A leak-proof secondary packaging; and
- An outer packaging of adequate strength for its capacity, mass and intended use, and with at least one surface having minimum dimensions of 100 mm X 100 mm
- For liquids, absorbent material in sufficient quantity to absorb the entire contents must be placed between the primary receptacle(s) and the secondary packaging so that, during transport, any release or leak of a liquid substance will not reach the outer packaging and will not compromise the integrity of the cushioning material
- When multiple fragile primary receptacles are placed in a single secondary packaging, they must be either individually wrapped or separated to prevent contact between them

Domestic dry ice shipments should be shipped by Wednesday at the latest. International dry ice shipments should be shipped by Tuesday at the latest to allow enough time for customs clearance and delivery. For international shipments, a minimum of 10 kg of dry ice is recommended for packaging purposes.

Dry Ice

Although regulated under the *Transportation of Dangerous Goods Regulations*, dry ice alone does not require UN Performance Packaging or a Shipper's Declaration for Dangerous Goods. However, you must follow the instructions listed below for labeling your box and completing the bill of lading for any shipments containing dry ice with other non-hazardous substances.

The class 9 label must be placed on one side of the box. It cannot overlap to another side of the box and must not be defaced in any way.

- The weight of dry ice in kilograms must be clearly marked on the box beside the class 9 label
- The box must be marked with "Dry Ice UN1845" next to the class 9 label
- The name, address and telephone number of the shipper and consignee must appear on the same side of the box as the class 9 label
- Shipments that contain a (frozen) liquid must have two directional labels placed on opposite sides of the box
- Class 9 labels, directional labels, and perishable labels can be found in HSC Stores-4N43, or ABB Stores-B166
- Styrofoam outer packaging is not allowed. Place Styrofoam containers inside a good quality fiberboard box. The boxes must allow venting of the dry ice, so do not tape all seams closed

Please note, domestic dry ice shipments should be shipped by Wednesday at the latest. International dry ice shipments should be shipped by Tuesday at the latest to allow enough time for customs clearance and delivery. For international shipments, a minimum of 10 kg of dry ice is recommended for packaging purposes.

Completion of Federal Express International Expanded Air Waybill or Domestic Bill of Lading for Dry Ice Shipments

1. Under the Special Handling section, tick off the box that corresponds to "Yes, Shipper's Declaration not required".
2. Under the Special Handling section, tick off the box that corresponds to "Dry Ice". Fill in the blanks beside the "Dry Ice" box with the number of packages and the number of kilograms of dry ice. For example, one box containing 5 kilograms of dry ice would be 1 x 5 kg.
3. Fill in "Description" of goods where prompted.

Dry Shippers (Liquid Nitrogen Dewars) Transporting Non-Hazardous Substances

Insulated packaging's containing refrigerated liquid nitrogen fully absorbed in a porous material and intended for transport, at low temperature, of **non-dangerous products** are not subject to Dangerous Goods Regulations provided the design of the insulated packaging would not allow the build-up of pressure within the container and would not permit the release of any refrigerated liquid nitrogen irrespective of the orientation of the insulated packaging.

The words "Not restricted, as per Special Provision A152" must be included in the description of the substance on the Air Waybill to indicate that it has been checked, that the packaging meets requirements and that **no Dangerous Goods are contained inside the insulated packaging.**

For more information on the legislated requirements for shipping dangerous goods visit: *http://www.tc.gc.ca/eng/tdg/safety-menu.htm*

Notes

Biosecurity Planning
and Implementation

Biosecurity Planning and Implementation

Getting Started

Everyone is in favor of progress; it's change they don't like.

And so it is with biosecurity.

Many clinics and institutions are compelled into designing biosecurity programs as a result of disease outbreaks. For example, salmonellosis, a serious zoonotic threat involving animals, veterinary hospital staff and public has been widely documented as an initiating cause of enhanced biosecurity programs within private veterinary practices and public institutions like veterinary colleges.

Biosecurity programs represent measures put in place to reduce the likelihood of introducing disease into a country, a region, or a specific location like a farm, ranch, animal shelter or veterinary clinic. As well, biosecurity measures reduce transmission of disease within and between locations when disease does gain entry. Common companion animal and livestock production diseases serve are examples. Biosecurity measures are often not specific to a particular disease or infectious agent, but rather a collection of important management and good production practices that reduce the risk associated with infectious agents. Biosecurity programs can be tailored for individual pathogens or for a particular facility as needed. For example, the American Association of Swine Veterinarians (AASV)[13] has developed protocols specifically designed to limit the introduction and transmission of porcine reproductive and respiratory syndrome (PRRS). Likewise, Alberta Milk and the Alberta dairy industry has introduced risk management strategies and biosecurity practices to control Johne's disease in dairy production units[14].

Animal diseases are transmitted in various ways: through direct contact between animals, indirectly by people or things, horizontally between animals of the same herd mates, or vertically between dam and offspring during gestation and parturition.

Direct contact is of particular significance for fragile pathogens unable to survive for extended periods outside the host; examples include feline leukemia virus (FeLV), feline immunodeficiency virus (FIV), or bovine virus diarrhea virus (BVD). Indirect transmission of disease between animals occurs via contaminated bedding, grooming kits, bowls, litter trays, medical equipment, boots and trucks used to transport livestock. People may unwittingly and indirectly transport infectious agents on their skin, clothing or shoes. The highly resistant canine parvovirus (CPv) is readily transmitted on clothes and shoes.

Biological vectors like midges are responsible for transmitting many viral diseases in sheep and cattle. Mosquitoes transmit West Nile virus, western equine encephalitis and heartworm, while ticks transmit diseases like Lyme disease and anaplasmosis. The large biting flies (*Tabanid spp.*) have been incriminated in mechanically transmitting equine infectious anemia and anthrax. Feline disease agents like *Mycoplasma haemofelis*, one cause of feline infectious anemia, is transmitted by fleas.

HACCP in Biosecurity Planning

One approach to formulating a biosecurity plan is to incorporate Hazard Analysis and Critical Control Point (HACCP) concepts[15, 16], a process conceived in the 1960s when the US National Aeronautics and Space Administration (NASA) asked Pillsbury to design and manufacture the first foods for space flights. HACCP is a systematic, preventive logic tool that addresses hazards and risk assessment as a means of prevention rather than finished product inspection. Since its inception, HACCP has been recognized internationally as a means of adapting traditional inspection methods to modern, science-based systems, commonly used today in the food and pharmaceutical industries. Using HACCP, biosecurity planning becomes proactive and preventative by identifying hazards before they threaten personnel, patients, or normal clinic operations.

[13] OHS Website link http://www.aasv.org/
[14] Alberta Milk Johne's Initiative; http://www.albertamilk.com/johnes/johnesinitiative.aspx?g=&k=
[15] United States Department of Agriculture, Food Safety Inspection Service. Pathogen Reduction/HACCP & HACCP Implementation. http://www.fsis.usda.gov:80/oa/haccp/imphaccp.html
[16] Colorado State University Veterinary Teaching Hospital. Biosecurity Standard Operating Procedures. http://www.cvmbs.colostate.edu/vth/unpub/biosecurity.html

The HACCP approach has seven integrated steps:

1. Operational hazards are identified, analyzed and preventive measures described.
2. Critical control points (CCP) are noted. A CCP is a step where control can be applied and a hazard can be prevented, eliminated, or reduced to acceptable levels.
3. Critical limits associated with each CCP that would trigger enactment of preventive or corrective measures are established.
4. Monitoring processes are described and procedures established for using monitoring results to adjust and maintain control of operations.
5. Corrective actions to be taken when critical limits are exceeded are described
6. Verification procedures that HACCP is working properly are determined
7. Effective record-keeping procedures documenting the HACCP system are developed.

Biosecurity: is about identifying risks and developing intervention measures

The clinic may be divided into service areas to be considered separately when designing biosecurity protocols. For example: small animal, food animal, equine, exotic/zoo animal, and ancillary services (e.g. radiology, clinical pathology, and isolation wards). A biosecurity plan has sections devoted to issues relating to operations overall and to each specific service area. HACCP plans for food safety address biological, chemical, and physical hazards. HACCP principles or steps may be applied to the veterinary practices biosecurity plan to address biological and workplace hazards.

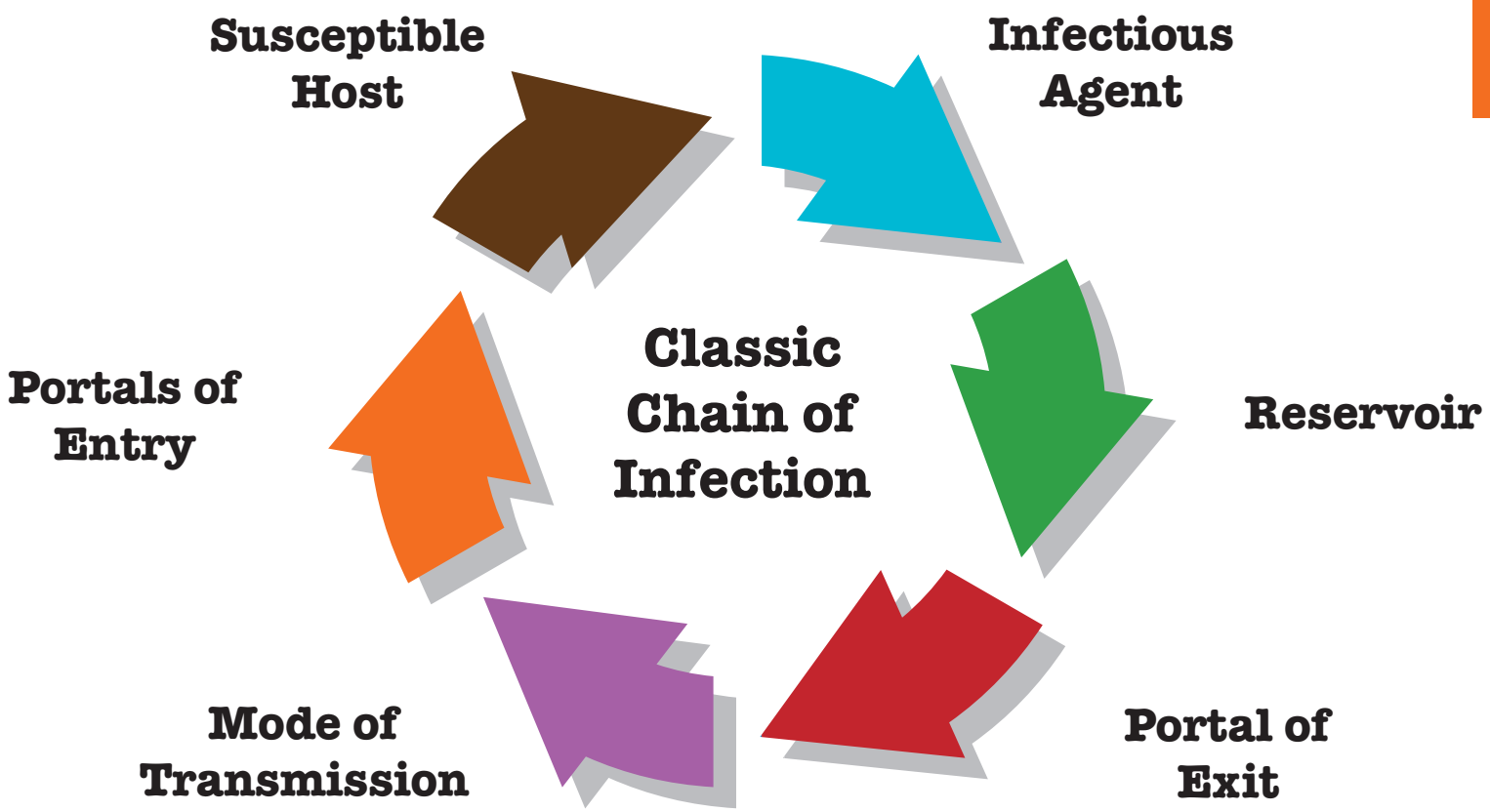
Notes

Hazard Analysis

Contagious infectious diseases are the major biological hazard to patients and staff. Important nosocomial pathogens important in biosecurity planning include gastrointestinal pathogens (fecal-oral transmission) and respiratory pathogens (aerosol transmission). Another important concern is contamination and infection of surgical wounds. Zoonotic agents are given special consideration, as are reportable diseases because the risk they pose to normal hospital operations and the legislative necessity to report. Infectious organisms recognized as common and/or important threats to biosecurity need to be identified e.g. Salmonella, Cryptosporidium parvum, equine influenza virus, canine parvovirus, organisms associated with neonatal scours, feline immunodeficiency virus, Streptococcus equi, Yersinia pestis, and ectoparasites.

When conducting hazard and risk assessments the factors required for the transmission of infection must be considered. They are commonly referred to as the "chain of infection" components. Controls are directed at the chains links to break the "chain of infection" at one of its links.

Chain of Infection: Diagram and Explanation; Infection Control for Nursing Students;
http://faculty.ccc.edu/tr-infectioncontrol/chain.htm



Critical Control Points and Corrective Actions

Transmission of infectious agents via contact is one of the greatest biosecurity concerns for the Veterinary Practice Entity (VPE). General principles for controlling contagious diseases need to be emphasized throughout the hospital. Preventative actions to be employed at all times include: frequent hand washing, appropriate cleaning and disinfection of contact surfaces, appropriate attire by hospital personnel, use of barrier nursing procedures, and providing lunch areas and rest areas for personnel away from animal housing and handling areas where food can be stored and consumed with less risk of exposure to zoonotic agents.

Hand washing is considered by the Centers for Disease Control and Prevention as the most important step in preventing the transmission of infectious diseases[17].

Instructions should be provided to personnel regarding correct hand washing technique, and all personnel should wash their hands before and after handling any animals in the hospital.

In the event that an area becomes contaminated with potentially infectious material, guidelines should describe appropriate methods for cleaning and disinfecting contaminated areas. Sample protocols are included in this manual and on the ABVMA website *(www.abvma.ca)* for disinfecting surfaces and hospital equipment exposed to animals or animal material.

All hospital personnel should wear clean protective attire whenever working in the hospital. The standard attire is intended to provide a minimum level protection from infectious agents, can be easily changed if soiled or contaminated, and generally heightens awareness about biosecurity. Smocks or laboratory coats should be required in small animal areas, and smocks or coveralls are required in the large animal areas. All personnel should wear closed-toe footwear that is easily cleanable and rubber over boots should be standard attire in the in-patient areas of large animal hospital facilities and isolation areas.

Barrier nursing precautions are another effective step in preventing the transmission of infectious agents whenever it is desirable to enhance precautions. Barriers should be used in isolation areas and for patients with special needs, e.g. foals and patients with compromised immune systems. Barriers include disposable plastic gowns, gloves, plastic or rubber over boots, and footbaths for each patient.

In addition to general biosecurity practices, service areas have specific control points and corrective actions, and are further divided according to differences in perceived shedding of infectious agents. For example, outpatients are generally considered to have the lowest risk of shedding infectious agents, while patients in isolation facilities represent the highest risk of shedding pathogens. Additional monitoring and biosecurity precautions are employed as the risk of shedding infectious agents increases.

Biosecurity is implemented when "reasons" are understood

Pathogen Monitoring

A process should be created to monitor the biosecurity procedures and provide feedback to the biosecurity officer and committee. Clinics may choose to maintain an active surveillance system in which environmental and patient samples are collected for routine bacterial isolation and identification. Samples could be routinely collected from patients that are considered to be at high risk for shedding pathogenic bacteria. In addition, the program may collect and maintain records of bacterial isolates and any identified nosocomial spread of disease. Corrective measures are based on analysis of the data collected.

Biosecurity:

- requires a plan, review and a veterinarian
- is an opportunity to increase competitiveness
- starts at home, on the farm, in the clinic
- encourages regular observation and early reporting

[17] Bolyard EA, Tablan OC, Williams WW, Pearson ML, Shapiro CN, Deitchman SD. Guideline for infection control 1998:26:289-354. Proceedings of the 9th International Symposium on Veterinary Epidemiology and Economics, 2000. Available at www.sciquest.org.nz

Biosecurity Program Development for VPE

1. Establish team
2. Identify outcomes for success
3. Identify and document hazards and assign risk
4. Identify hazard controls in place
5. Establish protocols and mitigation strategies

Step 1: Establish the Biosecurity Team

The structure of biosecurity teams will vary from practice to practice. Biosecurity teams represent the first step to buy in. While team structure will vary, a biosecurity officer for every practice is a constant.

Key Role: A Biosecurity Officer

The biosecurity officer will be the "biosecurity advocate" and source of biosecurity information and program development for a practice.

Responsibilities for a biosecurity officer include:

- Helping ensure the practice is compliant with ABVMA Bylaws pertaining to biosecurity
- Facilitating and leading:
  - ✓ Risk assessments and hazard surveys
  - ✓ Documenting protocols for implementation
  - ✓ Presenting plans to management and staff for review and acceptance
  - ✓ Establishing measurements of success to evaluate the biosecurity program
  - ✓ Reviewing and improving the biosecurity program based on predetermined benchmarks, staff and client feedback
- Assist with developing and monitoring biosecurity programs for clients, including training
- Oversight of compliance with biosecurity program(s)
- Direct training and awareness initiatives, which includes being a frontline source of information

Some of the more specific duties that might appear in the job description of a biosecurity officer:

- Familiarity with the ABVMA *Biosecurity in Practice* manual and updates regarding material posted on the ABVMA website
- Updated copies of the practice's biosecurity program are readily available for staff
- Establish cleaning schedules for different zones of the veterinary hospital
- Declaration of "no go" areas following exposure to a contagious pathogen
- Approval of rooms for use following cleaning and disinfection
- Patient triage when infectious diseases are involved
- Schedule and supervise interaction of clinic pets with client pets, if needed
- Establish protocols for medical sharps and waste disposal
- Maintenance of a Biosecurity Binder for the practice and staff with resources, protocols, disinfectant information and any other material the officer or staff may find useful to be compliant with biosecurity programs
- Ongoing update of training material used by staff and clients
- Maintain an inventory of pertinent promotional and information material

Step 2: Outcomes for Success

To be successful, biosecurity planning must be outcome oriented, providing clear answers to the question, **"What will look different?"** In keeping with an old cliché: A good plan is, as a good plan does! An outcome-oriented plan is measured by the ***results*** it achieves.

Five important outcomes include:

1. Concepts of public health are promoted among hospital personnel and clients
2. Risks of zoonotic disease are reduced
3. Patient care is optimized by minimizing the threat of nosocomial (hospital acquired) infections
4. Lifelong skills in public health and biosecurity are developed and promoted among hospital personnel

Many biosecurity plans fail because clear outcomes are not established.

Step 3: Workplace Hazards and Risk

Hazard identification and risk assessment are not perfect sciences. Formal risk management procedures are complicated and beyond the scope of most practices. What follows is an overview of risk assessment methods used by different organizations and how they have incorporated them into biosecurity programs. The sources of information include material from veterinary colleges, government agencies, commodity organizations and extension services. References are provided. Details beyond examples provided in *Biosecurity in Practice* appear in the Tool Kit of the ABVMA Biosecurity Web Page.

Biosecurity encourages "prevention" as opposed to "response"

Biosecurity information can be presented in different formats. Material from Western College of Veterinary Medicine (WCVM) and Liege is "protocol" oriented, while information from the University of Minnesota, Penn State and University of Davis is "species" oriented. The Canadian Food Inspection Agency, Ontario Veterinary Medical Association and New York State Cow Health Assessment Program delve extensively into the process of risk assessment. The Production Animal Disease Risk Assessment Program, Johne's Risk Assessment protocols for beef and dairy and the PRRS risk assessment tool are disease oriented.

Veterinary Practice Risk Assessment Questionnaire

Below is a sample Risk Assessment Questionnaire that may be used by a biosecurity officer within a veterinary facility. Please note: The questionnaire is not exhaustive and is intended to serve as a guideline for practices to tailor their own.

Risk Assessment Questionnaire: Mixed Animal Practice		
Access Management		
	Yes/No	Comments
Are areas of the practice identified as public access, employee only access or restricted access?		
Are critical access points identified with signs?		
Is client/visitor parking clearly identified?		
Are there areas of the clinic/practice/hospital that are identified as staff only?		
Are entrance and exits clearly identified for staff or clients?		
Are staff movements planned to minimize traffic through high risk areas? (e.g. kennel room)		
Is there a client visitation policy?		
Isolation patient visits?		
Are there clinic pets?		
If yes:		
What is their vaccination status?		
Are they restricted to one area of the facility?		
Are they able to interact with clients and/or patients?		
Are staff allowed to bring their pets to the hospital?		
Are there protocols in place regarding receiving outpatients?		
How are animals brought into the clinic on an emergency basis?		
Are there protocols in place for small animal patients with suspect contagious disease?		
If so, which diseases?		
GI Infections		
Respiratory Infections		
Multi-Drug Resistant Infections		
SPCA/Rescue cases		
Naïve patients		
Exotics and Wildlife		
Avian Species		

Access Management		
	Yes/No	Comments
Are procedures in place for non owned patients?		
Where are they housed?		
Where are they examined?		
Is there a standard treatment protocol on admission? Vaccines? Parasite control?		
How are patient belongings identified and stored?		
Is isolation clearly identified as Restricted Access or Staff Only?		
Is there a protocol for cleaning and disinfecting isolation when a patient is discharged?		
Is there a written protocol entering and exiting isolation?		
is there an anteroom prior to isolation for donning and removing PPE and storing supplies?		
Separate room with closed door?		
Crossover barriers?		
Demarcation/barrier line?		
Are supplies kept in covered impermeable containers that can and are disinfected regularly?		
Do staff booking appointments, for out of clinic appointments, ask about the clients biosecurity requirements?		
Are there protocols specific to ambulatory practice and field service in place for:		
Attire		
Arriving on farm		
Returning to clinic		
Is parking identified at the practice for ambulatory vehicles?		

Animal Health Management		
	Yes/No	Comments
Is barrier nursing employed?		
Is the protocol documented?		
Are the necessary materials on hand and located where needed?		
Are footbathes employed as part of the barrier nursing protocol?		
How are materials disposed of following contamination or patient discharge?		
Are triage procedures in place for patients with potentially infectious diseases?		
How are patient risks identified?		
Are there different zones or areas for infectious patients? E.g. isolation?		
Do zones limit the transmission of disease?		
Are general cleaning and disinfection procedures documented and followed for:		
Endotracheal tubes		
Anesthetic machines		
Ventilators		
Surgical Instruments		
Monitoring probes and equipment		
IV Poles		
Are there protocols in place for when an infectious or potentially infectious patient needs to access various areas of the hospital?		
Surgery		
Radiology		
Exam Room		
Handling Area		
Are staff familiar with Reportable and Notifiable disease regulations? (Provincial and Federal)		
Do staff receive training regarding zoonotic and highly contagious diseases affecting animals?		
Rabies		
Blastomycosis		
Avian Influenza		
Salmonella		
Others		

Animal Health Management		
	Yes/No	Comments
Are small animal surgery protocols in place?		
Dress codes		
Equipment cleaning and disinfection		
Surgical Preparation		
Patients with Suspect Contagious Disease		
Clothing Change		
Do DVMs and/or AHTs advise clients following diagnosing and/or treating a contagious disease on clients premise?		
Particpate in post diagnosis clean up?		
Preventative steps to keep other animals on premise healthy?		
Operational Management		
	Yes/No	Comments
Is there a documented workplace hazard survey?		
Is there a hand washing protocol in place?		
Before and after each patient within the facility?		
Waterless hand santizer available in public areas?		
Do new staff, students and volunteers receive specific training about biosecurity protocols?		
On the job?		
Orientation Manual?		
How are they advised of clients biosecurity requirements if attending ambulatory service calls?		
Is staff training tracked and documented in each employee file?		
Does the clinic have a dress code that minimizes disease transmission outside the veterinary facility?		
Are staff advised/trained to employ good hygeine practices before coming to work?		
Do staff leave work clothes at work for laundering?		
Are procedures in place for changing potentially contaminated clothing?		
Are facilities available for staff to "decontaminate" before going home?		
Are there cleaning and disinfection protocols for standard equipment?		
Does the protocol include precautions for moving equipment throughout the clinic area?		
Have cleaning and disinfection procedures been developed for functional areas?		
Documented?		
Appropriate disinfectant?		
Concentration?		
Contact Time?		

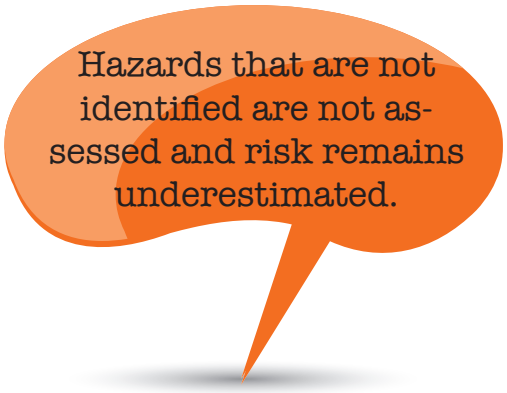
Operational Management		
	Yes/No	Comments
Have staff been trained?		
Is there an DVM or RAHT designated as the biosecurity officer?		
Do staff participate in regular training on accepted protocols?		
Does the clinic have a designated employee lounge/lunch room?		
Where do staff store food supplies and/or eat?		
Is there a policy regarding the disposal of sharps?		
Is there a Diagnostic Specimen protocol in place?		
How do staff identify possibly contagious samples?		
Are staff familiar with transportation regulations and shipping procedures?		
Is there a release of remains policy?		
Clinic mortality		
Necropsy		
Are cleaning and disinfection protocols available by functional area of the practice?		
Treatment/Exam Rooms		
Surgery		
Reception/Waiting Area		
Radiology		
Dental Suite		
Pharmacy		
Animal Housing Areas and Kennels		
Are supplies for animal housing areas kept in covered, impermeable containers that can be cleaned and disinfected?		
What is the staff vaccination policy?		
Rabies		
Influenza		
Tetanus		
Is there a policy in place regarding workplace injuries involving animals and use of equipment?		
Are workplace incidences reported?		
How?		
Follow up?		
Biosecurity breaches		
Workplace accidents (needle sticks, animal bites, slips/falls etc.)		
Nosocomial Infections		

Operational Management		
	Yes/No	Comments
Are waste disposal protocols in place?		
Bedding		
Medical Waste		
Body Tissues and Fluids		
Vaccine vials		
Expired or partially used drugs		
Chemotherapeutics		
Do staff receive training in Emergency Response?		
Fire		
Power Outages		
Spills		
Human Medical Emergencies		
Animal Escape		
Suspect Reportable Diseases		
Are all policies, protocols and procedures distributed to staff and/or made readily available within the workplace?		
How are exam rooms handled that have contained a patient with contagious disease and/or potential zoonoses?		
Out of Use rooms identified with signage?		
Protocol for cleaning and disinfection?		
Is PPE being used for dental procedures?		
Are supplies in isolation single use only?		
How is isolation laundry cleaned?		
What is the protocol for cleaning and disinfecting equipment that leaves isolation?		
Are garbages covered and identified as Isolation/Biomedical Waste?		
Sorting and Handling patient specimens		
Are there protocols in place for equipment cleaning and disinfection between patients and premises?		
Bull and Semen Evaluation equipment		
Ultrasound		
Dental Floats		
Stomach Tubes		
Castration Equipment		
Etc.		
Calving Jacks		

Operational Management		
	Yes/No	Comments
How are dirty coveralls/boots stored in between calls?		
How is dirty equipment stored/transported between appointments?		
How is ambulatory outwear cleaned and disinfected?		
Using disposable coveralls?		
Using disposable booties?		
Laundering protocol?		
Is the ambulatory vehicle stocked with:		
Disinfectant concentrate?		
Water to mix disinfectant?		
Garbage bags or closed bin to transport dirty outwear, boots and/or equipment?		
Clean coveralls and boots?		
Disposable coveralls and boots?		
Other biosecurity tools		

Notes

While formal risk-assessment process is beyond the scope of this manual, the principles of risk assessment remain paramount. Hazard identification is the critical step in risk-assessment – hazards that are not identified are not assessed and risk remains underestimated.



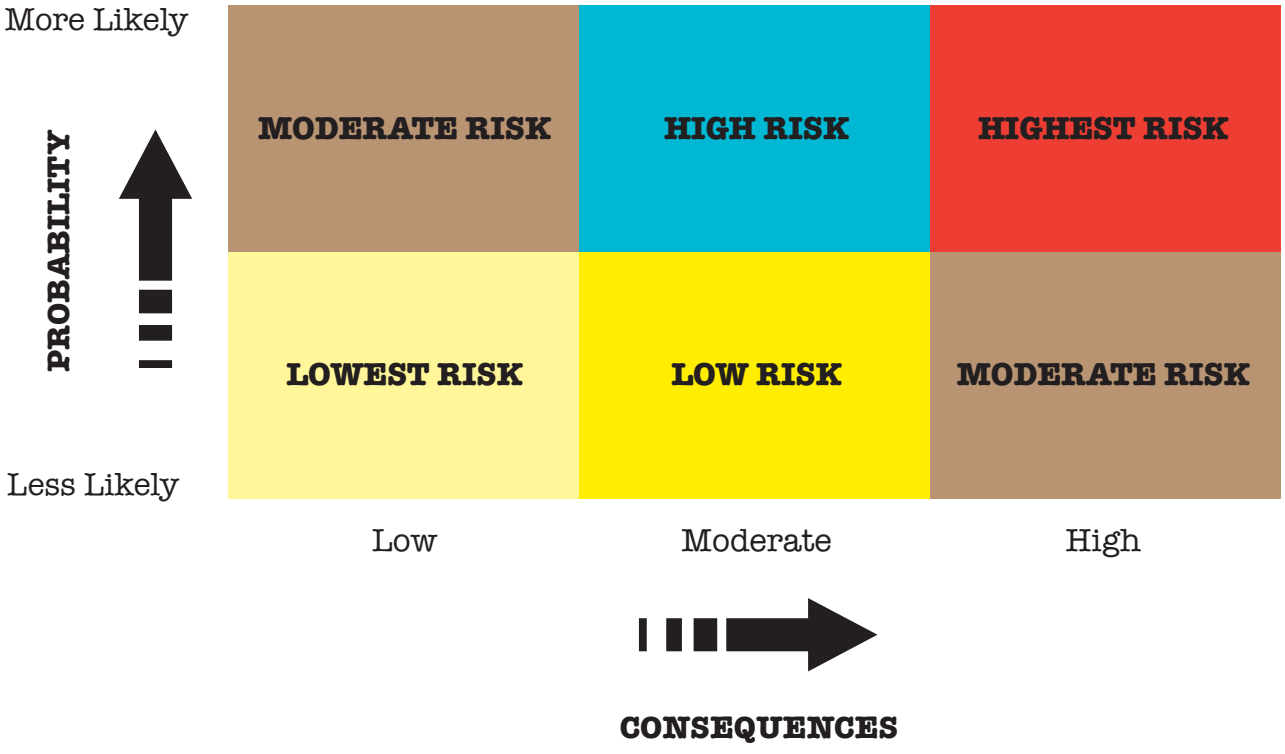
Assigning Level of Risk

Risk is a function of the likelihood and consequences of undesired events. In a biosecurity context the undesired event are threats to animal and human health. In a formal risk assessment process, effort is given to quantifying the likelihood and consequences of breaches in biosecurity. Because quantitative risk-assessments for biological stressors can be notoriously difficult to calculate, the following grid may help those planning biosecurity programs to categorize risk.

Infectious diseases encountered in hospitalized animals are normally classified into risk categories based on the potential transmissibility of an agent to other animals and their zoonotic potential. Using the above table as an example, **lowest risk** category diseases include those caused by agents that have **no likelihood of transmission** to other animals and no potential for human infection. As you move up the scale to the **moderate risk** category, consideration would be given to non-resistant bacterial infections caused by agents still representing a low level of transmission potential. Both low and moderate risk category diseases would usually be place in normal housing. Higher risk category diseases would involve those agents requiring **barrier nursing precautions** i.e. those infections caused by bacteria with highly resistant antimicrobial susceptibility patterns (based on diagnostic information), infectious diseases caused by agents with a substantial risk of transmission potential and those that are potential human pathogens. The **high risk** category of diseases have a high level of transmission and/or are extremely serious human pathogens and represent diseases typically housed in isolation wards.

Some form of risk category classification needs to be part of biosecurity planning. Assignment of risk priority depends on the specific disease, animal species involved and the area of the hospital or the service being examined.

Risk Assignment Grid[18]



[18] Adapted from the Assessment of Threat Scenarios, Health Canada, Office of Laboratory Security

Step 4: Identify Hazard Controls Already In Place

Within the Occupational Health and Safety niche, there is an accepted hierarchy of effective control of hazards.

Where engineering and/or administrative controls are not sufficient to eliminate or reduce the hazard, the third choice is the use of personal protective equipment (PPE). PPE is considered the "last resort" as a control, because it relies on proper use, fit and worker training. If PPE fails, there is a high likelihood of VHCW exposure to possibly pathogenic organisms. Often several controls are applied simultaneously to effectively control a hazard.

Checklist #1: Are appropriate controls identified, supplied and used?

- ✓ Where possible, are mechanisms to eliminate the hazard at the source identified?
- ✓ Are engineering controls identified and implemented?
- ✓ Are veterinary healthcare workers (VHCWs) trained on how to properly operate engineering controls?
- ✓ Are facilities and maintenance personnel aware of the purpose and mechanisms of ventilation as an engineering control?
- ✓ Are there alarms to warn of mechanical and ventilation system failures? Are VHCWs trained on how to recognize alarms?
- ✓ Is there a preventive maintenance program for ventilation systems?
- ✓ Are VHCWs involved in the determination and selection of hazard controls?
- ✓ Does the selection of controls take into account the chain of infection?
- ✓ Are all required controls available where needed?
- ✓ Is the use of hazard controls required and enforced?
- ✓ The following factors should be considered when determining
- ✓ The need for respiratory protective equipment:
- ✓ Who is potentially exposed to the biohazardous material as part of their work?
- ✓ What are the potential sources and routes of transmission to workers?
- ✓ Which job tasks increase the potential for worker exposure to biohazardous material at the workplace?
- ✓ Can the biohazardous material be spread to workers through airborne transmission?

Elimination of Hazard

Most Effective Control

Engineered Controls

Isolation Rooms, Vaccines, Safety-engineered devices and equiment

Ventilation, Automated Processes

Administrative Controls

Immunization Programs, Training, Scheduling

Policies and Procedures, Health Assessments appropriate to the hazard

Personal Protective Equipment (PPE)

"Last Resort" Control

Sample Form #1:
Hazard Assessment and Control Sheet

1. Identify job tasks and environmental aspects of work.
2. List all identified hazards.
3. Identify the controls that are in place—engineering, administrative, PPE, or combination—for each hazard

Job or Task	Potential or Existing Hazard	Hazard Risk Assessment	Controls in Place			Follow Up Action Required	Date and Person Responsible
			Engineering	Administrative	PPE		
List job or task here	List potential or existing hazards here	Probability, Severity, Frequency assessment leading to assessment of risk as High, Medium or Low	Identify controls that are in place, may identify them by type of control			Identify if there is any follow up action required, such as more training or PPE	Fill in name of person responsible for implementing controls and follow up
Example: Blood Collection	Needle stick		Engineered safe needle devices and needles systems Point of use sharps containers	Routine Practice[19] Blood Collection Procedures No recapping waste needles Training of DVMs, AHTs and support staff	Gloves		Sally Jones, RAHT

Routine Practices include a recommended pattern of behaviors' to form the foundation of limiting the transmission of microorganisms in all health care settings and is generally accepted care for all clients. elements of Routine Practices are: hand hygiene; risk assessment related to client symptoms, care and service delivery, including screening for infectious diseases; risk reduction strategies through the use of PPE, cleaning environment, laundry, disinfection and sterilization of equipment, waste management, safe sharps handling, client placement and healthy workplace practices; and education of healthcare providers and clients.

[19] Routine Practices include a recommended pattern of behaviours' to form the foundation of limiting the transmission of microorganisms in all health care settings and is generally accepted care for all clients. elements of Routine Practices are: hand hygiene; risk assessment related to client symptoms, care and service delivery, including screening for infectious diseases; risk reduction strategies through the use of PPE, cleaning environment, laundry, disinfection and sterilization of equipment, waste management, safe sharps handling, client placement and healthy workplace practices; and education of healthcare providers and clients.

Best Practices for the Control of Biological Hazards, by Veterinary Facility Functional Areas[20]

Each organization must systematically conduct hazard assessments for tasks performed by veterinary healthcare workers. While it is common to consider the transmission of infectious disease through direct contact with infected patients as a high risk hazard, a careful review of all veterinary healthcare workplaces will likely identify a complete range of risks that must be addressed. In this section the most commonly encountered biological hazards and methods to control them in specific veterinary healthcare functional areas are presented. Permit holders and practice owners should carefully evaluate the potential for exposure to biohazardous materials in all areas and ensure that they have an effective hazard control plan in place. This information will be useful for inclusion into hazard assessments.

Please note, this is not designed to be an exhaustive treatment of the subject, but is rather an overview summarizing the most frequently encountered biological hazards in healthcare settings.

General Notes:

- The following charts provide basic information about control strategies for commonly occurring biological hazards.
- Administrative controls for all areas include Routine Practices that are to be used as a minimum and additional precautions as warranted based on the risk assessment.
- Worker education and good communication processes are also critical administrative controls.
- Any PPE selected must be based upon the risk assessment of the task and the environment in which it is used.
- All legislation related to the selection and use of controls must be followed.

[20] Adapted from material covered in **Healthcare Hazard Control and Safety Management**, second edition, James T. Tweedy, CRC –Taylor & Francis, 2005; ISBN 1-57444-306-2

Potential Hazards	Summary of Major Control Strategies		
	Engineering	Administrative	PPE
Exposure to blood borne pathogens through needle stick injuries, contaminated items and surfaces, exposure to mucous membranes	*Engineered needle stick prevention devices; availability of sharps containers for disposal; vaccines for staff as appropriate*	*Compliance with all infection prevention and control practices; immunization program; worker education*	*Gloves, protective clothing, eye and face protection*
Exposure to airborne biological agents through contact with secretions from infectious patients (coughing, sneezing, etc.) or air contaminated with infectious biological agents	*Early detection of infection status; isolation*	*Compliance with all infection prevention and control practices; Immunization program; worker education*	*PPE based on the risk assessment may include gloves, protective clothing, eye, face and respiratory protection.*
Exposure to droplets containing infectious biological agents through contact with patient secretions or contaminated environmental surfaces or equipment	*Early detection and communication of infection status; isolation; disinfection/ sterilization of equipment*	*Good housekeeping practices; compliance with all infection prevention and control practices; immunization program; worker education*	*Gloves, protective clothing, eye and face protection*
Exposure to environmental biological contaminants from ventilation systems, water or food	*Maintenance of ventilation systems; early spill cleanup; preventive maintenance of ventilation systems and water supply systems with regular testing to ensure proper functioning; early detection and remediation of mold*	*Infection prevention and control practices related to building maintenance and food preparation (especially raw food diets); protocols for construction and renovation projects that reduce contamination; worker education*	*Use of proper PPE when cleaning contaminated environmental surfaces, including gloves, repiratory protection and eye protection*
Exposure to laser plumes	*Local exhaust ventilation; selection of medical devices (lasers). Information available at: http://www.techstreet.com/cgibin/detail?product_id=665838*	*Infection prevention and control practices related to building maintenance; worker education*	*Use of proper PPE when cleaning contaminated environmental surfaces, including gloves, respiratory protection, and eye protection*

Potential Hazards	Summary of Major Control Strategies		
	Engineering	Administrative	PPE
Exposure to blood borne pathogens through needle stick, glass slides, tubes, pipettes or other sharps injuries	*Engineered needle stick prevention devices; elimination of use of any unnecessary sharps avoid using glass products whenever possible; availability of sharps containers for disposal*	*Compliance with all infection prevention and control practices; immunization program; worker education*	*Gloves, protective clothing, eye and face protection*
Exposure to blood borne pathogens through contaminated items and surfaces		*Compliance with all infection prevention and control practices*	
Exposure to air contaminated with infectious biological agents	*Isolation*	*Compliance with all infection prevention and control practices*	*PPE based on the risk assessment may include gloves, respiratory protection, eye and face protection and other protective clothing*
Exposure to droplets containing infectious biological agents through contact with patient secretions or contaminated environmental surfaces or equipment	*Use of biosafety cabinets for handling patient samples*	*Good housekeeping practices; compliance with all infection prevention and control practices; spill response procedures; worker education*	
Exposure to biological hazards through specimen accessioning and laboratory testing procedures that generate aerosols	*Aerosol reduction equipment, including use of centrifuge carriers with lids, use of biosafety cabinets*	*Training in and enforcement of safe work practices; designation of clean/contaminated areas or equipment*	
Exposure to concentrated doses of biological agents	*Use of biosafety cabinets; appropriate containment level facilities; aerosol reduction equipment;*	*Aerosol reduction procedures; training in and enforcement of safe work practices*	
Exposure to pathogens present in tissues	*Appropriate containment level facilities; local exhaust ventilation for grossing; appropriate necropsy room ventilation*	*Training in and enforcement of safe work practices*	

Patient Transport

Potential Hazards	Summary of Major Control Strategies		
	Engineering	Administrative	PPE
Exposure to blood borne pathogens through contaminated items and surfaces, exposure to mucous membranes	*Use of waterproof, disposable pads if appropriate; communication of infection status;*	*Compliance with all infection prevention and control practices; worker education*	*PPE based on the risk assessment may include gloves, eye protection and other protective clothing*
Exposure to airborne biological agents through contact with secretions from infectious patients (coughing, sneezing, etc.) or air contaminated with infectious biological agents	*Communication of infection status; isolation*	*Compliance with all infection prevention and control practices; Worker education*	*PPE based on the risk assessment may include gloves, protective clothing, eye, face and respiratory protection.*
Exposure to droplets containing infectious biological agents through contact with patient secretions or contaminated environmental surfaces or equipment of infection status; isolation; disinfection/ sterilization of equipment	*Communication of infection status; isolation; disinfection/sterilization of equipment*	*Good housekeeping practices; compliance with all infection prevention and control practices; worker education*	*Gloves, protective clothing, eye and face protection* *Use of proper PPE when cleaning contaminated environmental surfaces, including gloves, respiratory protection, and eye protection*

Support Services including laundry, equipment sanitation and facility sanitation workers

Potential Hazards	Summary of Major Control Strategies		
	Engineering	Administrative	PPE
Exposure to blood borne pathogens through needle stick injuries, contaminated items and surfaces	*Safety Engineered Medical Sharps (SEMS)as needle stick prevention devices; availability of sharps containers for disposal; waterless hand sanitizer' metal detectors in sorting area*	*Compliance with all infection prevention and control practices; worker education*	*Puncture resistant gloves, protective clothing, face protection appropriate for level of infectious agent*
Exposure to airborne biological agents through contact with secretions from infectious patients (coughing, sneezing, etc.) or air contaminated with infectious biological agents	*Communication of infection status; isolation;*	*Compliance with all infection prevention and control practices; Worker education*	*PPE based on the risk assessment may include gloves, protective clothing, eye, face and respiratory protection.*
Exposure to droplets containing infectious biological agents through contact with patient secretions or contaminated environmental surfaces, equipment or laundry	*Communication of infection status; disinfection/sterilization of Equipment; design and identification of work area*	*Sorting procedures to reduce exposure; compliance with all infection prevention and control practices; worker education; use of water soluble laundry bags*	*Use of proper PPE when cleaning contaminated environmental surfaces, including gloves, respiratory protection, and eye protection*

Exam and Treatment Rooms including Dental and Diagnostic Imaging Rooms

Potential Hazards	Summary of Major Control Strategies		
	Engineering	Administrative	PPE
Exposure to blood borne pathogens through needle stick injuries, contaminated items and surfaces, exposure to mucous membranes	*Engineered needle stick prevention devices; availability of sharps containers for disposal; waterless hand sanitizer*	*Compliance with all infection prevention and control practices; immunization program; worker education*	*Gloves, protective clothing, eye and face protection*
Exposure to airborne biological agents through contact with secretions from infectious patients (coughing, sneezing, etc.) or air contaminated with infectious biological agents	*Early detection of infection status; isolation; cleaning of toys for clients (kids)*	*Compliance with all infection prevention and control practices; Immunization program; worker education*	*PPE based on the risk assessment may include gloves, protective clothing, eye, face and respiratory protection.*
Exposure to droplets containing infectious biological agents through contact with patient secretions or contaminated environmental surfaces or equipment	*Early detection of infection status; isolation; disinfection/ sterilization of equipment*	*Good housekeeping practices; compliance with all infection prevention and control practices; immunization program; worker education*	*Gloves, protective clothing, eye and face protection* *Use of proper PPE when cleaning contaminated environmental surfaces, including gloves, respiratory protection, and eye protection*
Exposure to biological agents in blood and saliva of patients through contact with blood and saliva or through contact with contaminated needle or sharp instrument	*Equipment to minimize formation of aerosols (rubber dams, high-speed evacuation, etc.); communicate infectious status; engineered needle stick prevention devices; availability of sharps containers for disposal; proper disinfection of instruments and decontamination of environmental surfaces, lab supplies and materials;*	*Compliance with all infection prevention and control practices; no recapping of needles (even if multiple injections in same patient); safe work procedures to minimize formation of aerosols where possible (proper patient positioning, etc.); proper disposal of waste materials; worker education*	*Use of gloves, eye and face protection when splashes or splatters are possible; gowns or uniforms that should be changed daily or when contaminated*
Exposure to respiratory infectious disease through droplet or airborne transmission	*Medical history of patients; communication of infectious status*	*Good housekeeping practices; compliance with all infection prevention and control practices; worker education*	*Use of gloves, eye and face protection when splashes or splatters are possible; gowns or uniforms that should be changed daily or when contaminated*

Ambulatory Veterinary Staff (Farm Calls, House calls)

Potential Hazards	Summary of Major Control Strategies		
	Engineering	Administrative	PPE
Exposure to zoonotic disease	*Risk assessment prior to visit; waterless hand sanitizer*	*Structure exams of animals healthy to sick during visit; Communication procedures; disinfection/sanitation procedures for when returning to VPE; returning to VPE prior to next appointment for disinfection/sanitation*	*Gloves, non-porous footwear or foot coverings and coveralls or lab coat and where needed protective barrier clothing for animal contact*
Exposure to blood borne pathogens through needle stick injuries, contaminated items and surfaces, exposure to mucous membranes	*Engineered needle stick prevention devices; availability of sharps containers for disposal; waterless hand sanitizer*	*Compliance with all infection prevention and control practices; immunization program; worker education*	*Gloves, protective clothing, eye and face protection*
Exposure to airborne biological agents through contact with secretions from infectious patients (coughing, sneezing, etc.) or air contaminated with infectious biological agents	*Early detection of infection status; use of disposable pads if appropriate*	*Compliance with all infection prevention and control practices; Worker education*	*PPE based on the risk assessment may include gloves, protective clothing, eye, face and respiratory protection.*
Exposure to droplets containing infectious biological agents through contact with patient secretions or contaminated environmental surfaces or equipment	*Early detection of infection status; isolation; disinfection/ sterilization of equipment*	*Compliance with all infection prevention and control practices; worker education*	*Use of proper PPE when cleaning contaminated environmental surfaces, including gloves, respiratory protection, and eye protection*
Exposure to biological agents in blood and saliva of patients through contact with blood and saliva or through contact with contaminated needle or sharp instrument	*Equipment to minimize formation of aerosols (rubber dams, high-speed evacuation, etc.); communicate infectious status; engineered needle stick prevention devices; availability of sharps containers for disposal; proper disinfection of instruments and decontamination of environmental surfaces, lab supplies and materials*	*Compliance with all infection prevention and control practices; no recapping of needles (even if multiple injections in same patient); safe work procedures to minimize formation of aerosols where possible (proper patient positioning, etc.); proper disposal of waste materials; worker education*	*Use of gloves, eye and face protection when splashes or splatters are possible; gowns or uniforms that should be changed daily or when contaminated*
Exposure to respiratory infectious disease through droplet or airborne transmission	*Medical history of patients; communication of infectious status*	*compliance with all infection prevention and control practices; worker education*	*Use of gloves, eye and face protection when splashes or splatters are possible; gowns or uniforms that should be changed daily or when contaminated*

Step 5: Establish protocols and mitigation strategies

To help simplify the planning process, everything related to biosecurity implementation can be grouped under one of **three biosecurity pillars: Access Management, Animal Management and Operational Management**

Access Control

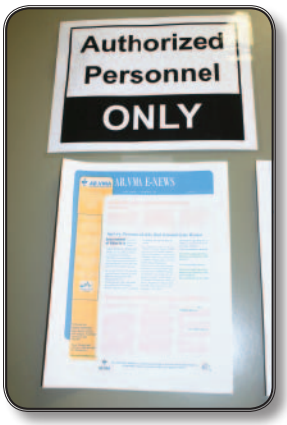
Access control, perhaps better described as the physical control we have over how disease gains entry onto a premise be it a farm, ranch, veterinary clinic or a household with pets. Access control is also about how to mitigate the natural tendency of disease to evade measures to contain it and the tendency for it to move from one premise, or control area, to another. Access control is about the physical barriers established to reduce the risk of disease transmission. It may relate to how vehicles, animals and people move onto, or off of agriculture enterprises or the physical barriers established in a small animal clinic to control the flow of human and animal traffic in a way that minimizes the risk of infectious disease transmission. Access control includes the effort to monitor people movement through visitor logs, signage that helps direct traffic or prevent unauthorized entry and security measures that cover the gamut from protective fencing to locked doors. Philosophically, access control can be elevated to the level of establishing sterile surgery protocols in a surgical suite.

Creation of zones based on risk associated with the movement of animals and people and the level of protection required as people cross zone boundaries is one way of managing access points within a facility. Zones can be demarcated with signs, physical barriers and/or floor markers such as red tape. Fences, signs and gravelled areas for parking help identify exterior zones.

Designate distinct zones

Zones can be created in line with operational needs. For example:

- **Public Access Zones** indicate to the public other areas that are NOT public access. Public access zones would have hand washing stations positioned strategically and frequently and would likely include reception or welcoming areas, exam rooms, meeting rooms etc.
- **Controlled Access Zones (CAZ)** are areas around outdoor runs, barns, pens, handling areas. Generally controlled access zones are restricted to clients and employees actively engaged in a veterinary service. A fence, sign or strip of crushed gravel may identify them. They are often designated as staff parking areas, or used specifically for ambulatory field service parking.
- **Restricted Access Zone (RAZ):** These zones should be identified at all entrances and exits as a Restricted Access Zone. Signs may also include statements such as “Employees Only” or “Biosecurity standards in place” or “PPE Required”.



- **Quarantine Zone:** Quarantine is an area for animals that are being observed for disease. For example, a rabies suspect patient following a biting incident. Depending on the facility operations, protocols may be customized to accommodate animal movement within the facility while under observation.
- **Isolation:** Isolation is an area for animals suffering from a contagious disease. Strict entry and exit protocols exist. To limit any chance of disease transmission, cleaning and disinfection is required after each use. Ideally, clear instructions should be posted at the point of entry. Step by step pictures are a helpful reminder to producers and/or staff about appropriate protocol.

✓ Use an anteroom as a transition zone from the regular veterinary facility into an isolation zone. If an anteroom is not a practical option, consider crossover barriers or a demarcation line outside the isolation room door to provide a visible reminder of a transition zone.

1 A demarcation line serves as a visible indicator of transitioning zones in a veterinary setting.

2 A crossover barrier built to size that accommodates changing footwear or donning booties by incorporating a bench into the design.

Isolation protocols
should be posted at point of entry.
Step by step pictures help.

Control access at critical control points

Movement of people, patients, equipment and vehicles into, between and out of the designated zones needs to be controlled.

This can be done most efficiently through the use of controlled access points. Physical barriers help remind employees and visitors of the change in zones. There may also be a requirement of those entering or exiting the zone to wash hands and/or change footwear and/or outwear.

Critical access points include: main entryways, staff entrances, treatment rooms and kennel room entrances, boarding or retail entrance etc.

Equipment travelling between zones should also be subject to cleaning and disinfection. Cleaning and disinfection protocols easily become a part of the routine if appropriate supplies are at hand and protocols are understood.

A prominently displayed Visitor's Log (or Guest Book) not only initiates conversation with visitors it can be a key piece in tracing the movement of people and animals in the event of a disease outbreak. Appointment books can also be used if ALL visitors are tracked and the following information is noted:

- Identity of people presenting animal patients
- Identity of all industry visitors e.g. company reps giving a presentation to the staff
- Information about retail inquiries and purchases
- Vaccination status of patients

The 3 Biosecurity pillars is an important concept:
Access Management
Animal Health Management
and Operational Management

Plan patient movement

- Scheduling patient movements ahead of time is the most effective way to minimize disease transmission risks because it gives staff a chance to review appropriate protocols, set up required equipment to facilitate efficient patient treatment and control the people and traffic flow in the area a high risk patient may have to enter or cross.
- Avoid moving young or sick animals through a heavily used area.
- Handle animals from youngest to oldest and healthy to sick as routine practice.

Planning patient movement is a particularly important concept in veterinary clinics and to VHCWs because a significant percentage of the animals we deal with in a day do or may carry a transmissible disease and our premise is a high density high traffic flow premise. For example, a dog with porcupine quills that may also be carrying fleas will quickly pass on his fleas! Or a cat with an upper respiratory condition. Or a cow or calf with Salmonella.

Also we deal with patients who are at a high risk for contracting a disease while in our care. Consider naïve patients (newborns that may not have gotten adequate colostrum at birth or have an immature immune system) or chemotherapy patients with a suppressed immune system. Both would be at risk for contracting disease.

Visit the ABVMA Biosecurity website to download and customize a variety of protocols for handling patients with specific risk factors.

Plan ambulatory visits

Biosecurity relies on consistent application of routine measures. It begins prior to leaving home and continues after returning home from work. Staff that own or come into contact with livestock and poultry during personal activities must ensure disease is not inadvertently transmitted from these sites to other sites during work. Personal clothing and vehicles can become contaminated and transmit pathogens and pests.

The CFIA identifies 3 levels of biosecurity that veterinary staff may employ when attending a producers' premises for an ambulatory visit. Minimally, VPE staff should employ Routine biosecurity on premises where direct animal contact or contact with animal housing is anticipated.

Avoid moving young or sick animals through a heavily used area.

CFIA recognizes three levels

Basic, routine and enhanced levels of biosecurity share a number of common elements as staff go through the planning stages of pre-visit, site-visit and post-visit.

Basic, Routine, and Enhanced Biosecurity levels build upon a common foundation of elements/procedures for conducting ambulatory visits which can be separated into three phases:

1) **Pre-visit: Preparation and Planning**
2) **Site Visit: Entry Procedures, Within Site Procedures, and Exit Procedures**
3) **Post Visit Activities**

CFIA Basic, Routine and Enhanced levels are described below and have been modified to be applicable to veterinary practitioners.

Basic Biosecurity measures may be employed for:

- Visiting the offices/personal residences of livestock and poultry producers or agricultural facilities (auction sites, semen centres, feedlots, etc.) when there will be no contact with animals or their housing areas.
  - ✓ If staff must transit through areas which may be a source of disease agents or which may be affected by disease agents (animal housing areas, premises controlled access areas, laboratories, carcass disposal areas, etc.), routine or enhanced procedures must be used.

Routine Biosecurity measures:

- Are the standard (day to day) procedures required for entering sites where livestock and poultry are housed and/or contact with these animals is necessary or likely to occur?
- Should be employed when entering controlled areas (Controlled and Restricted Access zones if present) and transiting areas used for housing animals, storing animal inputs (feed, bedding), and disposal areas (manure and mortality).

Enhanced Biosecurity measures:

- Are employed when heightened bioexclusion and/or biocontainment is required when visiting pathogen free facilities, artificial insemination centers, breeding facilities or when there is the suspicion of a serious non reportable disease on a site or in the industry.
- Are frequently established by the facility and include additional transition procedures to create a break between the external (dirty environment) and the inside area housing animals (clean environment).

If disease is suspected, securing the site and controlling movement is fundamental to minimizing disease transmission

Access Management...a summary

- Post biosecurity signs at main and rear or side entry and exits; at access points of "staff only" areas, and at pre-entry locations leading to animal housing, which may include kennel rooms, boarding areas, isolation, quarantine, outdoor runs etc.
- Establish visitor parking away from animal housing/handling areas
- Establish and identify parking for ambulatory/field service vehicles
- Post biosecurity signs at the borders of all control zones reminding producers, staff and visitors that standards are on place.
- Provide a transition zone outside of an isolation zone
- Clean and disinfect equipment as it moves between zones
- Consider the vaccination status of outpatients and inpatients to help identify who is at risk of contracting disease and who presents a risk of transmitting disease to patients and/or VHCWs
- Implement protocols to assist staff in planning patient movements

Animal Health Management

Animal health management. The second basic principle of biosecurity – one the veterinary profession most intimately aligns itself with - is associated with management of animal health programs that limit the risk of either introducing disease or transmission of endemic disease between animals, premises, operational units, geographical areas, generations of animals and animal species including humans. Within the setting of an intensive livestock operation, preventative animal health programs are paramount. The source of replacements, processing and isolation protocols, treatment and vaccination regimes and disease surveillance are important components of managing animal health. Managing animal health programs can be disease specific or general in nature. Controlling respiratory disease in a feedlot, PRRS in swine herds, coccidiosis in broiler flocks or Johne's disease in a dairy herd contain elements of both. Animal health programs can be tailored to specific operational units like the calf rearing area of a dairy operation or the foaling shed of a brood mare operation. Managing animal health overall, cannot be disentangled from on-farm food safety programs, animal welfare initiatives and good production practices.

Managing animal health programs in a companion animal practice or a clinic providing service to a race track face similar challenges. Vaccination, for example, a critical component of reducing the day-to-day risk of contracting disease outside the clinic also becomes a part of reducing disease risk as patients seek veterinary services.

By their very nature, clinics are places where "sick" animals come to for care, and as such, can be potential sources of disease for the naive from the point they walk through the waiting room door, or temporarily reside in a clinical ward. Animal patients can be indirectly and inadvertently exposed to new diseases by clinic staff that has failed to wash hands or change soiled clothing between patients.

Biosecurity programs help direct how a wide variety of infectious diseases are managed within a veterinary facility and precautions prescribed by level of risk involved. Biosecurity programs curtail unintended error and potential exposure to legal liability for the veterinary practice entity.

There are potential issues of zoonotic disease risks for staff and clients that clinic employees must be aware of and prepared to address with pet owners.

Veterinary clinic staff must not only be stewards of preventing risks associated with transmission of common infectious diseases affecting animals under their purview, they must also assume the important role of teachers and technology transfer to clients. Assumption of these roles evolves through understanding and practicing sound biosecurity measures. It's mostly about doing the simple things right every day as individuals on an animal health care team.

Here is a list of some of the protocols you will find on the ABVMA Biosecurity website; many have been adapted, with permission, from the Western College of Veterinary Medicine's Infection Control Manuals.

- Patients presenting with or at risk of acquiring gastrointestinal infections
- Patients presenting with respiratory infection (aerosol spread)
- Patients presenting with multiple drug-resistant infections
- Patients suspected/confirmed of having blastomycosis with no fistulating wound
- Patients suspected/confirmed of having blastomycosis with fistulating wound
- Patients considered naïve animals
- Patients suspected/confirmed of FeLV and/or FIV
- Patients suspected of having Rabies
- Protocol for veterinary staff exposed to rabies
- Protocols and considerations for exotics and wildlife including reptiles, avian species, parrot species, rodents, bats, wild birds (including information about avian influenza), wild mammals (including information about rabies.
- Calves and small ruminants with history or clinical signs suggestive of contagious enteric or respiratory disease
- Large ruminants with history or clinical signs suggestive of contagious enteric or respiratory disease
- Equine patients presenting with or at risk of acquiring gastrointestinal infections (fecal-oral route)
- Equine patients presenting respiratory infection (aerosol spread)
- Foals
- Patients presenting with possible equine infectious anemia
- Equine patients presenting with multiple drug-resistant infections
- Other measures determined by you and the client.

Animal Health Management:

Plan patient movements

Implement patient handling/ movement protocols (see ABVMA website for examples)

Plan ambulatory visits to mitigate the disease transmission risks. Use basic, routine or enhanced protocols as appropriate.

Establish a disease/disaster response plan

Operational Management

There are many day-to-day responsibilities within the operation of a veterinary practice that do not fall directly under access management and/or animal health management, but still impact biosecurity. Things like dress codes, Occupational Health and Safety considerations, routine maintenance, cleaning and disinfection, lunch and coffee room protocols, laundry, general hygiene, disposal of sharps and protective clothing all need to be addressed in a biosecurity program.

In an agriculture setting, managing feed supplies, managing pharmaceuticals and vaccines, farm maintenance, livestock transportation and handling dead stock are a few items that impact biosecurity, but not always considered a part of biosecurity.

While the three pillars of biosecurity will be referred to a number of times throughout *Biosecurity in Practice*, none of the three should be considered mutually exclusive. A person cannot address access control without considering the impact it has on operations. Likewise, animal health management in livestock operations cannot be addressed without overlapping practices associated with managing things like feed supplies and procurement of pharmaceuticals.

Designing and implementing biosecurity programs is about doing the simple things right all the time. For most involved in veterinary practice, biosecurity practices are quite intuitive. However, we sometimes forget that we only mange things well that we constantly measure. Measuring the small, important things that make biosecurity work is sometimes easier if viewed as components under one of the three pillars.

For information on carcass disposal for large animals, review Chapter 8: Beneficial Management Practices published by Alberta Rural and Agricultural Development[21])

Carcass Disposal

Veterinary HCWs should plan and control the disposal of deceased patients and carcasses according to municipal and provincial regulations. Carcasses should be disposed of in a timely manner.

- Always follow manufacturer's directions and use correct dilutions when using commercial cleaning and disinfection products)
- Cleaning and Disinfection requires a protocol just as vaccination and medication programs
- Cleaning is the removal of dirt (organic material) that can protect or carry pathogenic organisms. Organic material significantly reduces the activity of disinfectants; clean surfaces first!
- Use the correct dilution of chosen disinfectant. Disinfectants work best at approved levels. More is not necessarily better.
- Remember disinfectants require contact/exposure time. Read the manufacturer's direction to determine the appropriate time for the concentration being used. Rinse if needed.

[21] Chapter 8: Farmstead Waste Management, Beneficial Management Practices: Environmental Manual for Alberta Farmsteads; http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex11159/$file/Chapter8.pdf?OpenElement

Hygiene:
Keep the premises, equipment and vehicles clean

Buildings, equipment and vehicles should be cleaned regularly to prevent the spread and recycling of disease. This is a cornerstone of any effective veterinary biosecurity program.

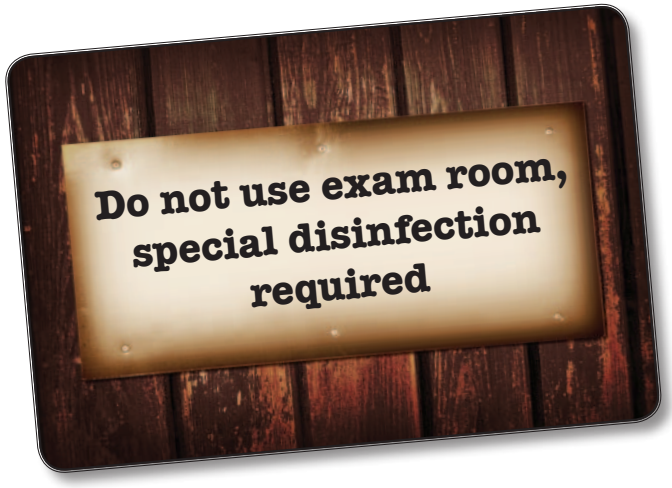
Sample Cleaning and Disinfection Protocols

These protocols are available on the ABVMA Biosecurity website for you to download and customize to your practice.

Small Animal Kennel Cleaning Protocol

1. The animal, all bedding materials, toys, and all food and water bowls must be removed from the kennel for disinfection to take place
2. Remove gross contamination from kennel, including doors, all walls, top and floor.
3. Wash all surfaces with detergent (Sunlight, Dove, Ivory solution etc.). Use clothes such as J-clothes, a new one for each kennel.
4. Rinse and wipe dry with clean rag or paper towel.
5. Spray with disinfectant (e.g. Virkon 1%, 1:16 Peroxigard) and wait the amount of time based on manufacturer's instruction (e.g. Virkon, 15 minutes).
6. Wipe kennel down to remove as much of the chemical as possible (only after contact time has elapsed).
7. Allow to dry.
8. Place the animal back in the kennel with appropriate bedding or kennel is now ready for next patient.

In the event an animal is confirmed as having an infectious or contagious disease, place a **"DO NOT USE, SPECIAL CLEANING REQUIRED"** sign on the kennel and follow *Isolation Protocols for cleaning/disinfecting.*



Patients being fed a raw diet should have their dishes cleaned and disinfected immediately following completion of every meal. Identify bowls/dishes specifically for their use while in hospital care.

Cleaning and Disinfecting Bowls, Dishes and Toys Protocol

These items should be washed and disinfected on a daily basis. Patients being fed a wet diet may require more frequent washing.

1. Using a warm water detergent solution (Sunlight, Ivory etc.) scrub and wipe out item.
2. Rinse.
3. Disinfect with appropriate disinfectant and ensure contact time is met. (Virkon 1%; Peroxigard 1:16; 10% household bleach)
4. Rinse before returning to animal or storage so it is ready for use.
5. Store in covered non porous container.

Large Animal Temporary Housing and Handling Areas Cleaning and Disinfection Protocol

This protocol may be applied to chute system, rails, chutes, equine stalls, stocks, hydraulic squeeze, walls, doors and floors to clean and disinfect.

1. Assign staff member/position will ensure that the large animal ward will be maintained in a state of cleanliness prior to and following housing animals and/or any procedures completed in such facility.

2. The floors will initially be scooped and free of fecal material. Fecal material will be transported by wheel barrel to identify area where uncontaminated animal waste is to be deposited; ideally compost area. Floors may also be swept if applicable.
3. The animal housing/treatment area such as chute system, rails, chutes, or equine stalls, stocks and walls, doors and floors should be sprayed and cleaned using a dilution device such as a Hydrofoamer with hot water and detergent (such as Nutrafoam, which is a neutral pH detergent). The area will be generally scrubbed and washed and free from any gross contaminant.
4. The ward should be left to dry. If area use is continuing within the same day, the area should be squeegeed in order to remove as much water as possible.
5. The following day, after drying – the ward will be completely covered in disinfectant solution (such as Virkon 1%), which is a broad spectrum disinfectant (virucidal, bactericidal and fungicidal activity); also using a dilution device, such as a Hydrofoamer, and then allowed to dry before using for another patient/procedure.
6. If time does not allow for complete drying before applying disinfectant solution, squeegee as much water as possible to the drain; apply disinfectant and allow a minimum contact time according to manufacturer's directions. (Virkon 15 minutes) After this, if the area is needed; the Virkon may then be squeegeed off.
7. **Once a month** the ward should be cleaned with an acid de-scaling detergent such as Biofoam.

Biosecurity ALERT Protocol–Exam Rooms and Animal Handling Areas

This protocol can be used in an examination area/room in the event a patient was examined and sent home or to isolation. If a **contagious infectious disease is suspected** based on history, physical examination, and evaluation of previously performed laboratory work:

1. Close off exam room
2. Place a **"Do not use exam room, special disinfection required"** sign (make laminated copies available in all exam rooms).
3. **Notify Biosecurity Officer of the suspected agent** and **do not use the room** until an AHT has removed the sign indicating adequate cleaning/disinfection has occurred.
4. Clean and disinfect the exam room, all surfaces and equipment used for that patient according to the isolation protocol.

   a. Including wearing disposable booties, gloves and gowns while cleaning.
5. Following disinfection, staff member should change into clothes/scrubs and the dirty ones be treated as Isolation laundry.

Exam room may be used when dry from rinsing (if rinsing required).

The following protocols (and more) are available for download and customization on the ABVMA Biosecurity website:

- Hand Washing Procedure
- Public Entrance to the Veterinary Clinic and Reception Area
- Staff Entrance to the Veterinary Clinic
- Staff Offices and Staff Room
- Exiting the Veterinary Clinic
- Routine Surgery Sanitation: Protocol
- Surgery Sanitation Following Exposure Protocol
- Surgical Equipment Cleaning Protocol
- Radiology Equipment Sanitation Protocol
- High Risk Infectious Patients Considerations
- Small Animal kennel cleaning Protocol
- Cleaning and Disinfecting Bowls, Dishes and Toys Protocol
- Kennel Room/Ward Cleaning Protocol
- Large Animal Temporary Housing and Handling Areas Cleaning and Disinfection Protocol
- Small Animal Examination Biosafety
- Large Animal Examination Biosafety Recommendations
- Biosecurity ALERT—Exam Rooms and Areas Cleaning and Disinfection Protocol

- General Hygiene/Cleanliness For Large Animal Handling
- Attire/hygiene for receiving Large Animal Patients
- Large Animal Outpatient Receiving
- Preparing Small Animal Isolation Protocol
- Isolation Anteroom Stock List
- Exiting Small Animal Isolation Protocol
- Cleaning Upon Discharge of Patient Protocol
- Isolation Laundry Protocol
- Visitors to Isolation Policy
- Preparing LA isolation for a patient Protocol
- Large Animal Isolation Ward Cleaning and Disinfection Protocol
- Return to main hospital facility Protocol
- Exiting Large Animal Isolation Protocol

Have a written biosecurity plan with protocols that is reviewed and updated regularly.

Ensure that new employees receive proper training and training materials so they can continue to follow the plan.

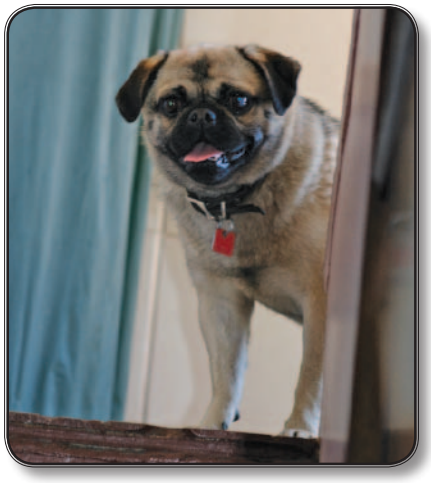
Develop a clinic routine of practicing or reviewing specific biosecurity protocols at staff meetings to ensure everyone is clear on the why, what, where and when of your biosecurity program.

Control pests and clinic pets

Ensure a pest management program is in place to prevent the spread of disease. This area of Operational Management will vary widely depending on the veterinary facility and animal production operation. Poultry and swine industries have strict standards for pest management and recommend a “no pets policy”.

The following are some considerations for a pest management program:

1. Build rodent proof facilities, kennel rooms and barns
2. Schedule regular inspections of premises for signs of pests
3. Use bait stations and eliminate breeding and harborage areas for insects and rodents
4. Keep the Controlled Access Zone clean, free of debris and, ideally, void of vegetation. A strip of gravel or crushed rock makes the area unattractive to rodents
5. Clean up feed spills immediately to eliminate food sources for rodents
6. Keep blankets and bedding in covered rodent proof containers to avoid establishing areas that may become nesting sites
7. Document your Pest Control Program as it is an important part of your biosecurity program. Have clear protocols for the use of bait stations.



Clinic Pet Recommendations

Clinic pets have several purposes. Some practices might use them as blood donors, therapy for clients, or just a welcoming face. But the reality is, they also present a significant disease transmission risk to our clients and their patients; both as outpatients and as inpatients.

Ideally, veterinary practices and facilities should not have clinic pets or allow staff to bring pets to the facility.

In the event the practice does either or both, the ABVMA advises you follow the below policy:

- Clinic and staff pets must be restrained at all times.
- Clinic and staff pets will have no contact with clients or patients unless a specific need arises. In such a case, prior to the interaction, the Biosecurity Officer will:
  - ✓ Identify risks
  - ✓ Implement hazard controls if necessary
  - ✓ Oversee the interaction
  - ✓ Follow up with the client to ensure no incidence of injury or disease transmission occurred
- Clinic pets will be vaccinated annually, or as recommended by the DVM responsible for the pet's care, to protect the pet and any patients it may come into contact with

Staff pets will be kept current on vaccines and parasite control (including fleas) at the recommendation of their veterinarian

Be sure to include clinic pets or staff pets when you do a risk assessment and hazard control tour for the veterinary facility. Clearly identify the risks they present (both disease and injury to patients and clients) and identify controls that will minimize the risk they present.

Here are some more examples of protocols that would fall under the Operational biosecurity pillar.

Day to Day Vehicle Cleaning Following an Ambulatory Call

Vehicles should be cleaned after farm site visits. The degree of cleaning depends on the degree of contamination and degree of risk posed by the inspection activities. However, veterinary staff should assume a level of risk for all site premises visits and as a minimum:

Exterior of Vehicle

- ☑ Should be visibly clean with no accumulation of organic debris.
- ☑ Pay particular attention to the chassis, wheel wells and tires.
- ☑ If small accumulations of debris are present:
  - ☛ Cleaning with a stiff handled brush and disinfection with a hand sprayer may be sufficient.
- ☑ If visibly dirty or if staff have attended a site with suspect disease:
  - ☛ Wash vehicle at a commercial car wash or use a pressure washer or scrub brush and hose.
  - ☛ Use hot water and detergents
  - ☛ Wash the exterior chassis surfaces, tires, wheel wells and rims, the step plates and any boot brush and access area, and if possible the undercarriage
  - ☛ If a pickup truck or cube van, wash the box including floor and sides and any external storage compartment(s)

Visit the ABVMA Biosecurity website to download and customize this protocol for your practice.)

Inside of Vehicle:

- ☑ Floor mats should be visibly clean.
- ☑ Spray or wipe down with a disinfectant floor mats and steering wheels.
- ☑ Trunks or Truck beds should be visibly clean and wipe down with disinfectant any areas where dirty equipment was placed.
- ☑ If visibly dirty or if staff have attended a site with suspect disease:

☛ Remove rubber floor mats and clean with pressure washer. Disinfect and allow to dry.

☛ Vacuum seats, floors and trunk, removing any bins or equipment.

☛ Wipe the steering wheel with water and detergent, or a disinfectant wipe

☛ Brush or wipe down with water and detergent the seat (seat covering?), pedals, door handle, control panel(s) and radio/telephone. Disinfect and allow to dry (disinfectant wipes or sprays or solutions). If the surfaces are visibly clean, dry and wet cleaning prior to disinfection may not be necessary.

Operational Management... a summary

- Properly store and dispose of deadstock
- Use Personal Protective Equipment as identified in protocols or clinic policy
- Make medically engineered sharps available to minimize needle stick injuries
- Keep the veterinary facilities, equipment and vehicles clean
- Document a pest control program
- Control clinic and staff pets to eliminate disease and injury risks
- Use antimicrobials and other pharmaceuticals responsibly
- Plan, train and communicate your biosecurity program to maximize staff, patient and client safety

Common Principles of Effective Biosecurity Programs

Infection prevention and disease control principles that guide development of all procedures described in this document help prevent disease transmission from staff to patient, patient to patient, patient to staff and staff to staff. Principles that become a part of **all biosecurity programs** include:

1. Optimal hygiene through application of standard precautions including hand washing, proper attire and barrier protection. Other basic precautions include minimizing unnecessary contact with patients, appropriate disposal of infectious materials and proper cleaning and disinfection.
2. Disruption of transmission cycles by effective use of hygiene protocols that encompass understanding routes of disease transmission and creating barriers for direct and indirect transmission of infectious agents for patients with differing risks. Consideration of disease transmission cycles within a clinic setting involves detailed examination of factors like traffic patterns and housing of patients, as well as traffic patterns of personnel and students and guests within the veterinary facility.
3. Target and refine infection prevention and control procedures through surveillance and other investigative procedures.
4. Enhance education and awareness regarding nosocomial and zoonotic disease risks through optimizing communication about the purpose for these guidelines and procedures.

VPE[22] Biosecurity Pillars – A Review

This table summarizes the key recommendations for effective biosecurity programs in Alberta. For specific insight into each point, refer back to the contents of this guide.

Access Management	Animal Health Management	Operational Management
• Understand your patient's and facilities risk factors • Control access to your facility, facility areas and patients at critical points • Provide transition zones for staff • Manage staff and visitors' risk • Plan patient movements to minimize introduction, transmission or recycling of disease	• Plan ambulatory visits to minimize risks • Wash hands prior to and following all animal contact • Establish a disease/ disaster response plan	• Clean and disinfect equipment • Use PPE and cleaning and disinfection protocols • Control clinic and staff pets • Document a pest control program • Use pharmaceuticals responsibly • Follow Best Practices for handling biomedical waste • Communicate your biosecurity program clearly and effectively

[22] VPE Veterinary Practice Entity; as used in the ABVMA PIPS Bylaws

Report, Measure and Improve

A process should be created to monitor the biosecurity procedures and provide feedback to the designated Biosecurity Officer. Some clinics may choose to maintain an active surveillance system in which environmental and patient samples are collected for routine bacterial isolation and identification. Samples could be routinely collected from large animal patients, equine patients, and other animals that are considered to be at high risk for shedding pathogenic bacteria. In addition, the program collects and maintains records of bacterial isolates and any identified nosocomial spread of disease. Corrective measures are based on analysis of the data collected.

Measuring also includes reporting incidents of workplace accidents, possible nosocomial infections and occurrences of zoonotic disease. Regular review of these reports will help the biosecurity officer determine if the overall biosecurity program is effective and a step forward in making recommendations for improvement.

Review and Train

Orientation of new staff, students and volunteers

Biosecurity programs are only as effective as the commitment of the people in the workplace. Therefore, training staff is critical to ensure the biosecurity program remains intact and effective.

This guide is an excellent place for a new staff person to start. It will give staff of all levels of education and experience a solid base of knowledge to understand why disease prevention and control strategies in the veterinary workplace are vital.

Once the biosecurity team has documented the practice's biosecurity program, present it to new staff once they have read this manual.

Conduct Regular Staff Training

Staff training serves many purposes. Training specific to biosecurity helps:

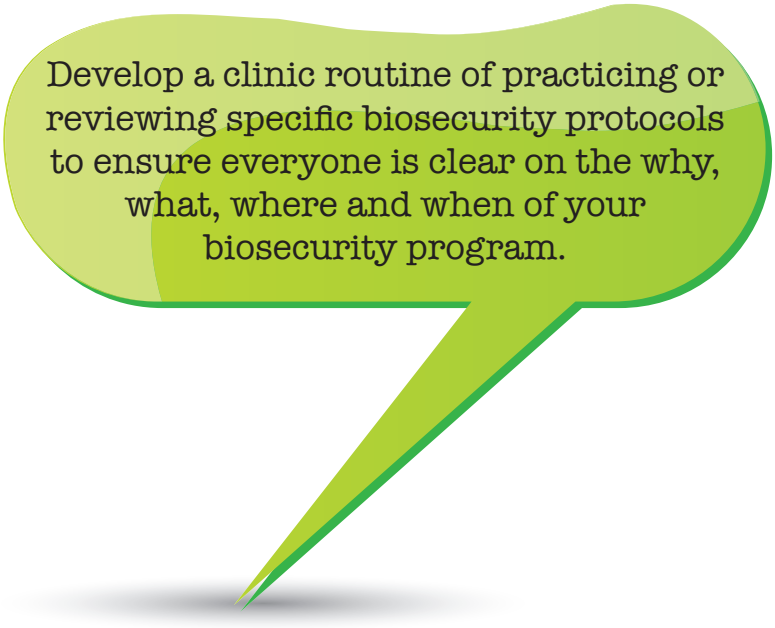
- Orient new staff
- Encourage buy-in and compliance with existing programs
- Identify areas where improvement or change may be needed
- Clarify expectations to ensure effective program and protocol completion by all staff members
- Revisit outcomes and goals of biosecurity programs

Routinely reviewing biosecurity protocols at staff meetings is a way of adding value to regular meetings. VHCWs are engaged in the process of implementing and reviewing protocols and this in turn yields higher compliance.

Have a written biosecurity plan with protocols that are reviewed and updated regularly.

Ensure that new employees receive proper training and training materials so they can follow the plan.

Develop a clinic routine of practicing or reviewing specific biosecurity protocols at staff meetings to ensure everyone is clear on the why, what, where and when of your biosecurity program.



Biosecurity and Clients

Biosecurity and Clients

Toward National Standards

The Canadian Food Inspection Agency (CFIA), provincial governments and participating commodity organizations have recognized the need for and, for a number of years, invited effort to establish a consistent and standardized approach to managing disease risk in food producing animals. National biosecurity standards would facilitate advancement in industry's knowledge of risks associated with pathogens and ultimately increase awareness and adoption of biosecurity measures at the farm level.

Advisory groups were established by the various sectors to guide development of voluntary National Farm-Level Biosecurity Standards for each commodity. One of the first jobs of each advisory group was establishment of a national benchmarking exercise to identify potential gaps in current disease control within the sector, the level of biosecurity awareness and best practices currently in place.

National Farm-Level Biosecurity Standards have always been considered a complement to existing farm-level programs associated with food safety and quality assurance.

The commodities that first participated in developing national standards included the poultry industry (complete), swine industry (complete), cattle and dairy industry, and the potato industry.

Funding to develop voluntary standards has been provided under the Growing Forward Agricultural Policy Framework. National on-farm biosecurity standards and companion guidance documents formed the basis of comprehensive, voluntary biosecurity programs for owners or managers in food producing sectors across Canada.

The role of individual provinces was the development of programs to help producers implement biosecurity measures.

For poultry, the Standard and associated producer guide are designed as a tool for all people and businesses handling and keeping poultry, including large-scale supply-managed producers, backyard flock owners and other domestic bird keepers. Farm-specific biosecurity protocols were important for segments of the industry that do not participate in a provincial association or On-Farm Food Safety (OFFS) program (such as the non-regulated commercial and non-commercial sectors). They have also been designed to be complementary with existing on-farm programs. OFFS programs developed by industry formally address many of the elements of biosecurity and will be the primary avenue for implementation where OFFS programs exist.

The *National Avian On-Farm Biosecurity Standard* has been organized into three sections representing the foundations of a smoothly operating biosecurity system. These are defined as:

- **Access Management**
- **Animal Health Management**
- **Operational Management**

For the swine industry, the Canadian Swine Health Board led the charge on establishing national biosecurity standards. Funded by Agriculture and Agri-Food Canada, the Canadian Swine Health Board (CSHB) was formed in 2008 as a national organization with the mission 'to provide leadership and coordination in support of the management of the health of the Canadian swine herd. The Board of the CSHB includes representation from the Canadian Pork Council, the Canadian Association of Swine Veterinarians, and the Canadian Centre for Swine Improvement Inc., the Canadian Meat Council, and The Veterinary Colleges of Canada.

Four key components were identified to support the establishment of a structured disease response plan for the Canadian pork sector: Biosecurity, Research, Long Term Disease Risk Management, and Sustainability.

Within the Biosecurity pillar, the development and implementation of the *National Swine Farm-Level Biosecurity Standard* and related best management practices are an important first step. The *National Swine Farm-Level Biosecurity Standard* has been published. The user guide outlining best management practices is being developed.

General principles incorporated in the pork industry standard include:

1. **Segregation:** The application of barriers (physical barriers, temporal separation of activities, and procedures) to limit risk of pathogens from infected animals and from contaminated materials from entering an uninfected site or group of animals.
2. **Sanitation:** Described as cleaning and washing to remove visible organic material, disinfecting and drying; all to reduce and/or inactivate pathogens.
3. **Flow Management:** The actions taken to prevent the cross-contamination of uninfected pigs by organizing the flow of pigs, people and materials within a farm or a production system.
4. **Records:** While not a biosecurity principle in itself, documentation is required to support the application of BMPs, training and compliance with biosecurity protocols. A verification process may be performed by internal or external inspection or by an independent third-party audit and is important to confirm that biosecurity best management practices are applied.
5. **Biosecurity Planning and Training:** Every farm or production system should have a written plan documenting its biosecurity protocols. Appropriate education, training, and compliance strategies should be utilized.

The CFIA Biosecurity Standards and Guidance documents can be accessed at the following sites. Updates will be added as new information becomes available.

Poultry: http://www.inspection.gc.ca/english/anima/biosec/aviafrme.shtml
Swine: http://www.swinehealth.ca/CSHB_Biosecurity_StandardE.pdf

Education

Biosecurity is not a new or emerging concept. Putting preventive measures in place to keep animals healthy has been a long-standing and successful practice on Canadian farms. Disease prevention has always been based on biosecurity practices specific to risk, resources and producer commitment. The catchword "biosecurity" or "biosafety" reflects the changing climate of animal production. The potential risk of introducing disease and the economic devastation that follows due to producer losses and disruption of trade increases with agriculture intensification and mobility of animals, people and products.

A biosecurity plan should address how producers and staff manage farm-level access of animals, vehicles and people, animal health and operations overall.

By coaching clients and their staff on sound biosecurity practices, veterinarians fill an important role in maintaining the health and economic viability of agriculture enterprises.

Intensive livestock operations, mobility of animals and animal products and global mobility of people means the potential loss from a disease outbreak can be devastating to local producers, local and international consumer attitudes and international trade routes. The potential risk of introducing disease and the economic devastation that follows due to producer losses and disruption of trade increases with agriculture intensification and mobility of animals, people and products.

Many of the same principles apply to developing biosecurity plans for a veterinary facility as they do for a biosecurity plan on-farm. For example:

The University of Minnesota approach to risk-assessment and biosecurity planning for dairy herds includes the following steps:

1. **Identify the goals of the dairy operation:** This relates to the products sold now and in the future (milk, dairy beef, calves heifers, milk cows, embryos, semen) and how long the dairy plans to operate.
2. **Identify and prioritize the key hazards on each operation in relation to the goals:** This involves identifying the infectious diseases most likely to threaten the operation.
3. **Evaluate key methods of transmission of important pathogens** (e.g. understand incubation periods, duration of clinical disease, duration of shedding, survival or growth in the environment).
4. **Evaluate potential methods of pathogen control and changes** necessary to implement an effective biosecurity program. The benefits of controlling risks must be weighed against the costs and managerial difficulty of such a program.

Program Development

Developing a comprehensive and realistic biosecurity plan is a step by step process. There are different approaches producers and veterinarians may employ, but the core principles of goal setting, risk assessment, protocol development and implementation strategies remain constant. The basic steps:

1. Establish the biosecurity team
2. Identify outcomes and goals
3. Perform a risk assessment
4. Develop and implement protocols, best management practices and operations based on the three pillars of biosecurity (Access, Animal Health and Operational Management)
5. Measure, review, improve and train

One process that may be used by clients to develop their own biosecurity program is:

1. Establish the biosecurity team
2. Identify outcomes and goals
3. Perform a risk assessment
4. Develop and implement protocols, best management practices and operations
5. Measure, review, improve

Core principles outlined on the following pages apply to a variety of situations. Whether the client operates a boarding kennel, participated in animal rescue, raises sheep, owns a stable, lives on a hobby farm or owns and operates a commercial livestock business, benefits are accrued from a well planned and written biosecurity program.

Step 1: Establish the biosecurity team

A client's biosecurity team may be made up of several people. The client should consider what skills, knowledge and value do possible members bring to the team. Who has a vested interest in the health and safety of their animals?

Client: The client will be the primary member of the team. They should provide information to the rest of the team, lead discussion and make decisions about policies, procedures, protocols or best management practices to implement.

Staff: Staff involvement in the biosecurity team increases buy-in of the people who will be instrumental in the effectiveness of any biosecurity program that is implemented. They have valuable input to what is realistic, attainable and relevant to the animal health and safety of any particular operation.

Veterinarian: Provides guidance and information about specific animal disease risks and mitigation strategies.

Animal Health Technologist: Supports the veterinarian and client through the process. The RAHT may work with the producer to complete a risk assessment, review a risk assessment completed by the client and present information and preliminary recommendations to the client and veterinarian, assist with protocol development, and/or participate in regular reviews of established programs.

Step 2: Identify outcomes and goals

Work with clients to answer two questions:

1. Why are we doing this?
2. What will be different after developing and implementing a biosecurity program?

Those two questions will help clients to identify what they want to accomplish in this process and provide milestones to measure success.

Step 3: Risk Assessment

At a farm or ranch level, biosecurity programs are built on identifying health risks each herd faces and then identifies the most important, practical, and cost effective actions that can be taken to minimize those risks in that herd[23] . The same principle may be applied to companion animal operations. Clients should perform a risk assessment to identify what and where there exists risk in disease transmission and spread. A veterinarian may participate to help decide which diseases need to be addressed, and the most effective, cost-efficient way to do this.

Clients should begin by targeting key management areas. Once management of these areas is being done well, the program could then be expanded if necessary.

Once risk assessment is complete, the biosecurity team can plan and then implement a biosecurity program. It is important that the final plan be documented and communicated to all members of the management team. Following implementation of the biosecurity plan, a monitoring or surveillance step will help evaluate the plan's effectiveness and identify new or emerging issues. This requires accurate diagnosis of diseases and good records. In the ideal system, any animal that dies would undergo a necropsy to confirm the cause of death. The biosecurity program should be reviewed at least annually, if not every 6 months initially, and expanded or modified as needed.

Veterinarians and clients designing biosecurity programs for their herds, flocks, packs etc. can take advantage of risk assessment tools developed utilized by other groups. For example: the University of Vermont in cooperation with the USDA developed a web page highlighting a logical and stepwise approach to risk-assessment and biosecurity planning: *Visitor Biosecurity : Healthy Farms - Healthy Agriculture ...> Farm Assessment and Biosecurity Planning.* Julie Smith, "Healthy Farms Healthy Agriculture- Farm Assessment and Biosecurity Planning," University of Vermont. Last modified march 16 2011.

http://www.uvm.edu/~ascibios/

The Website provides an excellent overview of on-farm biosecurity practices.

Risk Assessment Chart for Horse Owners/Equine Facility Operators

The following Risk Assessment Chart has been adapted from the general Risk Assessment Chart developed by the Ontario Veterinary Medical Association as part of their Biosecurity Initiative. It has been adapted for horse owners and equine facility operators in Alberta to help identify risk factors associated with premise design and layout, herd demographics and traffic patterns to help pinpoint areas critical to disease control and prevention. The questionnaire can be adapted to other species.

Completed risk assessments are necessary tools for use by veterinarians and the biosecurity team. They guide biosecurity protocol development based on risk.

The horse owner risk assessment survey is separated into 5 sections:

1. Animal Risk Factors
2. Feed and Water Risk Factors
3. Owner and Employee Risk Factors
4. Visitor and Facility Users Risk Factors
5. Premise Risk Factors

Each section provides an opportunity for owners to examine current disease control practices and where gaps exist that pose a threat client's animals.

[23] Developing Biosecurity Programs for Dairy Herds, S. Godden, S. Stewart, P. Rapnicki, J. Fetrow, S. Wells, J. Schefers, Dept of Veterinary Population Medicine, College of Veterinary Medicine, 225 VMC, 1365 Gartner Ave., St. Paul MN 55108
Email: godde002@umn.edu.

Equine Risk Assessment Charts[24]

Section A: Animal Risk Factors				
Do you:	YES / Always	Some-times	NO / Never	Comments / Action Points
Operate as a closed herd?				
If no, do you:				
Isolate new horses for 2-3 weeks?				
Identify zones that are closed to public access?				
Breed by live cover?				
Breed by Artificial Insemination (AI)?				
Test all breeding specimens, either studs or semen, for Contagious Equine Metritis (CEM)?				
Isolate new horses for 2-3 weeks?				
Isolate clinically sick animals?				
Use separate pens for foaling and sick animals? If yes:				
Clean and disinfect foaling pens between births?				
Clean and disinfect sick pens/crates between animals?				
Follow a veterinarian reviewed vaccination program against specific diseases of concern? If yes:				
Vaccine program documented?				
Require all boarders/leases to comply with the vaccine policy?				
Require all facility users to comply with vaccination policy?				
Have a health record for each animal? If yes:				
Document medications, vaccines and dewormer given, when and by whom?				
Record normal vitals for each horse (HR, RR, Temp)				

[24] Adapted from the Ontario Veterinary Medical Association Biosecurity Initiative Final Report

Do you:	YES / Always	Some-times	NO / Never	Comments / Action Points
Document all incidences of horse illness to monitor for trends?				
Follow a veterinarian reviewed dewormer program? If yes:				
Document dewormer program?				
Have effectiveness of deworming policy tested regularly with fecal floats?				
Require all boarder/leases to comply with the deworming program?				

Section B: Feed and Water Risk Factors				
Do you:	YES / Always	Some-times	NO / Never	Comments / Action Points
Take measures to ensure that the main feed supply cannot be contaminated with manure?				
Restrict manure application to field crops?				
Take measures to limit exposure of feed supply to rodents, pets and/or wildlife?				
Clean and disinfect waters between horses or herds?				
Practice sanitation to minimize contamination of livestock waters by manure and/or urine?				
Is the source of livestock drinking water:				
Untreated surface water?				
Ground water?				
Treated surface water?				
Municipal water?				

Section C: Owner and Employee Risk Factors				
Do you:	YES / Always	Some-times	NO / Never	Comments / Action Points
Work with animals youngest to oldest?				
Work with horses from healthy to sick?				
Clean and disinfect equipment between animals or groups of animals housed separately?				
Use equipment for single purposes? E.g. shovel for manure, different one for clean bedding				
Change, disinfect boots or use disposable boot covers boots when working with neonate foals?				
Put on or change outwear and footwear before working with horses in isolation, sick pens or quarantine?				
Change to clean outwear and disinfect footwear after working with horses in isolation, sick pens or quarantine?				
Wear footwear and outerwear specific to that barn/stable/facility?				
Have access to or know where the barn/stable/facility is biosecurity protocols are documented?				
Understand and comply with the biosecurity protocols?				

Section D: Facility User and Visitor Risk Factors				
Do you:	YES / Always	Some-times	NO / Never	Comments / Action Points
Have a visitor log book in plain view of the main entrance that would be used by visitors?				
Require all visitors to sign the visitor log at each visit?				
Post biosecurity protocols in plain sight for visitors to read understand and follow?				
Have posted protocols that include a name and contact information for visitors to be directed to for clarification?				
Restrict visitors from entering the barn and outbuildings prior to contacting management?				
Provide hand washing stations?				
Provide visitors and farm service workers with clean boots, and/or outwear?				
Have a designated, signed parking area for visitors, visiting trailers and employees?				
Post a diagram of farm/barn layout clearly identifying access zones?				
Have access to or know where the barn/stable/facility is biosecurity protocols are documented?				
Understand and comply with the biosecurity protocols?				

Section E: Premise Risk Factors				
Do you:	YES / Always	Some-times	NO / Never	Comments / Action Points
Keep animals from different sites or zones separate at all times?				
Prevent uncontrolled pets from accessing barns and stalls?				
Return animals to the farm that have left the premise? If yes:				
Isolate those animals on return?				
Ensure they are fully vaccinated?				
Ensure any horses that may come into contact with them are compliant to the vaccine policy?				
Clean and disinfect truck and trailer after returning?				
Have regularly positioned and maintained hand washing stations?				
Soap and water?				
Waterless hand washing agents?				
Encourage hand washing between animal contacts?				
Make available and maintain boot washes?				
Near main entrances?				
Outside isolation stalls/pens?				
Outside quarantine stalls/pens?				
Outside foaling stalls/pens?				
Have a documented pest control program especially to limit flies in facilities and on horses?				
Identify one halter and lead rope per horse? If no:				
Limit halters and lead ropes to one group of animals?				

University of Minnesota Farm Assessment/Risk Management Plan Worksheet

Another example of a farm assessment/risk management plan worksheet that might be useful to facilitate the process of developing a plan by or with a client. While the questionnaires, score cards and worksheets were designed with the dairy industry in mind they can easily be adapted to other livestock enterprises.

How well are you protecting your live assets—your livestock—from diseases currently not found on your premises? This assessment will help you find out The questions are designed to be answered from a farmer's perspective. Although they were written with a dairy farmer in mind, almost all of the questions apply across all types of livestock farms. Select the option that most closely refelcts your current farm management practices. Be honest! Record your answers on the *Farm Biosecurity Risk Assessment Score Card* to help asssess your farm's risk

Animal health, animal additions, commingling with other herds

1. Of the following practices, how many are part of your herd health program?
   - A. All 10
   - B. 8 or 9
   - C. 6 or 7
   - D. 4 or 5
   - E. Less than 4

   ❍ We follow protocols for colostrum managment.
   ❍ We follow protocols for feeding management.
   ❍ We follow protocols for forage quality and ration formulation.
   ❍ We follow protocols for manure handling (with special attention to avoiding contamination of feed alleys and feeding equipment).
   ❍ We follow protocols for stall comfort and cleanliness
   ❍ We follow protocols for air movement (cooling in summer) and ventilation (especially in winter)
   ❍ We follow protocols for milk quality monitoring
   ❍ We follow protocols for routine vaccinations
   ❍ We monitor compliance with all protocols
   ❍ We review our protocols with our veterinarian at least annually.

2. Knowing that stress reduces the ablity of animals to resist diseases, how many of the following practices do you enforce?
   - A. All 6
   - B. 5
   - C. 4
   - D. 3
   - E. 2

   ❍ We maintain a regular daily routine (e.g. of feeding and milking).
   ❍ We maintain a consistent ration (e.g. test forage dry matters regularly and after any precipitation)
   ❍ We maintain adequate nutrient levels in rations (e.g. fiber for cows)
   ❍ We minimize switching animals between groups or rations
   ❍ We minimize stacking of stressful events (e.g. multiple vaccines on the same day)
   ❍ We handle all animals calmly and quietly

3. How many of the following fation management practices do you use to maximize animal health?
   - A. All 5
   - B. 4
   - C. 3
   - D. Less than 3

   ❍ We analyze all of our forages
   ❍ We use a ration balancing program ourselves or through our nutritionist.
   ❍ We regularly monitor lameness, body condition scores, and rumnation activity (or have our veterinarian or nutritionist do this.)
   ❍ We feed a total mixed ration (TMR) and minimize the potential for ration sorting.
   ❍ We measure forage dry matters regularly and after major precipitation.

4. How well do you prevent contamination of feed by manure with equipment?
   - A. The same equipment (dump buckets or shovels) may be used for either feed or manure, but is usually cleaned in between.
   - B. The same equipment is used for both feed and manure only if cleaned well (after being contaminated by manure).
   - C. A separate bucket or skid steer is used for pushing feed and scraping manure. Shovels are dedicated to use with either feed or manure.

5. How well do you prevent contamination of feed by manure with wheel or foot traffic?
   - A. Feed delivery equipment never crosses routes contaminated by manure. People working with animals never step in feed mangers with boots contaminated with manure.
   - B. Feed and manure handling traffic is kept separate as much as possible. Pass-throughs or gates make it easy to avoid stepping in feed if entering or leaving cow pens in a freestall.
   - C. Feed and manure handling traffic uses the same paths or corsses paths. People walk through feed mangers to cow alleys and vice versa.

6. How well are instruments for jobs such as hoof trimming and dehorning cleaned and disinfected (sanitized)?
   - A. Not cleaned or disinfected between animals.
   - B. Cleaned (but not disinfected) between animals.
   - C. Cleaned and disinfected between animals.
   - D Thoroughly cleaned and disinfected between animals.

7. How many times are the same rectal sleeves and needles used?
   - A. Sleeves are changed between groups or if blood is seen. A different needle is used for each vaccine or product.
   - B. Sleeves and needles are used only once with one animal.
   - C. One can do all or most of the herd.

8. How are replacement or new animals (including bulls) for your herd acquired?
   - A. From auctions or sale barns, not tested and not isolated upon arrival.
   - B. From auctions or sale barns, tested after purchase and briefly isolated (for less than 2 weeks).
   - C. Only from herds of known health status, with screening tests and less than 30 days of isolation.
   - D. Only from herds of known health status, with screening tests and a minimum 30-day-isolation-period.
   - E. No animals are purchased; we maintain a closed herd.

9. How are replacement heifers for your herd raised?
   - A. Our heifers are sent to another facility for some period of time and commingled with animals from toher herds.
   - B. Our heifers are sent to another facility for some period of time, but are not commingled with animals from other herds.
   - C. Our heifers, if sent to another facility for some period of time, are isolated from the rest of our herd upon their return.
   - D. Alternatively, we raise all our own heifers on our own facilities and do not raise heifers born on other farms.
   - E. Our heifers, whether we raise them on our farm or through a contract raiser, are tested for persistent infection with BVD and vaccinated according to a regular protocol.

10. If you show animals, how many of the following steps do you take to minimize your herd's health risk?
    - A. All 7
    - B. 5 or 6
    - C. 3 or 4
    - D. Less than 3
      - ❍ Our show animals have current health certificates
      - ❍ Our herd's vaccination status is current.
      - ❍ We use our own trailer (or one that has been cleaned and disinfected).
      - ❍ We use our own equipment for grooming, feeding and milking.
      - ❍ We prevent nose-to-nose contact between our animals and those from other farms.
      - ❍ We bring home the same animals we took to the fair (no new ones!).
      - ❍ We isolate returning animals.

Visitors and agri-service personnel

(Refer to the visitor section for a description of visitor risk levels.)

11. Where do farm visitors (anyone not employed by the farm) park?
    - A. Wherever they want.
    - B. In a designated area by the main entrance.
    - C. In a designated area by the main entrance, away from livestock, and without driving through manure hauling or feed delivery lanes.
    - D. Like C, and low-risk visitor parking is set apart from medium- and high-risk visitor parking.

12. Where do farm visitors enter?
    - A. Wherever they want; multiple entrances may be used.
    - B. Usually through the main entrance, although it is not marked as the desired entry point.
    - C. Usually through the main entrance, which is clearly identified, although some visitors (especially medium-and high-risk visitors) enter wherever they want.
    - D. All visitors enter through a single, clearly marked entrance; we have a visitor log that some visitors sign.
    - E. All visitors enter through a single, clearly marked entrance; and all sign our visitor log.

13. Do you restrict visitor access based on the risk they present?
    - A. No, not really.
    - B. We posted a biosecurity sign a couple years ago and figure that is enough.
    - C. We turn away visitors who have been outside of North America in the past five days.
    - D. We know what risk our visitors present and restrict their access to parts of the farm accordingly, e.g. cattle hauler cannot enter barns.

14. What do farm visitors wear?
    - A. You don't care as long as it's not obscene.
    - B. Boots and outerwear that appear clean.
    - C. Boots and outerwear that appear clean; they may pass through a boot sanitizer mat or put on booties that are available.
    - D. Boots and outerwear that appear clean; they must sanitize their boots upon entry or put on plastic boot protectors; plastic booties are disposed of on your premises.E. Boots and coveralls (or plastic booties) that you provide for use only on your farm. Boot wash stations, placed throughout the facility at entrances/exits from high-risk areas, are used by high-risk visitors.

15. Whose equipment do visitors use?
    - A. Their own –potentially used at other livestock operations (halters, nose-leads, clippers, dehorning or hoof trimming equipment, etc.) and not necessarily cleaned and disinfected.
    - B. Their own –potentially used at other livestock operations, but clean.
    - C. Their own –cleaned and disinfected prior to use on our farm.
    - D. Some of their own plus some provided by our farm –all clean.E. Only equipment provided by our farm.

16. What animals can visitors come in contact with on your farm?
    - A.Only veterinarians and other animal service providers are allowed contact with any animals. And they organize their work from clean to dirty, youngest to oldest, healthy to sick, in addition to wearing proper protection (disposable gloves, coveralls, etc.).
    - B. Only veterinarians and other animal service providers can contact our high-risk animals –youngstock, periparturient (around birthing), or sick animals.
    - C. Most visitors can contact only adult, healthy animals.
    - D. Most visitors can contact only healthy animals.
    - E. Any visitor can contact any animal.

17. When you visit other farms, what do you do to ensure the health security of both of your herds?
    - A. I don't think twice to drive right over in my farm clothes and boots to borrow a tool or stop in to chat.
    - B. I wear clean clothes and boots (not your farm work boots) and stay out of feed and manure on the farm I am visiting.
    - C. I wear clean clothes and boots and stay out of feed and manure on the farm I am visiting. I clean and disinfect my boots before leaving.

Wildlife, birds, and insects

18. How is your feed grain protected from wildlife, birds, dogs, and cats (and the pathogens they may carry)?
    - A. It is not protected at all.
    - B. It is has a cover.
    - C. It is well-covered and we periodically check for spoilage and raccoon, rodent, or other infestation.
    - D. It is well-covered, we periodically check for spoilage and raccoon, rodent, or other infestation, and we clean it between loads of feed.

19. How are your water sources protected from pathogens?
    - A. The barn (or pasture) water is drawn from a pond that is not protected from wildlife.
    - B. Alternatively, our herd has regular access to a pond or stream that is not protected from wildlife.
    - C. Our herd drinks water from sources that are protected from manure (of livestock or wildlife) as much as possible.
    - D. Our herd drinks water from tested sources (or is treated); water troughs or cups are cleaned out on a regular schedule.

20. How many of the following are part of your animal vector control program?
    - A. All 5
    - B. 4
    - C. 3
    - D. Less than 3
        - ❍ We regularly set traps or bait (using caution for pets).
        - ❍ We do not let cats or dogs in the barn or feed storage areas.
        - ❍ We clean up piles of wood, old boards, junk, or spoiled feed near barns or feed storage areas.
        - ❍ We inspect buildings for rodent entryways and denning places and eliminate them..
        - ❍ We use bird detractors (even if the barn was built to minimize testing and roosting places for birds).

21. What is your biting insect (flies, lice, mange) control like?
    - A. We use appropriated insecticides (tags, pour-ons) and premise products
    - B. We have an integrated pest management program including insecticides, parasitic wasps, bedding and manure management. We follow practices to prevent the development of insecticide resistance.
    - C. We're doing what we've always done, but if doesn't seem to be working so well.
    - D. What control?.

Farm Biosecurity Risk Assessment Scorecard

The questions in this assessment are grouped by the three main ways diseases could be introduced to a farm—through animal additions, visitors, or wildlife. Circle the letter corresponding to the client's answer for each question. If none of the options describe the management practices, choose the one that is closest or mark the question as not applicable.

This questionnaire challenges clients to think about their management practices and ways to reduce the risk of introducing (or reintroducing) diseases to their animals as individuals and groups. If the client circled any letters in the high risk column, they have identified management practices that are considered highly risky in terms of their potential to allow diseases to enter or spread.

The next step in the program development process asks clients, "What steps can they do take to move toward the lower risk practices?

Question #	High Risk		Moderate Risk		Low Risk	Comments
Animals						
1	E	D	C	B	A	
2	E	D	C	B	A	
3	-	D	C	B	A	
4	A	-	B	-	C	
5	C	-	B	-	A	
6	A	-	B	C	D	
7	C	-	A	-	B	
8	A	B	C	D	E	
9	A	B	C	D	E	
10	D	C	-	B	A	
Visitors						
11	-	A	B	C	D	
12	-	A	B	C	D	
13	A	B	-	C	D	
14	A	B	C	D	E	
15	A	B	C	D	E	
16	E	D	C	B	A	
17	A	-	-	B	C	
Wildlife						
18	A	B	-	C	D	
19	A	B	C	D	E	
20	-	D	C	B	A	
21	D	C	-	A	B	
Totals						

Step 4: Develop and Implement Protocols and Best Management Practices

The 3 management pillars of biosecurity for livestock operations, commercial small animal facilities or any other living situation are consistent with the pillars we apply to veterinary practices. A reminder, the pillars are:

- Access management
- Animal health management
- Operational management

Each principle area must be addressed in an effective biosecurity program, regardless of industry or setting.

Each biosecurity pillar must be addressed in an effective biosecurity program, regardless of industry or setting.

Access Management

Access management criteria outline points for consideration in respect to controlling who and what enter animal production premises. Most disease walks onto farms. Controlling entry of people, animals, vehicles and equipment is a major barrier to disease transmission. Pathogens must come into contact with animals to cause disease, therefore access management becomes a focal point for effective biosecurity programs.

Designate distinct zones

Establish distinct zones where varying levels of protection are needed. Define these zones with fences or other features e.g. crushed gravel and identify them with signs.

Zones can be created dependent on the specific needs of an operation. Consider the following zones for inclusion in a biosecurity program:

- **Controlled Access Zone:** is an area that you may identify around barns, pens, handling areas that should be restricted to producers and employees. May be identified by a fence, sign, strip of crushed gravel etc.

A strip of gravel and a fence identify this buffer of a Controlled Access Zone at Grande Prairie Regional College Fairview College Campus.

- **Restricted Access Zone:** These zones should be identified at all entrances and exits as a Restricted Access Zone. Signs may also include statements such as “Employees Only” or “Biosecurity standards in place” or “PPE Required”

- **Quarantine Zone:** Quarantine housing areas are for new animals to reside in while they are being observed for disease prior to introduction to a healthy herd. Quarantine is also for the separation of animals returning from shows and exhibitions where they may have comingled with animals from other herds. Depending on the operations, protocols may be customized to accommodate animal movement or facility use while under observation.
- **Isolation:** Isolation is an area for diseased animals. Strict entry and exit protocols, post use cleaning and disinfection protocols are needed to ensure disease within the Isolation Zone does not enter other animal areas. Ideally, those protocols should be posted at the Isolation entry, even step by step pictures to remind producers and/or staff.
- **Public Access Zone:** Identification of a public access zone indicates to the public that there are areas that are NOT public access. Public access zones would have hand washing stations positioned strategically and frequently.

Control Access to Farms and Barns at Critical Points

Control movements of people, animals, equipment and vehicles into, between and out of the designated zones.

This can be done through the use of controlled access points. Physical barriers help remind employees and visitors of the change in zones. There should also be a requirement of those entering or exiting the zone to change boots, and/or outwear and wash hands.

If it is equipment or vehicles transitioning between zones, consider implementing a cleaning and disinfection protocol. An effective cleaning and disinfection protocol is easy to do, well set up with supplies at the ready and will ensure disease agents do not cross into or out of zones.

Visitors present unique risks and challenges. Farm visitors can be classified by the risk they represent:

- Low-risk visitors come from urban areas and do not contact livestock. They present almost no risk of introducing disease, even if few precautions are taken.
- Moderate-risk visitors are those that travel from farm-to-farm, but do not directly contact livestock or manure.
- High-risk visitors are those that travel from farm-to-farm and work directly with livestock or manure. These people contact the bodily fluids or manure of animals, and must be the most diligent with their biosecurity practices.

Encourage producers to question people that come onto their farm so they can accurately assign a visitor risk level and apply appropriate control measures. A prominently displayed Visitor's Log (or Guest book!) may stimulate conversation about the visitor and will be used to trace movements of people in the event of a disease outbreak.

Access Management recommendations include:

- Post biosecurity signs at barn entry and exits and pasture entrances
- Establish visitor parking well away from barns, pens and pastures.
- Post biosecurity signs at the barrier of each zone; reminding producers, staff or visitors that standards are on place.
- Disinfect thoroughly delivery and supply trucks, transport trucks etc. before entering animal handling/living areas

Animal Health Management

Movement of animals onto farms, how they are handled while on the farm and how they leave has a lot to do with controlling disease.

Strategies include:

- Permanently identifying all animals and keeping records for traceability
- Testing to monitor disease status before introduction
- Establish appropriate risk avoidance measures through consultation with a veterinarian, including vaccination programs. Awareness of potential problems internationally can avoid a Canadian version of the disastrous foot and mouth disease outbreak in Japan in April 2010[25]
- Following post arrival quarantine or isolation procedures, including outlining vaccine requirements
- Scheduling animal movement ahead of time
- To allow for effective cleaning and disinfection, maximize downtime between animal groups in production areas

Additional recommendations may include:

- Maintaining a closed herd to lower risk
- All in/All Out practices lower risk
- Keep arrival and shipping times a short as possible
- Arrange pens or gates in a manner that facilitates animal movement without potentially contaminating other housing areas
- Avoid moving young or sick animals through high traffic areas

If not using an all in/all out production model, enhance animal segregation and biosecurity by:

- Regulating pedestrian, vehicle and manure handling traffic in a way to minimize cross contamination and unnecessary exposure of animals to disease
- Limit equipment movement between pens. Clean and disinfect thoroughly if unavoidable
- Rountinely handling animals from youngest to oldest and healthy before sick
- Ensuring transport trucks are clean, disinfected and rinsed properly prior to loading animals

[25] OIE Foot and Mouth Disease, Japan, Follow Up report #8
http://www.oie.int/wahis/public.php?page=single_report&pop=1&reportid=9167

Observe animals for signs of disease

Coach producers to ensure workers are knowledgeable and experienced in recognizing signs of disease. They should be able to do this by observing animals' production levels, behavior, clinical signs, and feed and water consumption. This is an excellent area for veterinary clinics to build relationships with clients and client's staff by holding disease information meetings.

Work with your clients and staff to educate them on the typical signs of disease or distressed animals.

Establish response plans for potential disease/disaster situations

Encourage clients to contact a veterinarian if they see unusual rates of disease or death.

A significant challenge is producer reluctance to call a veterinarian. Reasons include cost, concern about introducing disease from other farms and the uncertain outcome of diagnosing previously unknown disease in their herd or flock.

While there is a stigma with all animal disease, universal prevention is virtually impossible. The many factors associated with production, potential introduction of pathogens and disease emergence is overwhelming. Though perfection is impossible, managing risk is achievable.

Encourage and work with clients to have a "disease response plan" in place for suspected cases of contagious or reportable diseases. An "emergency response" or "disease response" plan removes the "what if" worry about disease. Producers take comfort in knowing beforehand the steps needed to combat and prevent disease.

A disease response plan should include:

1. Triggers for the response plan. For example:
   a. numerous animals showing signs of disease
   b. a significant decrease in production
   c. a lack of response to routine treatments, unanticipated mortality rates
2. Details of industry contacts: who to contact, when, what to relay, who will contact them, who not to contact until it is appropriate to do so (e.g. media, neighbours)
   a. Herd veterinarian
   b. Local veterinarian
   c. Staff
   d. Alberta Veterinary Medical Association (if foreign animal disease is suspected or possible)
   e. Regulatory/marketing animal commodity group (if foreign animal disease is suspected or possible)
   f. Government agency (if foreign animal disease is suspected or possible)
3. Plans for limiting movements of animals, people or vehicles on or off the premises, and

Disease control measures determined between veterinarian and client.

Operational Management

Properly dispose of deadstock

Producers should plan and control the disposal of carcasses according to municipal and provincial regulations. Carcasses should be disposed of in a timely manner. Below is an excerpt from Chapter 8: Beneficial Management Practices published by Alberta Rural and Agricultural Development[26]

"8.5 Livestock, Poultry and Farm Animal Mortalities: Livestock and animal deaths may occur no matter how well an operation is managed. Disposing of dead animals quickly and effectively is important to reduce the risk and spread of disease. Carcasses can be a source of disease if scavenged by wildlife or pets. Some of these diseases can then be passed back to livestock or even humans. Carcasses are also unsightly, odorous and a breeding site for flies.

The choices for disposal under Alberta Agriculture's *Livestock Diseases Act – Destruction and Disposal of Dead Animal Regulation* are:

- burial
- incineration
- composting
- rendering
- natural disposal (except for animals that have been euthanized with drugs and chemicals or if the animal is known or suspected to have died from an infectious or reportable disease)

[26] Chapter 8: Farmstead Waste Management, Beneficial Management Practices: Environmental Manual for Alberta Farmsteads; http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex11159/$file/Chapter8.pdf?OpenElement

The dead animal should be disposed of within 48 hours of death. However, the dead animal may be stored for more than 48 hours if stored:

a. less than a week in an enclosed structure with impervious walls and floors that have been constructed for the storage of dead animals
b. outside during winter when the temperature is low enough to keep the dead animal completely frozen
c. in a freezer
d. in accordance with the directions of an inspector appointed under the *Health of Animals Act* or under the *Livestock Diseases Act*

Burial

If carcasses are to be buried, do it promptly to control odor, insects and scavenging. Screen the burial pit area from view with trees, shrubs or fences, and locate it some distance away from livestock and other farm areas (see Figure 8.1). For more information, refer to Alberta Agriculture, Food and Rural Development's Livestock Mortality Burial Techniques document (Agdex 400/29-2)[27] .

Destruction and Disposal of Dead Animals Regulations contain the following guidelines for burial:

- The total weight of carcasses in a burial pit must not exceed 2,500 kilograms (5,500 lb.).
- The pit must be:
  - ✓ 100 m (328 ft.) from wells, waterways and high watermarks of lakes
  - ✓ 25 m (82 ft.) from the edge of a coulee, major cut or embankment
  - ✓ 100 m (328 ft.) from any livestock facility, including pastures that are not owned or leased by the owner of the animal
  - ✓ 100 m (328 ft.) from a residence
  - ✓ 300 m (984 ft.) from a primary highway
  - ✓ 100 m (328 ft.) from a secondary highway
  - ✓ 50 m (164 ft.) from any other road
- Apply quicklime to the carcass in sufficient quantities to control flies and odor.
- The pit must be covered with:
  - ✓ minimum of 1 m (3 ft.) of compacted soil
  - ✓ wooden or metal lid that is designed to exclude scavengers
  - ✓ The bottom of the pit must be at least 1 m (3 ft.) above the seasonal high water table.

Incineration

The *Destruction and Disposal of Dead Animal Regulation* state that dead animals may be disposed of by incineration on your property. However, this practice must follow the Substance Release Regulation or the Code of Practice for Small Incinerators available from Alberta Environment.[28]

Composting

Composting carcasses is an effective way of disposal and can be done in a bin system designed for composting, in a windrow system or open compost pile. Examples of bin designs are available in

Alberta Agriculture, Food and Rural Development's Swine Mortality Composting[29] and Poultry Mortality Composting[30] documents (Agdex 440/29-1 and Agdex 450/29-1).

A windrow or open compost pile must be:

- 100 m (328 ft.) from wells or other domestic water intakes, streams, creeks, ponds, springs, and lake high watermarks
- 25 m (82 ft.) from the edge of a coulee, major cut or embankment
- 100 m (328 ft.) from any residence
- 100 m (328 ft.) from any livestock facility or pasture owned or leased by another person
- designed in a manner that will exclude scavengers

Within these structures:

- Each animal or part of it must not exceed 100 kg (220 lbs.)
- maximum volume of the animals must not exceed 25 percent of the total compost pile
- animals must be covered by at least 15 cm (6 in) of composting material

[27] Available at Government of Alberta, Agriculture and Rural Development, http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex5310
[28] Small Incinerators Codes of Practice (EPEAact); saved to file) http://www.qp.alberta.ca/documents/codes/INCINERATORS.pdf
[29] Bin Composting of Daily Swine Mortality, http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex8387
[30] Poultry Mortality Composting, http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex6117

Rendering

Dead animals must be picked up by rendering plants within 48 hours of death; until then, the carcass must be stored. When storing carcasses:

- locate the storage area close to the entrance of the farm to minimize the need for collection vehicles to enter the property
- use an area that will minimize the spread of disease — for example, do not store the carcass near a waterway or water body or where it will be easily scavenged
- if not picked up within 48 hours, use special storage bins or refrigeration until the carcass is taken to a rendering facility

Natural Disposal

Natural disposal refers to disposal by scavenging and sites must be located well away from farm areas, water bodies and sources (see Figure 8.2). However, if the animal is known or suspected to have died from a reportable or an infectious disease that can be spread by scavengers or insects, it is best to dispose of these animals under the direction of a veterinarian. Also, natural disposal is not allowed under the *Livestock Diseases Act* if the animal is euthanized.

Here are the following guidelines for natural disposal under the Destruction and Disposal of Dead Animals Regulation:

- The animal is disposed of on property owned or leased by the owner of the animal.
- The total weight of the carcasses disposed of at any one site must not exceed 1,000 kilograms (2,200 lbs.).
- There must be at least 500 m (1640 ft.) between disposal sites.
- The site must be:
  - ✓ 500 m (1,640 ft.) from wells, waterways and lake high watermarks
  - ✓ 25 m (82 ft.) from the edge of a coulee, major cut or embankment
  - ✓ 400 m (1,312 ft.) from any livestock facility, including pastures that are not owned or leased by the owner of the animal
  - ✓ 400 m (1,312 ft.) from a residence
  - ✓ 400 m (1,312 ft.) from a road allowance
  - ✓ 400 m (1,312 ft.) from a provincial park, recreation area, natural area, ecological reserve, wilderness area or forest recreation area
- The site must not create a nuisance.

Manure Disposal

Plan and control manure management according to municipal and provincial regulations. Planning should include measures for collecting, storing, moving, and disposing of manure in ways that minimize the chance of spreading any disease organisms.

Manure should not re-enter specified zones once removed and transporting should not require manure to be moved through zones of higher security access.

A standard in the poultry industry is: Storage of manure should be outside the Control Access Zone (CAZ).

Additional information for producers is available. The Alberta Agriculture and Rural Development Manure Management website is a great place to start.[31]

Keep the premises, buildings, equipment and vehicles clean

Buildings, equipment and vehicles should be cleaned regularly to prevent the introduction of disease and pests.

Suggest a vehicle cleaning station away from animal areas. Stations might have a high pressure hose for the exterior of vehicles and undercarriages and disinfectants to apply to wheels and undercarriages.

Make it routine to regularly clean and disinfect the interior of vehicles. Use appropriate disinfectants for surfaces and observe contact times.

Recommendations for producers should include:

- Wash vehicles regularly, and especially after visiting another farm, high pressure wash and disinfectant the under carriage and wheel wells
- Keep the interior cab of farm vehicles clean and free of dirty coveralls, boots or equipment. Disinfect regularly
- Avoid sharing equipment with other farms, purchase commonly used equipment and keep it in the barns to minimize disease introduction or transmission
- Follow manufacturer's directions when using commercial cleaning and disinfection products

[31] Alberta Agriculture and Rural Development Manure Management http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw12912

- Keep in mind the following points when cleaning and disinfecting equipment, barns, pens, stalls:
  - ✓ Read all labels thoroughly for Use, Direction, Safety Requirements and Toxological Information.
  - ✓ Cleaning and Disinfection requires a protocol just as vaccination and medication programs
  - ✓ Record: product used; rationale for selection of that product; concentration used (include calculations); mixing procedure; volume used; area covered; spray or fog; safety; procedures; drying conditions; cleaner used (cleanliness rating); validations.
  - ✓ Disinfectants have strengths and weaknesses. Those that are excellent against bacteria may not be the product of choice against viruses. Ease of application and safety are major considerations.
  - ✓ Value of using cleaners first, BEFORE disinfection cannot be overemphasized. Cleaning is the removal of dirt (organic material) that can protect or carry FAD viruses. How do cleaners work and save work?
- Wetting – decreases surface tension
- Emulsifying – floats and carries away dirt particles
- Suspending – floats and carries away dirt particles
- Sequestering – dissolves salts
  - ✓ There are alkaline and acid cleaners.**NOTE: do not use chlorine with acid cleaners.**
  - ✓ Use the correct dilution of disinfectant. Disinfectants work best at approved levels. More is not necessarily better.
  - ✓ Disinfectants must be mixed properly before use. Use warm or hot water to mix disinfectants as most disinfectants, detergents and soaps have increased activity in warm water.
  - ✓ Remember disinfectants require contact/exposure time. Phenols and quaternary ammonium need at least 10 minutes. Chlorine and iodine are fast. Formalin and oxidizing agents are intermediate. Rinse if needed.
  - ✓ Organic material significantly reduces the activity of disinfectants; clean surfaces first!
  - ✓ Follow local government regulations regarding the application of disinfectants to ensure compliance with environmental legislation.
  - ✓ Store in cool dry place with lids tightly fastened.

Use Personal Protective Equipment (PPE)

For producers, staff and visitors entering restricted areas, including isolation or quarantine:

- Consider using disposable booties and coveralls for use in isolation areas
- Wear clothing that will only be worn on premises under common practice such as clean or disposable coveralls. Remove them prior to entering farm service vehicles, offices, and residents. Leave germs at home.

Have clean coveralls and boots available for visitors and service personnel…and make sure they use them! This will minimize the risk visitors will introduce a disease causing pathogen into your herd

Maintain the facilities in a state of good repair

Maintain all facilities in a state of good repair so that your biosecurity plan can be effectively implemented.

This may include:

1. buildings and fences to prevent wildlife and people from entering the premises
2. feed storage areas to prevent access by wildlife and vermin, and
3. Laneways to allow for cleaning and disinfecting vehicles.

Obtain production inputs from a reliable source

Encourage producers to buy production inputs such as feed and bedding from reliable sources. Ensure the water supply is free of contamination.

Also, advise producers to inquire about the biosecurity practices of their suppliers, especially if they are having companies deliver to the farm. Producers should be familiar with their supply company's biosecurity policy, especially for delivery trucks that may come in the vicinity of animals.

Clean, disinfect and rinse transport trucks and trailers before loading animals.

Control pests and pests

Ensure a pest management program is in place to prevent the spread of disease. This area of Operational Management will vary widely depending on the animal production operations. Poultry and swine have strict standards for pest management and recommend a "no pets policy". Practical and applicable guidelines are still being developed by the beef and equine communities. The following are some considerations for a pest management program:

- Build rodent proof houses/barns
- Inspect premises regularly for signs of pests
- Use bait stations and eliminate breeding and harborage areas for insects and rodents
- Patch gaps under the eaves and screen air inlets to prevent birds from nesting or entering the barn
- Repair damage immediately!
- Keep the Controlled Access Zone clean, free of debris and, ideally, void of vegetation. A strip of gravel or crushed rock makes the area unattractive to rodents
- Fill holes where water can stagnate and become breeding grounds for insects
- Clean up feed spills immediately to eliminate food sources for rodents
- Avoid establishing areas that may become nesting and perching sites
- Do not allow pets into the barn
- Document your Pest Control Program

Recommendations to producers should include:

- Use highly visible clear signage to post your biosecurity protocols
- Include biosecurity protocols in staff training and document employees completion of training
- Identify access/entry points (roadways, laneways etc.), ideally with a physical barrier such as a gate
- Identify Visitor Parking well away from barns, pens and pastures
- Make Visitors aware of biosecurity protocols before arriving on the farm
- Keep a Visitor log book with date, name and any previous animal contact in the last 7 days
- Visitors should be accompanied by the producer or an employee at all times to assist in compliance with biosecurity protocols

Measuring, reviewing, improving

Have a written biosecurity plan that is updated regularly. Ensure that employees receive proper training and training materials so they can continue to follow the plan.

Sidebars to Biosecurity

Biosecurity Incidentals

Antimicrobial Resistance

One of the peripheral responsibilities associated with biosecurity is the prudent use of antimicrobials, primary tools used to control and treat disease in animals. The following material has been adapted from information published by the Canadian Veterinary Medical Association on general principles of antimicrobial use and, more specifically, prudent use recommendations in food animal production.

Prudent Use Guidelines (CVMA) – General

Antimicrobials have been important tools in the control of infectious diseases since the 1950s. Their use in veterinary medicine has improved the health and welfare of animals. Antimicrobial use has also contributed to the production of meat, milk and eggs which are safe for both the consumer, and the people involved in food production. The CVMA recognizes the emerging implications of antimicrobial use on human health. The continued use of antimicrobials in veterinary medicine depends upon the profession's ability to use these products wisely and finding the balance between maximizing animal welfare and conserving antimicrobial efficacy.

General Principles:

- Veterinarians, animal owners and animal caretakers all share responsibility for minimizing the use of antimicrobial drugs to conserve drug efficacy.
- Antimicrobial treatment regimens should be designed to maximize therapeutic efficacy while minimizing bacterial resistance.
- Antimicrobials used in animals should only be used within the confines of a valid veterinarian-client-patient relationship (VCPR)- see below.
- Veterinarians should continually update their knowledge of methods of disease prevention, new therapeutics and of other issues such as drug resistance trends, to ensure the prudent use of antimicrobials.
- All users of antimicrobials should be educated in the proper use of antimicrobials including administration, handling, storage, disposal and record-keeping. Veterinarians have a responsibility to educate staff, clients and other animal handlers on the prudent use of antimicrobials and for ensuring such training occurs.

Specific Principles

1. All antimicrobials, even those not purchased directly through or on prescription from a veterinarian, should be used within the confines of a valid VCPR**.
2. Animal owners and caretakers should be instructed in and encouraged to implement management, immunization, housing and nutritional programs that prevent or reduce the incidence of disease and therefore antimicrobial use.
3. Antimicrobials should only be used therapeutically if a pathogen is demonstrated or anticipated to be present, based on clinical signs
4. History, necropsy examinations, laboratory data (including resistance testing), and if the pathogen is expected to respond to treatment.
5. The need for prophylactic antimicrobials should be regularly assessed. Prophylactic antimicrobials should only be used when an animal(s) is determined to be at risk and evidence indicates that such usage reduces morbidity and/or mortality. Surgical protocols should emphasize strict aseptic technique instead of prophylactic antibiotics.
6. Antimicrobials should only be used to promote growth and feed efficiency if such use does not compromise therapeutic use in animals and people. Only those products currently approved should be used as growth promotants.
7. Antimicrobial selection should be based on the known or suspected target organisms, their known or predicted antimicrobial drug susceptibility, the site of infection, knowledge of the drug including its pharmacokinetic and pharmacodynamic properties, and other factors such as host immunocompetence. Antimicrobials that specifically target the pathogen should be selected over broader-spectrum agents and local therapy should be selected over systemic therapy when appropriate.
8. Antimicrobials with unique mechanisms of action or novel resistance profiles in human medicine should not be used in veterinary medicine, particularly food animals, unless other antimicrobials by use or sensitivity testing have been shown to be ineffective and use of the antimicrobial is considered to be life-saving in the animal.
9. Antimicrobials approved for the treatment of the diagnosed condition should be used whenever possible. The dose, frequency and duration stated on the label should be followed whenever possible.

10. Combinations of antimicrobials, compounding of active pharmaceutical ingredients and extra-label usage of antimicrobials should be avoided unless safety and efficacy have been documented.
11. Antimicrobials should be used for the shortest time period required to reliably achieve a cure. This minimizes exposure of other bacterial populations to the antimicrobial.
12. Appropriate withdrawal times for antimicrobials used in animals intended for food should be adhered to.
13. Animals treated with antimicrobials may shed resistant bacteria into the environment. If possible, steps should be taken to minimize environmental contamination.
14. Antimicrobial products should be handled and stored properly. This includes proper disposal to avoid environmental contamination by the antimicrobial drug.
15. Veterinarians should alert any person handling antimicrobials of any potential risk to themselves and other species.
16. Veterinarians, animal owners and animal caretakers all share responsibility for minimizing the use of antimicrobial drugs to conserve drug efficacy.
17. Antimicrobial treatment regimens should be designed to maximize therapeutic efficacy while minimizing bacterial resistance.
18. Antimicrobials used in animals should only be used within the confines of a valid veterinarian-client-patient relationship (VCPR).
    a. A Veterinarian/Client/Patient Relationship (VCPR) exists when all of the following conditions have been met:
        i. The veterinarian has assumed the responsibility for making clinical judgments regarding the health of the animal(s) and the need for medical treatment, and the client has agreed to follow the veterinarian's instructions
        ii. The veterinarian has sufficient knowledge of the animal(s) to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s). This means that the veterinarian has recently seen and is personally acquainted with the keeping and care of the animal(s) by virtue of an examination of the animal(s) or by medically appropriate and timely visits to the premises where the animal(s) are kept
        iii. The veterinarian is readily available for follow-up evaluation, or has arranged for emergency coverage, in the event of adverse reactions or failure of the treatment regimen.[32]
19. Veterinarians should continually update their knowledge of methods of disease prevention and control.

A Kansas State University study (K Stenske, January 2009) found that 10 percent of dog-human owner pairs shared the same *E. coli* strains and that resistance to common antibiotics was higher than expected, although owners had more multiple-drug resistant strains than pets. Researcher, K. Stenske suggested the findings may indicate that dogs are not likely to spread multiple drug-resistant *E. coli* to owners, but perhaps owners may spread them to their dogs. The research also showed that bonding behaviors like sharing the bed or licking had no association to an increase in shared *E. coli*. However, the research did show an association between antibiotic-resistant *E. coli* and owners who didn't wash their hands after petting their dogs or before cooking meals.

[32] ABVMA Council Guidelines; Adopted July 1999; Revised Dec. 23, 1999

Personal Protective Equipment

Use of personal protective equipment (PPE) is considered the "last resort" or a third line of defense against biomedical risks. This reflects the reliance on proper selection, fit, use and maintenance of the equipment by the organization and individual healthcare workers (HCWs). PPE is often used in conjunction with other controls (engineering and administrative) to provide additional protection to workers.

The primary types of PPE are designed to protect the worker from infectious disease by breaking the chain of infection at microbiological "portals of entry or exit". Gloves, gowns for example reduce dermal (skin) exposure and help contain microorganisms to the work environment. Eye and face protection reduce exposure through mucous membrane contact. Masks and respirators worn by veterinary HCWs reduce exposure via the respiratory system.

This subsection covers the selection and use of key PPE. Factors that influence PPE selection include: the route of potential exposure, durability, appropriateness of PPE for the task at hand, and proper fit. It is important to consider the compatibility of PPE within a work environment and user comfort. The employer should ensure that adequate quantities and sizes of PPE are available for HCW use.

Gloves

- Most common type of PPE
- Made from a variety of materials including latex, nitrile, neoprene, copolymer, and polyethylene and available in varying levels of thickness
- Gloves must be waterproof when dealing with infectious, known or suspected, materials
- Select appropriate gloves based on:
  - ✓ The Canadian General Standards Board (CGSB) certification for medical gloves
  - ✓ Balancing the needs for protection and dexterity
  - ✓ Thicker gloves (or double gloving) may provide greater protection, may also make tasks more difficult and increase the exposure risk
  - ✓ Recommendations for Canadian Health care and Public Service Settings[33], notes the "Selection of the best glove for a given task should be based on a risk analysis of the type of setting, type of procedure, likelihood of exposure to blood or fluid capable of transmitting blood borne pathogens, length of use, amount of stress on the glove, presence of latex allergy, fit, comfort, cost, length of cuffs, thickness, flexibility, and elasticity."

Safe Practices for Glove Use[34]

- Wear medical gloves when there is a risk of contact with blood, body fluids or substances, mucous membranes, open wounds or skin lesions.
- Wear gloves that are certified by the CGSB.
- Wear gloves when handling items contaminated with blood, body fluids, secretions or excretions.
- Wear gloves if you have any cuts or lesions on your hands or if you have dermatitis affecting your hands.
- Avoid latex gloves and powdered gloves to reduce sensitization or allergic reactions.
- Ensure that the gloves fit properly.
- Inspect gloves for holes or tears, discarding any damaged gloves.
- Put gloves on just before beginning the task, and remove them promptly when finished and before touching any environmental surfaces.
- Work from "clean to dirty" (touching clean sites or surfaces before dirty or contaminated ones).
- Do not touch your face or adjust PPE with contaminated gloves and avoid touching uncontaminated items such as light switches, telephones, etc. while wearing gloves.
- Change gloves when they become soiled, during lengthy procedures, and between patients.
- Wash hands before using and after removing gloves.
- Never reuse or wash single-use disposable gloves.
- Use sterile gloves when performing invasive procedures.

[33] **Recommendations for Canadian Health Care and Public Service Settings**; http://www.phacaspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s3/index.html

[34] Modified from information provided in Preventing the Transmission of Blood Borne Pathogens in Health Care and Public Servic Settings; http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s3/index.html

Protective Clothing (in general)

- Necessary to protect skin and prevent contamination of street clothes during all procedures or patient care tasks that may generate splashes of blood, body fluids, secretions or excretions.
- Should be liquid-resistant and be closed in the front (no open neck or v necks).
- Gowns should be knee length, fasten in the back, and have long sleeves and snug cuffs that can be covered with gloves. Gowns that are too tight restrict movement; gowns that are too large may cause hazards during performance of the tasks.[35]
- Plastic disposal aprons are used to cover uniforms when there is the potential of a splash of contaminated material.
- The common lab coat, made of loose weave cotton or cotton blend, does not provide adequate protection in areas where contact with patient body fluids or airborne hazards is possible. the features of the lab coat that make it unacceptable include its open neck, gap between sleeve and glove, wide cuffs, front opening, and the loose cotton weave or cotton blend is not liquid resistant.[36]
- Scrubs are not considered protective clothing
- Should be covered with PPE when risk of exposure to biological hazards exists
- Any scrubs visibly contaminated should be changed within the facility
- The VPE should consider implementing a "change in, change out" policy for staff to limit risk of pathogens leaving the VPE

Considerations for Choosing Protective Clothing

- ☛ What is the risk of exposure to blood or body substances?
- ☛ What tasks will be performed?
- ☛ Is sterile protective clothing required?
- ☛ Is the protective clothing disposable or reusable after laundering?
- ☛ Does the protective clothing fit properly?
- ☛ How will the protective clothing be handled after use?

Head and Foot Coverings

- Protect head/hair and shoes during procedures that may expose the veterinary staff to blood, body fluids or substances.
- Shoes should be completely closed, made of non-porous material that is non-absorbent and have nonskid soles.

Face Protection-Eye Protection and Masks

- Required when there is the potential for exposure of the face to splashes or sprays of infectious material
- Includes safety glasses, goggles, visors, face shields and table mounted barrier shield
- Face shields are NOT considered full face protection and should be used in combination with other eye protections
- Regular prescription glasses or contact lenses are not considered adequate eye protection
- Safety eyewear should fit, be clean, and well maintained and stored. Anti-fog, untinted and scratch resistant are recommended
- Surgical masks are not recognized by regulators as an approved design for respiratory protection, even though they may offer some degree of protection[37]
- Masks are useful to keep veterinary staff's contaminated hands from touching their own mucous membranes
- A fit-tested NIOSH approved respirators (N95), provides a proper seal at the HCWs face, forcing inhaled air to be pulled through the filter material and not through gaps between the face and the respirator

[35] **The Proper Fit for PPE**, John Roark, Infection Control Today Magazine, Nov. 2004
[36] **Preventing Occupational Exposures to Blood Borne Pathogens**; Janine Jagger and Jane Perry, International Healthcare Worker Safety Center, University of Virginia, 2004.
[37] **Protecting the Faces of Health Care Workers; Knowledge Gaps and Research Priorities for Effective Protection Against Occupationally-Acquired Respiratory infectious Diseases**; Annalee Yassi and Elizabeth Bryce; Report to Change Foundation, March 2004

- An occlusive fit and a clean shave for men provide the best protection for the health care worker who is to wear a N95 mask
- Masks should be fit tested according to the manufacturer's recommendations. In addition, masks should be fit checked each time the mask is put on. To check test the mask the wearer takes a quick, forceful inspiration to determine if the mask seals tightly to the face
- For instructions on how to best use the N95 mask or equivalent, refer to the handout provided by the manufacturer

Removing Personal Protective Equipment

Healthcare workers should always remove protective clothing (except gloves) before removing their respirator and protective eyewear. Hands should be washed as soon as the gloves are removed and again after eye protection and respirators are removed. Disposable personal protective equipment must be properly discarded (sealed plastic bags) and reusable or non-disposable personal protective equipment should be cleaned and disinfected properly.

Biomedical Waste Best Practices

This section focuses on assisting veterinary facilities and staff in developing and implementing effective protocols for handling biomedical waste. All healthcare settings, including veterinary healthcare hospitals and offices, should complete a thorough hazard identification and assessment of the workplace to identify risks and precautionary measures that can be taken to limit the potential risks to healthcare workers, clients and patients.

The protocols in this section should be of use to veterinary employers and employees to begin implementing a "best practice" program for handling biomedical waste. Protocols within the workplace should be reviewed and modified regularly to assess their validity, accuracy and applicability. They cannot be less than the requirements of the Occupational Health and Safety (OHS) Legislation. For more information on OHS guidelines, refer to Section 1: Legislation of this manual.

Education and commitment by practice owners/permit holders, senior management staff, DVM associates, animal health technologists and other support staff are key to implementing an effective best practice program for injury and illness prevention.

Definition of Best Practice[38]

For the purpose of this document, a best practice is a program, process, strategy, or activity that:

- Has been shown to be effective in the prevention of workplace illness or injury.
- Has been implemented, maintained, and evaluated.
- Is based on current information.
- Is of value to, or transferable to, other organizations.

In Alberta, the requirements for health and safety are outlined in the Occupational Health and Safety Act Regulation and Code. The Act, Regulation, and Code are available for viewing or downloading on the Alberta Employment and Immigration (AEI), Workplace Health and Safety website at **http://employment.alberta.ca/whs-ohs**. This document does not replace the OHS Act, Regulation, and Code and does not exempt you from your responsibilities under the legislation.

Official printed copies may be purchased from the Queen's Printer at **www.qp.gov.ab.ca/custom_page.cfm?page_id+41** or:

Queen's Printer Edmonton
Main Floor, Park Plaza
10611 - 98 Avenue
Edmonton, Alberta T5K 2P7
Phone: 780-427-4952
Fax: 780-452-0668

[38] Best Practice Guideline for Workplace Health and Safety, Government of Alberta, 2008; http://employment.alberta.ca/documents/WHS/WHS-PUB_bp003.pdf
[39] Excerpt from **Best Practices Guideline for Occupational Health and Safety in the Healthcare Industry**; Government of Alberta, 2009

Best Practices – Hazard assessment and control and harmful substances[39]

Direction from Alberta Occupational Health and Safety Act, Regulations and code (OHS Act, Section 2 & OHS code, Part 4 & 35, 2009) and best practices as set out in this document combine to guide the healthcare industry to ensure that work exposure to harmful substances are kept as low as reasonably practicable/reasonably achievable through hazard assessment and control.

Towards an Understanding of Terms

"Reasonably Practicable/Reasonably Achievable"

Reasonably Practicable is a concept used by the courts to assess the "reasonable person test". This would include what a dozen peers (i.e. twelve AHTs with equal qualifications and experience) consider reasonable in a similar set of circumstances. The peers would likely review what happened and compare it against what they do in their own operations. Some of them might do more, others less. The result would be a balanced and wise judgment that could be defended to others.

Reasonably Practicable is an OHS legal term that has been tested in the Canadian courts and has supported a high standard for effective workplace protection. Understanding of the term reasonably achievable comes from the "Canadian Nuclear Safety Commission Regulatory Guide (2004)", for "keeping radiation exposures and doses as low as reasonably achievable". Though the term reasonably achievable has not been given definite meaning by the Canadian court system, it is generally accepted in industry to encompass the same considerations as the concept of "reasonably practicable".

Refer to **http://employment.alberta.ca/documents/WHS/WHSLEG_ohsc_p04.pdf**

Biomedical Waste Definition

Biomedical waste refers to waste that is generated by:

- Human or animal health care facilities
- Medical or veterinary research and teaching establishments
- Healthcare teaching establishments
- Clinical testing or research laboratories; and,
- Facilities involved in the production or testing of vaccines

The following are definitions of biomedical waste:

a) Human Anatomical Waste: consisting of human tissues, organs and body parts, but does not include teeth hair and nails.

b) Animal Waste: consisting of all animal tissues, organs, body parts, carcasses, bedding, fluid blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood and body fluids removed for the diagnosis or removed during surgery, treatment or necropsy, **unless a trained person has certified that the waste does not contain the viruses and agents listed in Risk Group 4 (see Appendix 6)**; excludes teeth, hair, nails, hooves and feathers.

c) Microbiology Laboratory Waste: consists of laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human or animal cell cultures used in research and laboratory material that has come into contact with any of these

d) Human Blood and Body Fluid Waste: consists of human fluid blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood and body fluids removed for diagnosis during surgery, treatment or autopsy; not including urine or feces.

e) Waste Sharps: clinical and laboratory materials consisting of needles, syringes, blades or laboratory glass capable of causing punctures or cuts.

This section of the manual contains protocols for handling a variety of types of biomedical waste. We have broken down the topic into Legislated biomedical waste and non-legislated biomedical waste.

[39] Excerpt from **Best Practices Guideline for Occupational Health and Safety in the Healthcare Industry**; Government of Alberta., 2009

Regulated biomedical waste is waste that is clearly identified in federal, provincial and municipal legislation and must be handled in an appropriate manner. This waste often poses a risk to human or environmental health and therefore every effort must be made to comply with the protocols within this manual as they are consistent with all levels of legislation.

This symbol will be used to identify:

1. Waste products that are clearly regulated biomedical waste and therefore must be handled in a compliant manner; and

2. Protocols that must be in use within veterinary healthcare settings to comply with existing legislation.

Non-regulated biomedical waste includes waste, by products or end products of veterinary practices that may be viewed by the public as posing a public or environmental health risk. The perception of risk and the unsightliness of these products in the public eye mandate that veterinary staff handle and dispose of this category of waste in a sensitive and appropriate manner. The protocols included in this manual regarding non legislated biomedical waste should be followed to maintain public confidence in how the veterinary community handles true biomedical waste.

This symbol will be used in this manual to identify:

1. Waste products that may not be included as regulated biomedical waste, but should be handled in a sensitive manner due to public perception of risk; and
2. Protocols that are recommended for veterinary employers and employees in handling biomedical waste.

Veterinary Healthcare Employers, Workers and Biomedical Waste

Responsibilities specific to biomedical waste include:[40]

Employers must:

- Establish safe work procedures for the use and disposal of medical sharps.
- Ensure that workers are trained in safe work procedures including: information on the use and disposal of medical sharps.
- Ensure workers are informed of the health hazards associated with exposure to biohazardous material.
- Ensure that workers' exposure to biohazardous materials is kept as low as reasonably practicable/reasonably achievable.
- Establish policies and procedures for post-exposure management of workers exposed to biohazardous material.
- Provide sharps containers and ensure that they are located as close as reasonably practicable to where sharps are used.
- Ensure that a sharps container has a clearly defined fill line and is sturdy enough to resist puncture under normal conditions of use and handling.

Workers must:

- Use the sharps container provided.
- Not recap waste needles.

The following new OHS legislation came into effect July 1, 2010: [41]

Medical sharps

525.2(1) Subsections (2) and (3) come into effect on July 1, 2010.

525.2(2) An employer must provide and ensure that any medical sharp is a safety-engineered medical sharp.

525.2(3) Subsection (2) does not apply if,

(a) use of the required safety-engineered medical sharp is not clinically appropriate in the particular circumstances, or

(b) the required safety-engineered sharp is not available in commercial markets.

Veterinary team members must not recap waste needles. Employers of VHCWs must provide medically engineered sharps if available and medically appropriate.

[40] **OHS Act**, Section 2 & code Part 4 & 35
[41] **OHS Act**, Part 35

525.2(4) An employer must develop and implement safe work procedures for the use and disposal of medical sharps if a worker is required to use or dispose of a medical sharp.

525.2(5) An employer must ensure that a worker who is required to use and dispose of a medical sharp is trained in the safe work procedures required by subsection (4) and such training must include:

(a) the hazards associated with the use and disposal of medical sharps

(b) the proper use and limitations of safety-engineered medical sharps

(c) procedures to eliminate accidental contact with medical sharps, and

(d) any other relevant information.

525.2(6) A worker must use and dispose of a medical sharp in accordance with the training provided by the employer."

Storage and Disposal of Biomedical Waste

Every worksite that produces biohazardous waste, handles it, disposes or sends it away for disposal must establish written procedures to ensure proper and safe disposal. Alberta Health recommends the following procedures for biomedical waste:

- Segregate, label and color code waste at the point of generation
- Keep manual handling of waste to a minimum
- Package and identify waste accordingly to Table 1 - Waste Categorization
- Securely close all packaged waste before moving
- Carts or other conveyances used for movement of waste shall be:
  - ☛ Constructed of durable and impervious material that will permit effective cleaning and
  - ☛ Disinfecting
  - ☛ Designed to contain waste and prevent spills, and
  - ☛ Used only for that purpose.
- Wash and disinfect carts used for carrying waste on a regular schedule (at least once a week)
- When visibly soiled and to control odors.

Storage[42]

Waste shall be stored in designated waste storage facilities in accordance with the Public Health Act Waste Management Regulations.

- Final on-site waste storage shall:
  - ☛ Be totally enclosed
  - ☛ Be separate from clean supply rooms and food storage/preparation areas
  - ☛ Be labeled for the storage of waste only
  - ☛ Be accessible to authorized personnel only and be **locked** in the case of biomedical and chemical waste
  - ☛ Provide sufficient capacity for variation in amounts of waste generated and for delays in shipping or disposal
- Conform to local building and fire codes and C.S.A. refrigeration standards
- Be constructed of durable and impervious materials that will permit effective cleaning and disinfecting
- Be constructed in a manner that will prevent the entry of pests and vermin
- Be designed to contain spills
- Provide ease of access for maintenance and, when required, access for carts
- Be cleaned and disinfected on a regular basis or when visibly soiled; and in the case of cold storage, have the interior temperature displayed outside of the storage compartment or room.
- NO OTHER MATERIAL MAY BE PLACED IN THE SAME STORAGE AREA AS BIOMEDICAL WASTE.
- If refrigerating or freezing waste, should use a lockable, closed cold storage facility or a lockable, domestic type freezer unit.
  - ☛ Use only for biomedical waste
  - ☛ Display biohazard symbol
  - ☛ Identify as "Caution: Biomedical Waste"
  - ☛ Use caution when freezing waste containing glass or plastic containers as they may fracture at lowered temperatures.

[42] Guidelines for the Management of Biomedical Waste in Canada by CSA; February 1992

The length of time and temperature that biomedical waste is placed in final storage shall be:

- A maximum of 24 hours at room temperature
- A maximum of 42 days at 0°C to +4°C
- A maximum of 90 days below 0°C. (Temperatures below -10°C are not necessary.)
- Do not allow waste to accumulate to a point that the capacity of the storage space is exceeded or the waste creates a nuisance or health hazard.

Cleaning of Biomedical Waste Storage Areas

A facilities biosafety officer should establish a protocol for cleaning of biomedical waste storage areas and compartments. Protocol should include the following:

- Frequency of cleaning
- Process of cleaning (unplug, where to store waste that may be awaiting disposal etc.)
- Type of cleaner to be used
- Appropriate contact time
- Persons responsible for cleaning
- Provision for immediate cleaning in the event of a leak or spill

Cleaning of General Waste Containers

A facilities biosafety officer should establish a protocol for cleaning of general waste containers and the outside of biohazardous waste containers. Protocol should include the following:

- Frequency of cleaning
- Type of cleaner to be used
- Appropriate contact time
- Persons responsible for cleaning
- Provision for immediate cleaning in the event of a leak or spill

Sharps Containers-Single Use

- Must be sturdy enough to withstand puncture under conditions of use and to the point of disposal
- Must be color-coded yellow and labeled with the biohazard symbol
  - ☛ Entire container must be color dyed or
  - ☛ An appropriately colored band of not less than 50mm wide may encircle the container
  - ☛ If mounted inside a holder/container, only the internal container must be color coded, but the holder/container must be identified by the words: **CAUTION: WASTE SHARPS**
- If used for cytotoxic waste, must be labeled with the cytotoxic hazard symbol
- Lids must secure tightly
- Ideally:
  - ☛ Should have a fill line
  - ☛ Allow stacking
  - ☛ Have features that enable it to be attached to treatment carts
- Do not fill to more than ¾ full to prevent injuries from overfilling
- Do not fill with liquid disinfectant solution
  - ☛ Solution rarely has the required contact with all items placed within the container, resulting in failure to achieve the degree of decontamination intended
  - ☛ The liquid in the container presents a spill hazard
  - ☛ Before disposal, the liquid is usually decanted which presents an unnecessary opportunity for staff to contact pathogens

Use of secondary containers (discarded bleach bottles, empty cleaning jugs etc.) is only acceptable under the following conditions:

- Approved by your facilities person in charge of biomedical waste program (Biosecurity Officer)
- Meets requirements outlined above

Cardboard Containers-Single Use

- Must be color coded and labeled with the biohazard symbol
- Must be rigid, closable, leak resistant
- Must be capable of being sealed.
- Containers containing recycled fibers' is recommended
- If container is to be shipped to off-site disposal and not to be packaged with additional outer packaging meeting the requirements of the TDG Regulations, then the container must meet the requirement of the Regulations.

Color-Coding of Waste Containers by Waste Type

Waste Type	Color Coding Required
Human Anatomical	Red
Animal Waste	Orange
Microbiology Laboratory Waste	Yellow
Human Blood and Body Fluid Waste	Yellow
Waste Sharps	Yellow

Biomedical Waste Decontamination[43]

Procedures to ensure decontamination of surfaces, items, and clothing must be developed and implemented. Contaminated items should not leave the facility or be re-used until decontaminated. Contaminated clothing should be laundered according to facility procedures. It can be beneficial to have a change of clothing available to veterinary staff in case uniforms and clothing becomes excessively soiled or contaminated during job duties.

Biomedical waste may be decontaminated using any of the three principal methods of decontamination in general use including:

A. Autoclave
B. Chemical Disinfectant
C. Incineration

Autoclaves

- Should be operated at 1210ºC (2500ºF) for minimum exposure of 20 minutes or
- 121ºC at a pressure of 105 kPa (15lbs/in^2) for more than 60 minutes
- Test regularly and document testing
- Chemical indicators may be used to check operating temperatures
- Steam indicators should be used with caution as they only check the contents of packages
- Most accurate testing method is using biological indicators (such as the presence of Bacillus stearothermophilus); keep records of all biological indicator tests
- Laboratory waste, such as Petri dishes and syringes, may melt during process, trapping air or liquids, and therefore may require longer sterilization times.
- Consider type of plastic bags used
  - ☛ Some may impede steam penetration
  - ☛ Others may melt
  - ☛ Assess under working conditions for effectiveness and integrity
- Keep records of time, temperature and pressure each load of decontaminated waste is subjected to
- Records may be requested by landfill operators, stating waste has been treated

[43] Adapted from CDC-Guidelines for Disinfection and Sterilization in Healthcare Facilities; http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Disinfection_nov_2008.pdf

Chemical Disinfectant

- Choice of chemical disinfectant must be made based on:
  - ☛ Type of organisms, suspected or known.
  - ☛ Items or surfaces to be decontaminated
  - ☛ Hazards posed to the HCW by the disinfectant.
  - ☛ Cost of disinfectant.
  - ☛ Corrosiveness of disinfectant
  - ☛ Shelf Life and required dilution of disinfectant.
  - ☛ Material which inactivates the disinfectant.
- If more than one disinfectant are required, ensure they are chemically compatible
- Follow manufacturer's directions for making proper dilutions.
- Be aware of effective life of disinfectant
- Use effective exposure times; will vary on conditions of usage.
- Understand health and safety hazards that may be posed by a particular disinfectant
  - ✓ Ensure appropriate precautions are taken
  - ✓ Wear disposable gloves with any disinfectant
  - ✓ Consult MSDS for details

Summary of Treatment Options for Biomedical Waste[44]

Waste Type		Steam Autoclaving	Chemical Decontamination	New Technology
Animal Waste	Anatomical	NO	NO	Regulatory Approval Required
	Non Anatomical	YES*	NO	
Microbiology Laboratory Waste		YES	Regulatory Approval Required	
Waste Sharps		YES	YES**	
Cytotoxic Waste		NO	NO	

*Only if followed by incineration under strict control

**Chemical treatment alone does not render sharps safe for additional handling. This treatment option applies to filled sharps containers that may undergo further treatment after chemical decontamination, as part of a process. E.g. chemical decontamination coupled with mechanical shredding.

[44] Adapted from the CCME Guidelines for Biomedical Waste Management, Table 3

Disposal

There are several disposal options for treated and untreated regulated biomedical waste. The same options are available for waste from a veterinary facility that are not regulated biomedical waste, but carry some community risk or public perception of risk. This waste should be disposed of in a sensitive manner to protect the health of local communities and the public image of veterinary facilities. These include:

1. Landfill
2. Sanitary Sewer
3. Incineration
4. 3rd Party Disposal

Due to variations in local municipal guidelines and regulations, appropriate regulatory authorities should be consulted before implementing any of the disposal practices outlined here.

Landfill

The following are recommended protocols for disposing of decontaminated biomedical waste at landfill sites:

a) Generator of the waste should prearranged with the landfill operator specific details such as time of delivery, volume of waste, evidence of treatment required etc.

b) Decontaminated microbiology laboratory waste, or decontaminated waste sharps should be buried immediately upon receipt of following a schedule designated by the authority of the jurisdiction

c) To prevent direct contact with compaction equipment or other equipment operating at the surface, the waste should be covered with either earth or other waste at the site

Sanitary Sewer

- Acceptable for untreated fluid blood, suctioned fluids, excretions and secretions; except for fluids suspected of or confirmed as being infected with any of the 6 Risk Group 4 organisms.
- Microbiology waste, such as stock solutions, cultures, live or attenuated vaccines and laboratory cultures, must first be autoclaved or otherwise appropriately treated.
- NOT acceptable for any solid waste. Do not grind and flush solids as that practice produces aerosols and can clog sewer pipes.
- Liquid waste not being disposed of in sanitary sewer must be packaged in leak proof containers before treatment and/or disposal.
- DO NOT dispose of liquid waste at the landfill.

Contact your local municipality and inquire for the Bylaws pertaining to Sanitary Sewer systems. These bylaws should outline what is acceptable to be released in your local area.

Common bylaw prohibitions include, but are not limited to:

- Animals or portions of them, including fish; unless can fit through a 2 cm screen[45]
- Intestinal contents from horses, cattle, sheep or swine[46]
- Sharps
- Biological waste; defined as waste from a veterinary facility which contains or may contain pathogenic agents that cannot be effectively mitigated by wastewater treatment and/or experimental biological matter that may be hazardous to human health or detrimental to the environment
- Waste that may be harmful to fish, wild fowl or animal life
- Waste having a pH lower than 5.5 or higher than 9.5

Common restricted substances include, but are not limited to:

- Contaminants (e/g/ oil, grease, suspended liquids)
- Inorganic constituents (silver at levels greater than 5.0 mg/L; consider your x-ray processing chemicals, particularly fixer chemicals containing excess silver)
- Organic compounds (e.g. Chloroform at levels greater than 0.20 mg/L)

[45] City of St. Albert Sanitary Sewer Bylaw, available at http://www.stalbert.ca/uploads/files/our_government/bylaws/SanSewerConsolidation-by-Bylaw42-2009.pdf
[46] City of Lethbridge Sanitary Sewer Bylaw, Section 8; available at http://www.lethbridge.ca/NR/rdonlyres/AA5D6CDD-8D8E-413E-BD30-A83AB0453323/0/3250.pdf
[47] Waste Control Regulation available at Queen's Printer, http://www.qp.alberta.ca/574.cfm?page=1996_192.cfm&leg_type=Regs&isbncln=9780779739332

Incineration

To date, incineration is the only disposal method that is capable of handling all components of the biomedical waste stream.

- Waste from a small incinerator, including wastewater, shall be handled in compliance with the Waste Control Regulation[47]
- If using crematoria incinerators, they can only be used to dispose of anatomical wastes.
- To ensure the proper functioning and operation of an incinerator for biomedical waste, staff responsible should be trained in all aspects of incinerator operation. The appropriate incinerator should be selected and the incinerator should undergo regular maintenance.

Record keeping is required by the Code of Practice for Small Incinerators, Section 10. Operators are required to keep records for 5 years following the creation of the record and include, but are not limited to:

i. The source, quantity and characteristics of waste incinerated on a per monthly basis
ii. The quantity, type and disposal location of all wastes resulting from operation of the small incinerator on a monthly basis
iii. Description of maintenance.

Consult Alberta Environment's Code of Practice for Small Incinerators[48] (September 2005), legislated under the Environmental Protection and Enhancement Act, for requirements of operating small incinerators.

[48]Code of Practice for Small Incinerators available at Queen's Printer, http://www.qp.alberta.ca/574.cfm?page=INCINERATORS.cfm&leg_type=Codes&isbncln=0779739914

Disposal Options

Below are several tables that outline disposal for waste products by type of waste. It is important to keep in mind the definition of regulated biomedical waste. The below definition is not exhaustive.

Biomedical Waste: is defined as waste generated by veterinary or biological research establishments; clinical or forensic laboratories; medical, dental, veterinary or health unit offices; veterinary surveillance facilities; Brucella strain 19 vaccine and waste modified live rabies vaccine, that is generated by any animal health care administered by a veterinarian; does not include waste that has been certified by a qualified person (DVM or other qualified person) as being free from Risk Group 4 organism.

Disposal Options for Untreated Biomedical Waste[49]

Waste Type	Landfill	Sanitary Sewer	Incinerator	New Technology
Animal Anatomical Waste	NO	NO	YES	Regulatory Approval Required
Animal Non-Anatomical Waste	NO	NO	YES	
Microbiology Laboratory Waste	NO*	NO*	YES	
Waste Sharps	NO*	NO	YES	
Cytotoxic Waste	NO*	NO	YES	

*Microbiology laboratory waste and waste sharps can be disposed of in this way if they are first decontaminated by a treatment process deemed acceptable by the local authority. Check with local landfill operators for schedule of disposal and requirements.

Disposal Options for Treated Biomedical Waste

Waste Type	Landfill	Sanitary Sewer	Incinerator	New Technology
Animal Anatomical Waste	NO	NO	YES	Regulatory Approval Required
Animal Non-Anatomical Waste	YES* NO liquid Waste	YES Liquid Waste	YES	
Microbiology Laboratory Waste	YES	YES	YES	
Waste Sharps	YES	NO	YES	
Cytotoxic Waste	NO	NO	YES	
Live or Attenuated Vaccines	YES Liquid Waste	YES Liquid Waste	YES	

*Check with individual landfills to see if this type of waste is accepted at their facility and what requirement (documentation, time of drop off etc.) is in place

[49] Adapted from Table 4, CCME, Guidelines for the Management of Biomedical Waste

Disposal Recommendations for Community Risk Veterinary Waste

Disposal Recommendations for Community Risk Veterinary Waste that carries community risk by being contaminated with or possibly contaminated with a nationally reportable, provincially reportable or Notifiable disease. Attending CFIA inspector, as identified by the *Health of Animals Act*, may require disposal by means other than listed here.

Waste Type	Landfill	Sanitary Sewer	Incinerator	New Technology
Animal Anatomical Waste	NO	NO	YES	Regulatory Approval Required
Animal Non-Anatomical Waste	NO	NO	YES	
Microbiology Laboratory Waste	NO	NO	YES	
Waste Sharps	NO	NO	YES	
Cytotoxic Waste	NO*	NO	YES	

Disposal Options/Recommendations for Veterinary Waste

****Not regulated biomedical waste.**

Waste Type	Landfill	Sanitary Sewer	Incinerator	New Technology
Animal Tissues	YES	NO	YES	Regulatory Approval Required
Animal Body Parts	YES	NO	YES	
Animal Carcasses	NO	NO	YES	
Used Bedding	YES	NO	NO	
Fluid Blood and Blood Products	NO	YES	YES	
Items Saturated with Blood or Dripping with Blood	YES	NO	YES	
Bodily Fluids contaminated with Blood	NO	YES	NO	
Body Fluids removed for diagnosis or removed during surgery, necropsy or treatment	NO	YES	NO	
Animal Non-Anatomical Waste	YES	NO	YES	
Teeth, Hair, Nails, Hooves and Feathers	YES	NO	NO	
Microbiology Laboratory Waste	YES[51]	NO	YES	
Waste Sharps	NO	NO	YES	
Cytotoxic Waste	NO	NO	YES	
Live or Attenuated Vaccines (not vials)	NO	YES	YES	
Pharmaceutical Solid Waste Vaccine Vials Empty Medication Vials/Bottles Syringes	YES	NO	YES	
Pharmaceutical Liquid Waste	NO YES[52]	YES	NO	

[50]Items intended for reuse may be reprocessed or laundered
[51]Only after appropriate decontamination
[52]Can be disposed of in general waste following denaturing

On-Farm Emergency Response

This section has been adapted from the Ontario Veterinary Medical Association (OVMA) Biosecurity Protocols Program emergency biosecurity protocol.

The original document was developed with generous financial assistance from Agriculture and Agrifood Canada through the Agricultural Adaptation Council's CanAdvance Program, and the Ontario Ministry of Agriculture, Food and Rural Affairs. Its development was coordinated by eBiz Professionals Inc. and the Ontario Veterinary Advisory Forum.

Preparation for an On-Farm Visit with a Possible Reportable Disease Present - Enhanced Biosecurity Procedures

This document summarizes the emergency preparedness and response plan steps that veterinarians should follow to contain the spread of a foreign animal disease (FAD) or other major disease outbreak.

Ensure your vehicle is stocked with a biosecurity kit with the following supplies and equipment:

1. Rubber over-boots that allow easy disinfection and do not collect organic debris, and/or disposable boots of heavy plastic at least 3 millimeters thick
2. Washable coveralls that can be easily cleaned and disinfected and/or disposable coveralls of reinforced paper
3. Tyvek® or single use coveralls for use in high risk situations
4. Disposable head coverings, N95 respirator masks, and disposable gloves
5. Polyethylene bags to store and dispose of used coveralls and contaminated PPE articles
6. Disinfectant with equipment pail, plastic or non-
7. porous boot brush and/or smaller spray or squeeze container filled with disinfectant solution for small equipment cleaning
8. Hand sanitizer
9. Paper towels
10. At least four liters of water
11. Plastic non-permeable tool box(es) or kit(s) that can be easily cleaned and disinfected and that contains only required testing equipment and postmortem tools for that visit.
12. Separate compartment or separate box for soiled tools or samples for submission sealed in plastic bags
13. Sharps container that is disposable or readily sanitized
14. Plastic clipboard for records keeping.

Preliminary Disease Diagnosis

Complete the clinical examination and record all relevant findings. Clearly describe and discuss the preliminary diagnosis with the farm owner/manager.

It is important for the veterinarian to report any suspicion that the animal(s) is exhibiting signs that may be consistent with a reportable disease. Given that many reportable diseases are highly contagious, it is important to follow practices that will contain the possible spread of disease to other animals on the subject facility and those on other premises. The veterinarian should suggest to his client that a self-quarantine should be put in place.

Disease Control Strategy

Once a preliminary clinical diagnosis has been made, the veterinarian needs to implement appropriate control measures to reduce the possibility of further disease spread. Containment is vital to ensuring the least possible disruption and the fastest return to pre-disease status. The veterinarian should:

1. Ensure that all farm personnel, farm service personnel and visitors are notified and advised to remain on the premises and adopt necessary enhanced biosecurity protocols.
2. Advise any individuals on the farm who might have had contact with the diseased animal(s) to avoid other premises containing susceptible species of animals or birds.
3. Remain on the premises, if possible, until inspectors from the CFIA have arrived and implemented adequate controls and disinfection procedures to contain the site.
4. Ask the producer to ensure the availability of a list of people who have visited the premises in the past seven days.

When a CFIA representative arrives, he/she will start a containment strategy which includes erecting barriers at the farm gate and posting signs prohibiting the entry of additional personnel. The veterinarian will transfer the care of the animal(s) and control of the situation over to the CFIA veterinarian and should follow the instructions of the CFIA. Once a reportable disease is confirmed, the CFIA veterinarian has and will use the powers vested in the *Health of Animals Act* to do whatever is necessary to contain the outbreak. This may include quarantining areas, vehicles, facilities and animals.

The veterinary practitioner should ask the CFIA veterinarian for guidance regarding leaving the area, returning to his/her clinic and home, sanitizing his/her vehicle and equipment and what can and cannot be communicated. When returning to the practice, follow the anteroom protocol contained in the Veterinary Facility Biosecurity Protocol 2 (in-clinic biosecurity procedures).

Communications Strategies

Taking into consideration all freedom of information and privacy laws, the CFIA veterinarian will decide on the appropriate communication process. The audience may include industry organizations, the ABVMA and the general public. Before the disease is confirmed, the producer can choose whether to have his name released publicly or not. If the owner does not want the information released, the CFIA is restricted to internal communications and only a generalized location of the incident can be communicated externally. If the owner releases his/her name publicly or gives permission to the CFIA to release his/her name publicly, the ABVMA and AEMARRC and Species-Specific Organizations and the industry should be notified of the suspected disease and location. Once a reportable disease is confirmed the specific disease and location will be revealed to all stakeholders.

The veterinarian should contact his/her own clinic advising clinic personnel and colleagues of suspected disease and instructing them to enact elevated biosecurity protocols. He/she should also contact neighboring clinics to advise them of the situation and the need to increase their biosecurity. The veterinarian should not release identification details of the owner and farm location unless agreed by the owner.

Emergency Contacts

In the event of a suspected foreign animal disease outbreak, it is mandatory to contact the CFIA. The Alberta Veterinarian Medical Association should be advised so they can notify their members to be prepared and vigilant about biosecurity and disease spread. Contact information for these organizations is provided below.

Canadian Food Inspection Agency – 24-hour number 1.877.814.2342

CFIA District Office Phone Numbers[53]

Office	Mailing Address	Phone Number	Fax Number
Western Area Office (Calgary)	1115-57th Avenue NE Calgary, Alberta T2E 9B2	403-292-4301	403-292-6629
Coutts - Import Only	Customs and Immigration Building Post Office Box 130 Coutts, Alberta T0K 0N0	403-344-3808	403-344-3070
Edmonton	J.G. O'Donoghue Building 7000-113th Street, Rm 205 Edmonton, Alberta	780-495-3075	780-495-3359
Grande Prairie	Post Office Box 30 10135-100 Avenue Grande Prairie, Alberta T8V 0V4	780-831-0335	780-539-3467
Lethbridge	3605-14th Avenue North Lethbridge, Alberta T1H 6P7	403-382-3121	403-382-3148
Medicine Hat	7 Strachan Bay SE Suite 105 Medicine Hat Alberta T1B 4Y2	403-528-6850	403-528-6855
Red Deer	6503-67th Street Red Deer, Alberta T4P 1A3	403-340-4204	403-340-4260
Wetaskiwin	5729-40th Avenue Wetaskiwin, Alberta T9A 2Z1	780-352-3955	780-352-1647

Alberta Veterinary Medical Association
Toll free: 1.800.404.2862 **Edmonton area:** 780.489.5007 **Fax:** 780.484.8411

Alberta Emergency Management Agency Response Readiness Centre (AEMARRC)[54]
24 hours: 1.866.618.AEMA (2362) **Toll-free in Alberta:** 310.0000 followed by area code and the phone number of the office you wish to reach.
Edmonton direct: 780.422.9000 **Fax:** 780.644.1044 **Email:** aema@gov.ab.ca

[53]CFIA District Offices List http://www.inspection.gc.ca/english/anima/heasan/offbure.shtml
[54]Alberta Management Agency http://www.aema.alberta.ca/

Reportable Disease and Responsibility

Canada is one of a few countries which remain free from a number of serious epizootic animal diseases. It is a high priority of the Canadian Food Inspection Agency that Foreign Animal Diseases, especially a rapidly spreading disease such as Foot and Mouth Disease, be recognized and then eradicated as soon as possible. The consequences will depend on the size and nature of the outbreak, and can be greatly minimized by early identification, containment and elimination.

Veterinary practitioners are most likely to be the first to encounter and recognize a Foreign Animal Disease once it has gained entry into Canada. Early recognition by veterinarians may prevent widespread transmission and great expense to the Canadian public.

Suspicion[55]

Foreign Animal Diseases of concern to the Canadian Food Inspection Agency are those which would have severe economic consequences in Canada, primarily associated with the loss of our export markets. It is essential to be aware of the possibility of Foreign Animal Diseases. The spectrum of pathogenicity of Foreign Animal Diseases has changed significantly. Traditional expectations of dramatic clinical manifestations of foreign animal diseases in our highly susceptible livestock must be discarded. Changes in pathogenicity induced by accidental release of modified strains, or alterations included by passage through partially immune hosts, has resulted in a generation of agents whose clinical signs closely mimic common diseases of Canadian livestock.

The challenge for the clinician then becomes - **when do I refer a case to the District Veterinarian?** This must remain the judgment of the attending clinician. However, there are a couple of guidelines which may be useful. First, a history of a possible recent contact, such as visitors or people or livestock returning from abroad, should raise suspicions. This should be a key factor in the decision to refer. Second, a syndrome which does not follow expected clinical or treatment and response patterns should also be questioned. During the last 30 years, outbreaks of Hog Cholera, Anaplasmosis, Avian Pneumoencephalitis (Newcastle Disease), and Bluetongue have all occurred in Canada. Although clinicians are unlikely to encounter such diseases, they should be aware that they exist.

The following examples may be a useful reminder of some of these:

1. Hemolytic anemia with no hemoglobinuria, affecting adult cattle – consider Anaplasmosis.
2. Mature cattle affected with oral lesions and diarrhea; morbidity and mortality high or low -consider Rinderpest.
3. Pigs with severe systemic illness; morbidity high, or low and increasing (insidious) – have the possibility of African Swine Fever and Hog Cholera in mind. History and gross necropsy may be most useful.
4. Reproductive problems in sows - always include Pseudorabies, Hog Cholera and African Swine Fever, at least in initial list of rule-outs.
5. Horse with vesicles or papules on tongue - definitely call the Canadian Food Inspection Agency on suspicion of Vesicular Stomatitis.
6. Several bred mares return to heat with mucopurulent vaginal discharge; cultures are negative - search in breeding/travel history for possibility of Contagious Equine Metritis.
7. Sheep with stomatitis, lameness - suspect Bluetongue, Vesicular Diseases.
8. Poultry- depression, neurological signs, head edema, diarrhea, variable morbidity and mortality, hemorrhagic enteritis - consider Newcastle Disease, Highly Pathogenic Avian Influenza, possibly Fowl Typhoid
   a. If restricted to chicks and poults - consider Pullorum Disease
   b. Cattle over 3 years of age exhibiting a progressive neurological disease of two to three months duration, consider Bovine Spongiform Encephalopathy (BSE).

You are encouraged to request printed material from your District CFIA Office to keep updated on clinical signs and postmortem findings of serious Foreign Animal Diseases.

[55] http://www.inspection.gc.ca/english/anima/heasan/fad/privete.shtml

Response

Veterinarians are required by law (see *Health of Animals Act* Sec. 5(1) (2)) to immediately notify the District Veterinarian of reasonable suspicion of any serious Foreign Animal Disease, **regardless of whether it is reportable.** African Horse Sickness, Rift Valley Fever, Sheep Pox and Contagious Bovine Pleuropneumonia are examples of serious Foreign Animal Diseases that are not reportable.

Once a firm suspicion is established, it is important that the practitioner remain on the suspect premises until relieved by the Canadian Food Inspection Agency Veterinarian. If the District Veterinarian is of the opinion that a Foreign Animal Disease is a serious possibility, the clinician must consider very carefully the risks associated with continued contact with livestock on other premises without extensive personal and equipment disinfection. Many Foreign Animal Disease agents are resistant and spread readily by fomites. The danger of transmission by veterinarians from premises to premises is real and must be recognized along with the potentially tragic consequences and possible liability to the veterinarian should such an incident occur.

Individuals should maintain a list of alternative contacts, in case you are unable to reach local District Veterinarians (e.g. neighboring District Veterinarian, Area Office Personnel). Be discrete when discussing a tentative diagnosis with clients especially on party telephones lines. For example, use the term "Possible Exotic Disease" rather than "Foot and Mouth Disease". If confirmed, eradication measures would involve at least quarantine of the premises, and an epidemiologic investigation (e.g. Vesicular Stomatitis confined to horses at one stable). Further action would depend on other factors such as extent of spread (e.g. involvement of wildlife), legal mandate and industry support and could extend to a quarantine of an entire area and involve depopulation of affected premises.

In the case of an outbreak of a Foreign Animal Disease, a predetermined Emergency Response Team would be mobilized to a Field Operations Centre (FOC) to control the spread and eradicate the disease. Operationally, this Team is made of units having very specific tasks to do: Diagnostic, Trace-out, Movement Control, Evaluation, Slaughter and Disposal, and Cleaning and Disinfection. Veterinary practitioners could be requested to give assistance in one of these areas.

The control and eradication activities would begin by controlling movements of animals and people in zones where the disease has been diagnosed. There would be one **infected zone** (or more) containing the infected premises. Depending upon the disease, the perimeter of the infected zones(s) would extend a finite distance beyond all known infected premises and would follow, when possible, natural barriers and roadways to facilitate implementation of disease control procedures. Surrounding this (these) infected zone(s) would be a **security zone** extending from the perimeter of the infected zone(s) to a certain distance, which could vary according to the disease. A **buffer zone** would extend from the outer limit of the security zone to the limit of the control area. The three zones would constitute a **control area** where certain measures would be applied according to a pre-approved disease control/ eradication strategy.

During an outbreak, practitioners receiving information suggestive of the Foreign Animal Disease in question would notify the FOC in the outbreak area. In the case of a FAD emergency, appropriate information concerning the location and the telephone number(s) of the FOC, the limits of the control area, the movement restrictions, disinfection procedures, etc., would be made available at that time to all practitioners through the appropriate channels.

Disinfectants routinely used by a practitioner may not be effective against the agent of a suspected disease. The veterinary practitioner should consult with a District Veterinarian to determine what products are acceptable in the disinfection of himself, his equipment and vehicle.

Client education is an integral part of the practicing veterinarian's role in Foreign Animal Disease prevention and control. Owners will turn to their veterinarian as a primary source of information in the event of an outbreak. Control procedures such as disease reporting, quarantine and disinfection will be effective only with the element of owner co-operation and participation. This results from an understanding of the procedures and their rationale.

The involvement of practicing veterinarians with respect to Foreign Animal Disease may be summarized as follows:

1. Prevention:
   a. Maintain current knowledge of the Foreign Animal Diseases most likely to enter Canada. These include, Anaplasmosis, Highly Pathogenic Avian Influenza, Bluetongue, Velogenic Newcastle Disease, Pseudorabies, Vesicular Stomatitis, Foot and Mouth Disease, Hog Cholera, African Swine Fever and Bovine Spongiform Encephalopathy. The District Veterinarian has information on such diseases.
   b. Be aware of clinical/necropsy findings which should alert suspicion. Routinely include Foreign Animal Diseases in differential diagnoses.

2. Reporting:
   a. Immediately report any suspicion of the existence of a Foreign Animal Disease to the nearest District Veterinarian.
3. Control:
   a. If you have been physically present on the farm, **stay on site until the District Veterinarian arrives** and encourage others not to leave the premises.
   b. During an outbreak, continue to refer suspicious calls.
   c. Communication with livestock owner:

Inform the owner of your suspicions of an exotic animal disease without specifying the disease.

Controlling Disease Outbreaks

Some diseases can be controlled by vaccination and some by antibiotics. Others rely on strict isolation and sometimes destruction of the affected animals. The centralized coordination group would help the industry decide what vaccination procedures or medications to use in each situation. Humane euthanasia and environmentally-responsible disposal of carcasses will be a major challenge for the affected farmers, and the service teams will be available to assist in carrying out these procedures.

Section 80 of the Health of Animals Regulations prohibits movement of animals, and other risk objects within, into or out of the Control Area. All movements within, into, or out of a Control Area **can only be with permission of an inspector** or other person designated by the minister.

All such movement is only allowed with permits issued at the time of the emergency.

Once a disease is confirmed there will be total control on movement of animals, animal products and by-products and things contacting them off and onto the infected premise. Infected animals will be destroyed and disposed of and the premise(s) will be cleaned and disinfected before being declared **Not Infected.** Movement will be curtailed until the disease status in the zone is assessed and it will be necessary to identify all premises with susceptible species. Permission for animal movement will be dependent on the disease involved. In the security zone the restrictions are reduced. A permit is still necessary for movement of animals and other materials (usually general). If a high-risk premise, for example a sales barn or show, is located in the zone, there may be some additional restrictions.

Movement out of the restricted area is very limited with no susceptible livestock or vectors and only some products allowed to be moved.

For movement control there will be checkpoints, licenses and permits, signage on farms and roadways and public notification on radio, in newspapers and over the internet. Movement restrictions may be put on animals, susceptible captive species, animals that can be sectors, animal products from live animals, eggs, milk, semen, animal by-products, meat, blood, hides, offal, litter, manure, feed, fomites, apparel, vehicles and equipment.

Respective Federal and Provincial Roles

The Federal and Provincial governments have signed a Foreign Animal Disease Emergency Response (FADER) document to ensure that each agency knows who does what in the event of an outbreak.

In Alberta, province wide emergencies are coordinated by **Alberta Emergency Management Agency Response Readiness Centre (ARRC)[56].** ARRC coordinates the response from all provincial ministries and requests for federal resources. In the event of a major emergency, including an outbreak of disease, the ARRC will establish the Provincial Emergency Operations Centre to coordinate the provincial response to the emergency.

The maps below demonstrated the zones as established under the CFIA's direction under a foreign animal disease outbreak.

[56]Alberta Emergency Management Agency http://www.aema.alberta.ca/

Notes

Recovery

As mentioned above, CFIA may order the destruction of animals or birds to help control an outbreak. It will pay a set fee for any animal or bird they order destroyed but do not pay for euthanasia, disposal or cleaning and disinfection. All farms that have had the infection must meet CFIA "green" standard before any are allowed to resume production.

Humane euthanasia will be carried out if destruction is ordered and it will be either contracted out or performed by CFIA. Methods for the humane euthanasia of large numbers of animals need to be developed as are techniques for disposing of carcasses in an environmentally responsible way.

Cleaning and disinfection (C&D) is a time-consuming and labor-intensive process which is the responsibility of each farmer, but which must meet the established standards of the CFIA in a reportable disease situation. There will be ongoing surveillance of all farms in the area to ensure that the disease has been eliminated. Once the C&D process has been completed through the red, orange and green inspections the farm is ready to restock. In the case of Avian Influenza, for example, twenty-one days after the last farm in a zone passes its green inspection restocking can begin. There may be a need to coordinate the restocking process if the area involved was large, to protect the market from being flooded with products a few months after everyone re-enters production. Carcass disposal is a major function. A decision on whether the disposal will be on the farm, at a central location, and by composting, burial or incineration needs to be made. A location needs to be selected and teams need to be trained and made available. Specific equipment may also be needed to carry out the transportation and/or disposal. Welfare slaughter of animals or birds not infected by the disease but which either are a threat for spreading the infection or can't be fed or managed because of the disruption in the area may be necessary. The cost of this welfare slaughter is not covered by the CFIA and so must be dealt with by industry.

Industry Contact List

CFIA 24-hour number 1.877.814.2342

SRM Permits and Information
1.800.442.2342

Epidemiology and Surveillance
E-mail: notification@inspection.gc.ca
Fax: 450-768-0064 (attention: notification)

CFIA District Office Phone Numbers[57]

Office	Mailing Address	Phone Number	Fax Number
Western Area Office (Calgary)	1115-57th Avenue NE Calgary, Alberta T2E 9B2	403-292-4301	403-292-6629
Coutts - Import Only	Customs and Immigration Building Post Office Box 130 Coutts, Alberta T0K 0N0	403-344-3808	403-344-3070
Edmonton	J.G. O'Donoghue Building 7000-113th Street, Rm 205 Edmonton, Alberta	780-495-3075	780-495-3359
Grande Prairie	Post Office Box 30 10135-100 Avenue Grande Prairie, Alberta T8V 0V4	780-831-0335	780-539-3467
Lethbridge	3605-14th Avenue North Lethbridge, Alberta T1H 6P7	403-382-3121	403-382-3148
Medicine Hat	7 Strachan Bay SE Suite 105 Medicine Hat Alberta T1B 4Y2	403-528-6850	403-528-6855
Red Deer	6503-67th Street Red Deer, Alberta T4P 1A3	403-340-4204	403-340-4260
Wetaskiwin	5729-40th Avenue Wetaskiwin, Alberta T9A 2Z1	780-352-3955	780-352-1647

Alberta Veterinary Medical Association
#950, Weber Centre, 5555 Calgary Trail NW
Edmonton, Alberta Canada T6H 5P9
Toll free: 1.800.404.2862
Edmonton area: 780.489.5007
Fax: 780.484.8411

Alberta Agriculture and Rural Development
Regulatory Services Division
Inspection and Investigation Branch
204 Provincial Building
4920 - 51st Street
Red Deer, AB T4N 6K8
Telephone: 403.340.7172
Fax: 403.340.5870

Alberta Agriculture and Rural Development
Toll-free Hotline 1.866.252.6403

CANUTEC
Information: 613.996.6666

Alberta Emergency Management Agency Response Readiness Centre (AEMARRC)[58]
24 hours: 1.866.618.AEMA (2362)
Toll-free in Alberta: 310.0000 followed by area code and the phone number of the office you wish to reach.
Edmonton direct: 780.422.9000
Fax: 780.644.1044
Email: aema@gov.ab.ca

National Centre for Foreign Animal Disease
1015 Arlington Street
Winnipeg, Manitoba R3E 3M4
Telephone: 204.789.2012
Fax: 204.789.2038

Office of the Chief Provincial Veterinarian
1.800.524.0051

Queen's Printer Edmonton
Main Floor, Park Plaza
10611 - 98 Avenue
Edmonton, Alberta T5K 2P7
Phone: 780-427-4952
Fax: 780-452-0668

[57]CFIA District Offices List http://www.inspection.gc.ca/english/anima/heasan/offbure.shtml
[58]Alberta Emergency Management Agency http://www.aema.alberta.ca/

Resources and Useful Links

Resource/Name	Website or Source/Author
ABVMA Safety Handbook for Alberta Veterinary Facilities	D. McKelvey 2008
Access the Alberta Government's Hazard ssessment & Control eLearning Program at:	http://employment.alberta.ca/whs/learning/hazard/Hazard.htm)
AFAC Livestock Transport	http://www.afac.ab.ca/careinfo/transport/transport.htm
Agbiosecurity website	www.agbiosecurity.ca
Alberta Equestrian Federation Biosecurity Page	http://albertaequestrian.com/index.php?option=com_content&task=view&id=318&Itemid=356
American Association of Equine Practitioners Prudent Drug Usage Guidelines (Approved by the AVMA Executive Board June 2001)	http://www.avma.org/issues/policy/jtua_horses.asp
Animal Biosecurity (Australian)	http://www.daff.gov.au/animal-plant-health/pests-diseases-weeds/biosecurity/animal_biosecurity
Animal Diseases List (CFIA)	http://www.inspection.gc.ca/english/anima/disemala/disemalae.shtml
Animal Health Act and Regulations (Alberta)	http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts12272
AVMA Biosecurity Updates	http://www.avma.org/public_health/biosecurity/default.asp
Best Practice Guideline for Workplace Health & Safety During Avian Influenza, Government of Alberta, 2008	http://employment.alberta.ca/documents/WHS/WHS-PUB_bp003.pdf
Best Practices in Occupational Health and Safety in the Healthcare industry	http://employment.alberta.ca/SFW/6311.html
Biosecurity and Good Hygiene (UK)	http://www.defra.gov.uk/foodfarm/farmanimal/diseases/biosecurity/index.htm
Biosecurity and Infectious Animal Disease (paper; saved to file)	http://www.card.iastate.edu/publications/DBS/PDFFiles/05wp413.pdf
Biosecurity and Livestock Diseases	http://www.livestocktrail.uiuc.edu/biosecurity/
Biosecurity Considerations When Exhibiting Animals (article)	http://www.livestocktrail.uiuc.edu/biosecurity/
Biosecurity for Birds Campaign (US)	http://comminit.com/en/node/135455/293
Biosecurity Health Protection and Sanitation Strategies for Cattle and General Guidelines for Other Livestock (ON)	http://www.omafra.gov.on.ca/english/livestock/vet/facts/05-033.htm
Biosecurity Measures in Animal Husbandry to Prevent Epidemic Zoonoses (article)	http://unapcaem.org/Activities%20Files/A16/Biosecurity%20measures%20in%20animal%20husbandry.pdf
Biosecurity protocols for the prevention of the spread of porcine reproductive and respiratory syndrome virus	http://www.aasv.org/aasv/PRRSV_BiosecurityManual.pdf
Bolyard EA, Tablan OC, Williams WW, Pearson ML, Shapiro CN, Deitchman SD.	Guideline for infection control in health care personnel, 1998. American Journal of Infection Control 1998:26:289-354.
Centers for Security and Public Health	http://www.cfsph.iastate.edu/BRM/resources/Disinfectants/Disinfection101Feb2005.pdf
CEPA Environmental Registry; Environment Canada	http://www.ec.gc.ca/CEPARegistry/regulations/
CFIA Accredited DVM Program Reportable Diseases	http://www.inspection.gc.ca/english/anima/heasan/man/avmmva/avmmva_mod8e.shtml#a8.1
CFIA Common Procedures Manual	http://www.inspection.gc.ca/english/anima/heasan/man/cpmmpc/cpmmpce.shtml
CFIA Legislation Links	http://www.inspection.gc.ca/english/reg/rege.shtml
Cleaning and Disinfecting to Prevent a Foreign Animal Disease Outbreak	presented by Dr. Maurice Smith, Manager, Technical and Regulatory Services, Alpharma, to the Poultry Industry Biosecurity Workshop, 2005.
Colorado State University Veterinary Teaching Hospital. Biosecurity Standard Operating Procedures.	http://www.cvmbs.colostate.edu/vth/unpub/biosecurity.html

Resources and Useful Links

Resource / Name	Website or Source / Author
Controlled Drug and Substances Act (list of Schedule 2 targeted substances)	http://laws.justice.gc.ca/en/C-38.8/SOR-2000-217/index.html
CVMA GUIDELINES ON THE PRUDENT USE OF ANTIMICROBIAL DRUGS IN CATTLE	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC339164/?log$=activity
CVMA GUIDELINES ON THE PRUDENT USE OF ANTIMICROBIAL DRUGS IN SWINE	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC339290/
Disinfectant 101, Centre for Food Security and Public Health, Iowa State University, Glenda Dvorak, 2005	http://www.cfsph.iastate.edu/BRM/resources/Disinfectants/Disinfection101Feb2005.pdf
Environmental Law Centre (Alberta)	http://www.elc.ab.ca/pages/Library/default.aspx
Farm Biosecurity (AU)	http://www.farmbiosecurity.com.au/
Government of Alberta; Agriculture and Rural Development Biosecurity Webpage	http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/cpv10708
Guide for Managing a Biohazard Work Environment, Workplace Health	Alberta Corporate Human Resources, Dec 2004
Guidelines for Occupational Health in the Healthcare Industry; Government of Alberta; 2009	http://employment.alberta.ca/documents/WHS/WHS-PUB_bp010.pdf
Guidelines for the Management of Biomedical Waste in Canada	Canadian Council of ministers of the Environment (CCME); February 1992
Health Canada	http://www.hc-sc.gc.ca/dhp-mps/prodpharma/applic-demande/guide-ld/disinfect-desinfect/index-eng.php
Health of Animals Act	http://laws.justice.gc.ca/eng/UpdateNotice/index.html?rp14=%2Fen%2FH-3.3%2F
Infection Control Guidance for Respirators (Masks) worn by Health Care Workers-Frequently Asked Questions; Public Health Agency of Canada, 2003	http://www.phac-aspc.gc.ca/sars-sras/ic-ci/sars-respmasks-eng.php
International Animal Health (Bayer)	http://www.animalhealth.bayerhealthcare.com/3436.0.html
Laboratory Biosafety Levels	http://www.contractlaboratory.com/labclass/lab_biosafety.cfm ; Contract Laboratory.Com;
Minimum standards and Recommendations for Best Practices (New Zealand)	http://www.biosecurity.govt.nz/regs/animal-welfare/stds/min
National Avian On-Farm Biosecurity Standard	http://www.inspection.gc.ca/english/anima/biosec/aviafrme.shtml#doc
National Biosecurity Resource Center for Animal Health Emergencies (US)	http://www.biosecuritycenter.org/
Novel H1N1 Biosecurity Recommendations for Producers	http://www.pork.org/documents/News/Novel%20H1N1%20Biosecurity%20Recommendations%20for%20Producers%20v2.pdf
National Institute for Occupational Health and Safety	http://www.cdc.gov/niosh/
Office Biomedical Waste. Alberta Medical Association	http://www.albertadoctors.org/bcm/ama/ama-website.nsf/AllDoc/5D4154D18CDBCACB8725714100510519?OpenDocument
Proceedings of the 9th International Symposium on Veterinary Epidemiology and Economics, 2000	www.sciquest.org.nz
Small Incinerators Codes of Practice	http://www.qp.alberta.ca/documents/codes/INCINERATORS.pdf
Transportation of Infectious Substances; Dangerous Goods and Rail Safety	http://www.transportation.alberta.ca/Content/docType272/Production/infectious.pdf, Nov 2009
Transportation of Infectious Substances; Transportation Alberta bulletin	http://www.transportation.alberta.ca/Content/docType272/Production/infectious.pdf
United States Department of Agriculture, Food Safety Inspection Service. Pathogen Reduction/HACCP & HACCP Implementation.	[Available http://www.fsis.usda.gov:80/oa/haccp/imphaccp.html]

Glossary

Abbreviations

AASV: American Association of Swine Veterinarians
ABVMA: Alberta Veterinary Medical Association
ARRC: Alberta Emergency Management Agency Response Readiness Centre
AI: Avian Influenza
AMR: Antibiotic/Antimircrobial Resistance
ARD: Alberta Agriculture and Rural Development
BMP: Best Management Practices
BSE: Bovine Spangiform Encephalopathy
BVD: Bovine Viral Diarrhea
CANUTEC: Canadian Transport Emergency Centre
CAZ: Control Access Zone
CCIA: Canadian Cattle Identification Association
CCP: Critical Control Points
CFIA: Canadian Food Inspection Agency
CGSB: Canadian General Standards Board
CLTS: Canadian Livestock Tracking System
CPv: Canine Parvovirus
CPV: Chief Provincial Veterinarian
CSA: Canadian Standards Association
CSHB: Canadian Swine Health Board
CVMA: Canadian Veterinary Medical Association
FeLV: Feline Leukemia Virus
FIV: Feline Infectious Virus
FOC: Field Operations Center
HACCP: Hazard Analysis and Critical Control Points
HCW: Healthcare Worker
IATA: International Air Transport Association
NIOSH: National Institute for Occupational Health and Safety
OCPV: Office of Chief Provincial Veterinarian
OFFS: On-Farm Food Safety
OIE: World Organization for Animal Health
OSH: Occupational Health and Safety
OVMA: Ontario Veterinary Medical Association
PAM: Production Animal Medicine
PPE: Personal Protective Equipment
PRRS: Porcine Reproductive and Respiratory Syndrome
RA: Restricted Access; or Risk Assessment; depending on context
RAZ: Restricted Access Zone
RPE: Respiratory Protective Equipment
RSD: Regulatory Services Division of Alberta Agriculture
SEMS: Safety Engineered Medical Sharps
TDG: Transportation of Dangerous Goods
UCVM: University of Calgary Veterinary Medicine Faculty
VCPR: Veterinary client-patient relationship
VHCW: Veterinary Healthcare Worker
VPE: Veterinary Practice Entity
WCVM: Western College of Veterinary Medicine
WHS: Workplace Health and Safety

Definitions

Animal byproducts: as used in the *Health of Animals Act*; includes blood or any of its components, bones, bristles, feathers, flesh, hair, hides, hoofs, horns, offal, skins and wool, and anything containing any of those things.

Animal Deadyard: as used in the *Health of Animals Act*; means a place where animal carcasses, animal byproducts or disabled or diseased animals are brought when they are not to be prepared for human consumption.

Anteroom: a subsidiary room that opens into a larger room; in the context of this manual refers to an area that is clearly identified immediately adjacent to an isolation area; used for donning PPE, and serves as a transition zone into and out of isolation.

Antibiotic: A chemical substance produced by a microorganism that has the capacity, in dilute solutions, to inhibit the growth of or to kill other microorganisms.

Antibiotic/antimicrobial resistance (AMR): A property of bacteria that confers the capacity to inactivate or exclude antibiotics/antimicrobials or a mechanism that blocks the inhibitory or killing effects of these compounds.

Antimicrobial: An agent that kills bacteria or suppresses their multiplication or growth. This includes antibiotics and synthetic agents. This excludes ionophores and arsenicals.

Antiseptic: A chemical that can be applied to epithelial surfaces that causes the destruction or inhibition of microorganisms, preventing their growth or multiplication, without injuring the animal.

Barrier nursing: proven step in preventing the transmission of infectious agents; use of disposable gowns, gloves, footbaths, etc., for each patient helping to prevent passage of organisms from one patient to another; should be used in all isolation areas and for patients with special needs (foals, immuno-compromised patients.

Barrier nursing precautions: Materials and practices employed as a barrier between patients and personnel in order to prevent cross contamination of the body, clothing, and footwear, which, in turn, decreases the risk of nosocomial transmission to other patients. Barrier nursing precautions are used in all isolation areas (class 4) and for patients with special needs (animals considered to have an increased risk of shedding contagious agents (class 3), young or naïve animals, immuno-compromised patients, etc.). NOTE: Care must be used with barrier garments in order to prevent contamination of materials and hand contact surfaces.

Basic Biosecurity Level: as used in CFIA Common Procedures Manual; used in this manual to apply to VPE's and producers; should be used in ambulatory visits with no anticipated animal contact (outside companion animals)

Best Practice: For the purpose of this document, a best practice is a program, process, strategy, or activity that:

- Has been shown to be effective in the prevention of workplace illness or injury.
- Has been implemented, maintained, and evaluated.
- Is based on current information.
- Is of value to, or transferable to, other organizations.

Biocontainment: Can be defined as the outcome of actions resulting in control of a disease agent in a unit of interest, such as a laboratory, beef cow/calf enterprise, swine production facility. The outcomes of actions for control of disease agents already present.

Biosafety: The safe handling of biological materials, particularly infectious agents, which are classified on the basis of degree of risk to humans working with them and includes definition of biosafety levels for handling such agents. Level 1: standard microbiological practices; Level 2: Level 1 plus laboratory coats, decontamination of waste, restricted access, gloves, biohazard warning signs; Level 3: Level 2 practices plus special clothing and controlled access; Level 4: Level 3 practices plus change room access where all street clothing and accessories are removed and replaced with laboratory clothing or special half or full suits with independent air supply; all waste is decontaminated and personnel shower on exit.

Broad spectrum antimicrobial: An antimicrobial effective against a large number of bacterial genera; generally describes antibiotics effective against both gram-positive and gram-negative bacteria.

Bioexclusion: a set of practices used to minimize the introduction of pathogens and pests in animal and plant populations into specific pathogen free (SPF) herds/facilities, breeding facilities or other such operations.

Biosecurity: a set of practices used to minimize the transmission of pathogens and pests in animal and plant populations including their introduction (bioexclusion), spread within the populations, and release (biocontainment)

Biohazardous material: as used in the OHS Code; a pathogenic organism, including a blood borne pathogen that, because of its known or reasonably believed ability to cause disease in humans, would be classified as Risk Group 2, 3 or 4 as defined by the Public Health Agency of Canada, or any material contaminated with such an organism.

Biomedical waste: as used in the Guideline for Managing a Biohazardous Work Environment; animal anatomical waste, animal bedding waste, blood and body fluid waste, human anatomical waste, isolation waste, laboratory waste and waste sharps that are generated at one or more of the following places: human or animal health care facilities; medical, veterinary or biological research establishments; clinical or forensic laboratories; medical, dental, veterinary or health unit offices; veterinary surveillance facilities; and funeral homes. Waste Brucella strain 19 vaccine and waste modified live rabies vaccine, that is generated by any animal health care administered by a veterinarian; does not include waste that has been certified as being free from Risk Group 4 pathogen; does not include waste that has been decontaminated or disinfected.

Biosecurity measures: as used in the Animal Health Act; means actions taken to minimize the spread of a disease or a disease-causing agent.

Category A: as used in Dangerous Goods Transportation and Handling Act and Regulations; as used in Transportation of Infectious Substances published by Dangerous Goods and Rail Safety of the Government of Alberta means an infectious substance that is transported in a form such that, when it is released outside of its means of containment and there is physical contact with humans or animals, it is capable of causing permanent disability or life-threatening or fatal disease to humans or animals.

Category B: as used in Dangerous Goods Transportation and Handling Act and Regulations; as used in Transportation of Infectious Substances published by Dangerous Goods and Rail Safety of the Government of Alberta; means an infectious substance that does not meet the criteria for inclusion in Category A.

Contagious disease: A disease that is capable of being transmitted from one animal to another.

Contaminated material: as used in the Animal Health Act; means bedding, clothing, equipment, feed, footwear, manure, medicine and any other fomite that may have come into contact with a diseased animal or a disease-causing agent.

Controlled Access Zone (CAZ): also known as outer zone; used in the CFIA Common Procedures Manual; access is limited to those needing to be on the site (supply personnel from feed, bedding or other delivery companies); controls zone used in Animal Health Act established under Section 31

Conventional device: A sharps device that does not offer sharps injury protection.

Dangerous goods: as used in Dangerous Goods Transportation and Handling Act and Regulations; means a product, substance or organism included by its nature or by the regulations in any of the classes listed in the Schedule.

Decontamination: the process that removes microorganisms from an object, rendering it safe for handling; the process of cleaning, followed by the inactivation of pathogenic microorganisms, in order to render an object safe for handling.

Disease: as used in the *Health of Animals Act*; a) a reportable disease and any other disease that may affect an animal or that may be transmitted by an animal to a person, and b) the causative agent of any such disease.

Disinfectant: a chemical agent used on inanimate objects to destroy virtually all recognized pathogenic microorganisms, but not all microbial forms (e.g. bacterial spores).

Disinfection: a process that kills most organisms but rarely kills all spores; a process that kills most forms of microorganisms on inanimate surfaces; 3 levels of disinfection are low, intermediate and high.

Enhanced Biosecurity Levels: as used in CFIA Common Procedures Manual; used in this manual to apply to VPE's and producers; should be used as the standard biosecurity level when heightened bioexclusion and/or biocontainment is required; when visiting pathogen free facilities, artificial insemination centers, breeding facilities or when there is the suspicion of a serious non reportable disease on a site or in the industry.

Extra-label: Extra-label use means actual use or intended use of a drug in an animal in a manner that is not in accordance with the approved labeling. This includes, but is not limited to, use in species not listed in the labeling; use for indications (disease or other conditions) not listed in the labeling; use at dosage levels, frequencies, or routes of administration other than those stated in the labeling; and deviation from the labeled withdrawal time based on these different uses. Extra-label use in veterinary medicine implies the need for an established veterinary/client/patient relationship, a veterinary prescription and, in the case of food animals, professional guidance related to withdrawal times.

Field Biocontainment: a specialized function (unit) of CFIA's response to Foreign Animal Diseases whose primary role is to minimize the spread of infectious agents by people off premises declared infected.

Fomite: as used in the Animal Health Act; means an inanimate object that is capable of carrying a disease-causing agent but does not include a vehicle, railway car, aircraft or watercraft

Handling: as used in Dangerous Goods Transportation and Handling Act and Regulations; the loading, unloading, packing or unpacking of dangerous goods in or on a means of containment for the purposes of, in the course of or following transportation in or by a means of transport, and includes their storage in the course of such transportations.

Harmful Substance: as used in OHS Code, Part 1 Definitions and General Application; a substance that, because of its properties, application, or presence, creates or could create a danger including a chemical or biological hazard, to the health and safety of a worker exposed to it.

Hospital dedicated attire: Clothing, footwear, and outer garments that are worn only when working at the FVM or while on field service duty.

Immunization: The process of rendering a subject immune or of becoming immune, either by conventional vaccination or by exposure.

Infection Control and Prevention: Evidence-based practices and procedures that, when applied consistently in health care facilities and settings, can prevent or reduce the risk of transmission of microorganisms to health care personnel, clients and visitors.

Infectious Agent: referred to in the Classic Chain of Infection; microorganism capable of causing disease in humans; infectivity is affected by the organisms' viability, virulence, invasiveness and pathogenicity.

Infectious Substance: As used in the Transportation of Dangerous Goods Act; and as used in the Transportation of Infectious Substances by Government of Alberta Transportation; a substance known or reasonably believed to contain viable micro-organisms such as bacteria, viruses, rickettsia, parasites, fungi and other agents such as prions that are known or reasonably believed to cause disease in humans or animals.

Inspector: as used in the Animal Health Act Section 6; appointed by the Chief Provincial Veterinarian; may be registered veterinarians; may be individuals who are not registered veterinarians; must carry identification.

Laboratory Biocontainment: containment measures used to prevent the escape of pathogens from laboratory settings.

Livestock: for this manual; means animals of the bovine, caprine, equine, ovine and porcine species and animals of the camelidae family.

Means of containment: as used in Dangerous Goods Transportation and Handling Act and Regulations; a container or packaging, or any part of a means of transport, that is or may be used to contain dangerous goods.

Medical device: Any instrument, apparatus, appliance, material, or other article, whether used alone or in combination intended by a manufacturer to be used for human beings for the purpose of diagnosis, prevention, monitoring, treatment, surgery, or alleviation of disease, injury or handicap; investigation, replacement or modification of the anatomy, or of a physiologic process; or control of conception, and which does not achieve its principal intended action in or on the human body by pharmacological, immunological means, but which may be assisted in its function by such means.

Medical sharp: as used in the OHS Code, Part 35; a needle device, scalpel, lancet, or any other medical device that can reasonably be expected to penetrate the skin or other part of the body.

Mode of Transmission: referred to in the Classic Chain of Infection; the method whereby the organisms are transmitted from one place to the next. Examples may be by direct contact, indirect contact with a contaminated body substance, vectors, and fomites (contact with inanimate objects carrying infectious disease).

Monitoring: Monitoring includes periodic health surveillance of the population or individual animal examination.

Multiple Drug Resistance: Bacteria that have developed the ability to survive in the presence of several antibiotics. Antimicrobial drug resistance occurs when bacteria reduce or eliminate the effectiveness of drugs, chemicals, or other agents designed to cure or prevent infections. Often the antibiotics that can still kill these bacteria may be toxic to the animal and there number is limited. Examples of multiple drug resistant bacteria include some strains of Salmonella enterica, Methicillin Resistant Staphylococcus aureus and Vancomycin Resistant Entercocci.

Narrow spectrum antimicrobial: An antimicrobial effective against a limited number of bacterial genera; often applied to an antimicrobial active against either gram-positive or gram-negative bacteria.

Nosocomial Infection: A localized or systemic condition that results from an adverse reaction to the presence of an infectious agent or toxin and that was not present or incubating at the time of admission.

Occupational Health and Safety (OHS): An area of specialization which concerns factors such as working conditions and exposure to hazardous materials that influence the health of workers, and which is concerned generally with the prevention of disease and injury and the maintenance of fitness.

Personal Protective Equipment (PPE): Specialized equipment or protective clothing used by health care workers to protect themselves from direct exposure to clients' blood, tissue or body fluids. Personal protective equipment may include gloves, gowns, fluid-resistant aprons, head and foot coverings, face shields or masks, eye protection, and ventilation devices (e.g. mouthpieces, respirator bags, pocket masks).

Personnel: Refers to all people working in the FVM environment in any capacity, regardless of whether they are employees, students, visiting veterinarians or scientists, visiting students, or volunteers.

Portal of Exit: referred to in the Classic Chain of Infection; the means by which the organisms can leave the reservoir; include blood, skin, by coughs and sneezes, through other body substances; the portals of exit may be different for different organisms, based on where they are located in the body of the host.

Portal(s) of Entry: referred to in the Classic Chain of Infection; the site where organisms can gain access to the hosts; examples include mucous membranes, breaks in the skin, needle punctures, etc.

Premise: an area of land where recordable animals are bred, kept, raised, displayed, assembled or disposed of.

Premise identification account: as used in the Animal Health Act Traceability Premise Regulations; the account number given to an owner of recordable animals or to an operator of a commingling site.

Premise identification number: as used in the Animal Health Act Traceability Premise Regulations; the account number given to an area of land where recordable animals are bred, kept, raised, displayed, assembled or disposed of.

Recordable Animal: as used in the Animal Health Act Traceability Premise Regulations; includes alpacas, asses, bees, bison, cattle, domestic cervids, doves in captivity, ducks in captivity, fish acquired, propagated, reared or kept in accordance with a class A commercial fish culture license or a class B commercial fish culture license issued under the Fisheries (Alberta) Act; fur-bearing animals as defined in the Fur Farms Act; geese in captivity, goats, guinea fowl in captivity, horses, llamas, mules, peafowl in captivity, pheasants in captivity, pigeons in captivity, poultry in captivity, quail in captivity, rabbits raised for the production of meat, ratites, sheep, swine, wild boars, wild turkeys in captivity, and yaks.

Reservoir: referred to in the Classic Chain of Infection; a source that allows for microbial growth and multiplication; examples include people, equipment, and materials.

Restricted Access Zone: also known as the inner zone; where animals are housed/reared and access is restricted to only those needing to contact the animals.

Risk Group 2: pathogen carries moderate individual risk, limited community risk; can cause human or animal disease but, under normal circumstances, is unlikely to be a serious hazard to laboratory workers, the community, livestock, or the environment.

Risk Group 3: pathogen carries high individual risk, low community risk; usually causes serious human or animal disease, or which can result in serious economic consequences but does not ordinarily spread by casual contact from one individual to another, or that can be treated by antimicrobial or antiparasitic agents.

Routine Biosecurity Levels: as used in CFIA Common Procedures Manual; used in this manual to apply to VPE's and producers; should be used as the standard biosecurity level for ambulatory visits with animal contact is anticipated or necessary, contact with animal housing units, or entry to Controlled/Restricted areas such as transiting areas, animal input storage areas or output areas.

Safety Engineered Medical Sharp (SEMS): as used in the OHS Code, Part 35; a medical sharp that is designed to, or has a built-in safety feature or mechanism that will, eliminate or minimize the risk of accidental parenteral contact while or after the sharp is used.

Sanitize: a process that substantially reduced the bacterial count without eliminating all microbial forms.

Sanitizer: A chemical that reduces the number of microorganisms to a "safe" level, without completely eliminating all microorganisms. Sterilization: The removal of all microorganisms including bacterial spores from an inanimate object.

Sharps: as used in the OHS Code; means needles, knives, scalpels, blades, scissors and other items that can cut or puncture a person that may also be contaminated with a biohazardous material.

Shipping Records: as used in Dangerous Goods Transportation and Handling Act and Regulations; a record, including an electronic one, that related to dangerous goods being handled, ordered for transportation or transported and that describes or contains information about the goods.

SRM: specified risk material; CFIA defines SRM as: the skull, brain, trigeminal ganglia (nerves attached to the brain), eyes, tonsils, spinal cord and dorsal root ganglia (nerves attached to the spinal cord) of cattle aged 30 months or older; and the distal ileum (portion of the small intestine) of cattle of all ages.

Sterilization: a process that kills all microorganisms, including bacteria, viruses, spores and fungi.

Subclinical infection: A disease that is caused by the invasion of the body by a microorganism(s) that does not present signs and symptoms. A subclinical infection may be an early stage or very mild form of an infection in which signs and symptoms are not apparent or detectable by clinical examination or laboratory tests.

Surveillance: the ongoing systematic collection, analysis, and interpretation of healthcare data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those contributing data or to other interested groups who need to know.

Susceptible Host: referred to in the Classic Chain of Infection; a person or animal who lacks the immunity or resistance to the invasion of the body and reproduction by the microorganisms, resulting in infection.

Therapeutic: Treatment, control, and prevention of bacterial disease.

Veterinary Biological: as used in the *Health of Animals Act*; a) a helminth, protozoa or micro-organism, b) a substance or mixture of substances derived from animals, helminths, protozoa or microorganisms or c) a substance of synthetic origin that is manufactured, sold or represented for use in restoring, correcting or modifying organic functions in animals or for use in the diagnosis, treatment, mitigation or prevention of a disease, disorder or abnormal physical state, or the symptoms thereof, in animals.

Waste sharps: clinical and laboratory materials consisting of needles, syringes, blades or laboratory glass capable of causing punctures or cuts.

Zoonosis: Disease that can be transferred between vertebrate animals and humans, or vice versa.

Zoonotic diseases: Zoonotic diseases are caused by viruses, bacteria, parasites and fungi that are transmitted from animals and insects to humans and can cause human disease.

Notes

Notes

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Growing Forward
A federal-provincial-territorial initiative

On-Farm Carcass Disposal Options for Dairies

Kim Stanford and Brian Sexton

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Take Home Message

- Options for disposal of livestock mortalities are becoming more limited and increasingly regulated due to environmental and disease concerns.
- Before choosing a disposal method, first determine what is legally allowed at your farm location as regulations differ across provinces and municipalities.
- Cause of mortality, height of water table, proximity to open or ground water, topography of farm, soil type, prevailing wind direction, population density, relationships with neighbours, time, effort and advance preparation required will influence choice of disposal option(s).
- Composting and incineration are currently the on-farm mortality disposal options which offer the greatest biosecurity and the least potential for environmental contamination.

Introduction

Before the advent of BSE in Canada, disposal of mortalities was relatively straight-forward for many western Canadian dairies. A simple phone call to the local rendering company usually solved the problem. After BSE, rendering has become a fee for service industry with at least $75 charged per head for on-farm pick up. As well, rendering may not be an available option in some areas, an example being the province of Manitoba where rendering is currently only available for swine. Consequently, on-farm options for disposal of livestock mortalities are becoming increasingly attractive.

Along with the sudden shift in economics of mortality disposal comes a heightened on-farm concern for biosecurity. Rendering did an excellent job of removing pathogens from the farm environment and preventing the contamination of air, land and water. However, the situation changes for on-

WCDS Advances in Dairy Technology (2006) Volume 18:295-302

farm disposal of mortalities. Obviously, dead cattle died for some reason and any on-farm disposal method used should not lead to the spread of disease or negatively impact the environment.

When any new problem arises, researchers immediately leap into action. Unfortunately, speedy problem resolution by researchers is actively discouraged in the interest of preserving long-term research funding. Research into the environmental impacts, year-round feasibility and efficacy of pathogen elimination by the various methods for disposal of mortalities is mostly in its infancy. As well, some regulatory agencies seem to be stuck in the mindset of 1348 when burning was given the seal of approval for cases of the Black Death. As recently as 2001, smoldering piles of dead cattle and sheep decorated the U.K. after the outbreak of foot and mouth disease. Much better methods of mortality disposal than burning exist. Ignoring the contamination of air due to burning carcasses, it was later determined that the wind carrying hair and skin from funeral pyres actually helped to spread the virus (Gloster et al. 2001; Jones et al. 2004).

In this article, a variety of methods of on-farm mortality disposal will be discussed, although some will be given short shrift due lack of pathogen control or environmental concerns. Before a mortality disposal method is chosen, regulatory issues must first be addressed as regulations differ across province and sometimes by municipality within the province. On-farm mortality disposal options for dairies include (in no particular order) natural exposure, burial, burning or incineration, biodigestion and composting. For each option, the advantages, challenges and advance preparation required will be discussed.

Natural Exposure

Natural exposure involves taking dead cattle to an isolated part of the farm to be consumed by scavengers. No advance preparation is required and work/skill involved is minimal. In Alberta, natural exposure is a legal means of dead stock disposal (Anonymous 2002), although in practical terms legality is dependant on lack of complaints received by provincial regulatory officers.

As a disposal option, natural exposure can only be recommended in sparsely populated areas where huge tracts of land are available far removed from livestock. Problems associated with natural exposure are numerous and include transmission of foul odours, parasites and pathogens, conflicts with neigbours, contamination of water supplies and increased populations of scavengers and flies. Due to increased usage of natural exposure for disposal of cattle mortalities, outbreaks of cysticercosis, formerly a problem only in the third-world (Sani et al. 1997), have begun to appear in Alberta (Scandrett and Gajadhar 2004). With this condition, water or feed for cattle becomes contaminated with larvae from a tapeworm present in canine feces.

Cattle ingest the larvae and the larvae invade the skeletal muscles and lead to condemnation of the carcass. Completion of the lifecycle of the tapeworm requires that canines consume a carcass containing the larvae. If natural exposure is used as a method of mortality disposal, all farm dogs in the vicinity should undergo a rigorous parasite control program. Unfortunately, scavengers such as coyotes are very difficult to de-worm (at least on a regular basis).

On-farm Burial

Advance preparation: (hole digging) is required, including hiring machinery such as a backhoe. Digging a hole in frozen soil is impossible. Trenches to a depth of 1-1.2 metres are recommended as deeper holes are difficult to dig and may collapse. (Anonymous 2002) In most parts of Canada, burial pits must be covered by at least 3 ft (1 metre) of soil and some jurisdictions regulate the maximum weight of dead stock per hole.

Due to odour, vermin and possible contamination of drinking water mortalities should not be buried closer than 100 m from neighbouring homes or livestock facilities (barns, pens). Burial sites should be isolated from wells and streams or ponds. A distance of 150 metres or more is advisable between burial pits and wells (Anonymous 2002).

Water table, land topography and soil type of the available land will determine if burial is a valid option. Burial pits work best in heavy clay soils as there is less contamination of ground water. Burial pits should be located on flat land to avoid water erosion of the burial site and possibly contaminated run-off. If the water table is high at any time of the year (water in hole), burial is not recommended. Although burying one animal is unlikely to cause an environmental catastrophe, burying multiple animals has been shown to contaminate groundwater (Glanville 2000) and was not allowed for disposal of BSE suspect animals in Britain (Scudamore et al. 2002). As well, burial is slow to dispose of animals. Buried carcasses may not be fully degraded for years (Freedman and Fleming 2003) while production of noxious odours will continue unabated.

Other possible hazards of using burial for mortality disposal include danger of livestock, machinery or farm workers falling into open excavations. Open holes should be signed/flagged and covered as soon as possible. Unfortunately, burial pits are rarely covered after addition of each animal, which leads to scavenging of carcasses prior to complete burial and many of the same problems seen with natural exposure.

Incineration

Advance preparation: need to have incinerator (large barrel or burn pile is not incineration). Fuel for incinerators is often wood or natural gas. Although incinerators can be a mobile unit shared between farms, fuel source will determine location. Contamination of air is greatly reduced in high-temperature incineration as compared to burning, but common sense (knowledge of prevailing winds, distance to neighbours) should be used.

Other considerations: Time required will be dependent on the size of the incinerator. A small incinerator may take several days to completely incinerate a mature cow. Ash needs to be cleaned from the incinerator after use and disposal of ash may be a problem. Some localities such as Quebec require a second combustion chamber (after-burner) to reduce air contamination.

Advantages of incineration include: disposal of mortalities as they arrive – no need to stockpile. Residue from properly incinerated carcasses will not attract vermin and the mortality volume is almost completely reduced. As well, pathogen control from incineration is excellent, with incineration the method of choice in the EU for disposal of cattle (or parts thereof) possibly containing BSE prions (Scudamore et al. 2002; Paisley and Hostrup-Pedersen 2005). However, transport of highly infectious/dangerous materials to off-site high-capacity incinerators is also a biosecurity risk as would be sharing an incinerator between farms.

The primary obstacle to incineration is the major capital investment for equipment and the on-going expense for fuel. Maintenance costs for incinerators are also high. Safety hazards (starting new fires, injury to family members) are associated with high-temperature incinerators. As well, incinerators may not be legal in some jurisdictions, especially those in close proximity to urban areas.

Burning

Due to the excessive air contamination from burning carcasses and possibility of spread of pathogens due to incomplete combustion (Gloster et al. 2001; Scudamore et al. 2002; Jones et al. 2004) burning cannot be recommended as a means of disposal of dairy mortalities unless the dairy is in an extremely remote location with no near neighbours. As well, open burning of carcasses is a substantial fire risk and should not be attempted in dry or windy conditions. In most locales, burning carcasses is not a legal means of disposal. Dead cows are not prone to spontaneous combustion – considerable time and fuel will be required.

Biodigestion

Biodigestion is an appealing concept. In summary, livestock mortalities, manure, sewage sludge or other organic wastes are fed into an anaerobic chamber. Microbes then ferment the carbon sources into methane that can then be used to generate electricity, off-setting power usage at the farm. On the down-side, biodigestion technology is mostly in developmental stages in north America with a large capital outlay required (dependant on size of biodigester) and as yet low efficiency of methane production.

Successful operation of a biodigester relies on simple concepts from basic microbiology. In order to keep microbes happy, a steady flow of readily fermentable and similar substrates are required (whole cattle would require processing into a suitably small size for the digester). Microbes also prefer a constant temperature, which will require inputs of heat in the Canadian climate. Biodigesters have been shown to reduce efficiency at ambient temperatures of less than 30^{o} C (Dhaked et al. 2005). Currently most on-farm biodigesters use liquid manure as a feedstock (Amaral et al. 2004), although use of livestock mortalities in biodigesters has been proposed (Pedraza et al. 2002). The effluent from the biodigester is then used as a fertilizer, although the extent of pathogen/ parasite control from biodigestion remains to be evaluated.

Composting

Scientific methods of composting were first developed by the poultry (Rynk 1992) and pork industries (Henry 1995), with composting of cattle mortalities a more recent development (Mukhtar et al. 2003). Some advance preparation is required including a suitable area for composting (at least 100 m from wells, or bodies of water). Either bins (Stanford et al. 2000) or windrows (Fonstad et al. 2003) can be successfully used for mortality composting, although if windrows are used the composting area should be suitably secure to repel scavengers. As well, the composting site needs to be well-drained, have year-round access and able to contain run-off from rain or snow (Anonymous 2002). Turning the compost is essential to completely degrade the carcasses (Stanford et al. 2000). As a general rule, mature cattle mortalities should be turned at least 3 times at 3 month intervals. Specialized compost turning equipment is not required as a tractor with front-end loader works well for turning windrows containing cattle.

To build cow compost, besides the dead cows, a carbon source (sawdust, straw, wood chips) and solid or liquid manure are required. There are three requirements for successful composting of cattle mortalities: First, air must infiltrate the compost piles. Second, water content of the mixture should be 50-60%. The mixture should feel wet, but no moisture should drip from it if a handful is squeezed. Third, the carbon/nitrogen ratio should be between 20

and 40:1. Adding equal volumes of carbon source (straw, sawdust) and dead cattle will ensure that the carbon: nitrogen ratio is in the correct range.

Using manure in the mix allows year-round composting, with twice as much solid manure added as mortalities to the compost pile. If 'solid' manure is too wet when building the pile, oxygen is excluded and noxious odours are produced. For liquid manure systems the simplest approach is to build the straw base (at least 80 cm thick), lay the carcass on top of the straw and cover with another 80 cm of straw. Then, gently drizzle liquid manure over the straw, allowing the manure to percolate throughout the compost Do not add so much manure that it begins to run off the compost. Water may have to be added to the manure slurry. A general recipe is 1 front-end loader bucket of dairy slurry to 4.5 tractor buckets of straw, with approximately 500 litres of water added to the slurry to increase percolation of the manure through the straw (Sexton, Unpublished).

Compost is built in layers, starting with a layer of carbon source at the bottom of the pile. Dead cattle are placed on the straw layer and should be separated (not touching each other) and covered with a layer of solid manure (or straw if using liquid manure) shortly after addition to the compost pile.

Composting requires active management. Temperatures of the piles must be monitored and once the piles cool to 30^{o} C, the compost should be turned and water added to the pile if necessary. Turning the compost is essential to ensure complete breakdown of bones and tissues. Provided the compost heats to greater than 55^{o}C, most bacterial and viral diseases and parasites will be killed (Stanford et al. 2000; Fonstad et al. 2003). However, the effectiveness of composting at elimination of recalcitrant bacteria such as *Listeria* or prions is currently being evaluated, although preliminary studies have demonstrated the ability of composting to eliminate infectivity in scrapie prions (Huang et al. 2004).

Advantages of composting for mortality disposal include: relatively low cost, excellent pathogen and parasite control (although jury is still out on *Listeria* and BSE), year-round use, environmental neutrality and effectiveness for one animal or many. Once compost is actively heating scavengers are not attracted to mortalities. Compost that fails to heat from lack of oxygen or water can always be rescued by either turning or adding water (if necessary). In well-managed compost (properly heating), the odour is that of manure and no dead animal stench is present.

Composting may not be for everyone as it requires some labour/ management, time (3 months for calves, approximately 9 months for mature animals), and space. In wet climates, compost may have to be covered in vapour barrier to avoid over-wetting. In dry climates, piles that are too small may desiccate (mummified carcass). If placed too close to the edge of the

pile, bones may not degrade and will have to be added to next batch of compost and bones of mature animals are more difficult to degrade than those of calves.

Conclusions

No single option for disposal of mortalities can be recommended in all circumstances, although composting and incineration are likely the two on-farm disposal methods most applicable to dairies. When choosing disposal option(s), transmission of pathogens or parasites to surviving herd mates, direct expense of the disposal method, indirect costs of the method (legal action by irate neighbours) and environmental impacts should all be considered.

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Deadstock Disposal Resources from Other Jurisdictions

Disposal Option Resources

General

- **Animal Mortality Facility** (Iowa)
- **Composting Animal Mortalities on the Farm** (Maryland)
- **Dead Animal Disposal** (South Carolina)
- **Managing Animal Deaths: Your Options** (North Carolina)
- **Disposal of Dead Goats** (Maryland)
- **Disposal Methods of Livestock Mortality** (Nebraska)
- **Mortality Management** (US)
- **Livestock Mortality Management** (Colorado)
- **Mortality Management Options** (Georgia)
- **Static Pile Composting if Wild Birds, Game Birds and Backyard Poultry to Prevent the Spread of Avian Influenza (H5N1)** (Virginia)
- **Mortality Disposal** (Manitoba)
- **Managing Livestock Mortalities** (Saskatchewan)

Collecting and Rendering

- **Rendering Cost Estimator for Hog Production** (Alberta)
- **Essential Rendering** (online book produced by rendering industry)

Composting

Basics of Composting

- **The Composting Process - Fundamental Principles** (pdf) — The Composting Council of Canada: Action on Waste
- **The Science and Engineering of Composting** (Cornell, New York)

General

- **On-farm Composting of Livestock Mortalities** (Washington State)
- **On-farm Livestock Mortality Management** (Nova Scotia)
- **On-farm Composting Handbook** (Cornell, New York)
- **Composting Animal Mortalities** (Minnesota)
- **Composting Dead Livestock** (Iowa)
- **Composting Animal Mortalities: A Producer's Guide** (Saskatchewan)
- **Animal Composting Offers Disposal Alternatives for Livestock Producers** (Missouri)
- **Dead Animal Composting** (Pennsylvania)

- **Disposal of Dead Animals** (Vermont)
- **Farm-Scale Composting Resource List** (US)
- **Farm Mortality Composting** (Washington State)
- **Composting Animal Mortalities on the Farm** (Maryland)

Cattle

- **Low Maintenance On-farm Cattle Composting** (Manitoba)
- **Draft Guidelines for Emergency Composting of Cattle Mortalities** (Iowa)

Poultry

- **Poultry Mortality Composting** (Alberta)
- **Poultry Mortality Composting Guide** (Georgia)
- **Composting Poultry Mortality** (North Carolina)
- **In-House Composting of Turkey Mortalities as a Rapid Response to Catastrophic Losses** (Virginia)
- **Guidelines for In-House Composting of Poultry Mortalities as a Rapid Response to Avian Influenza** (Virginia)

Sheep

- **Composting Dead Sheep** (Maryland)
- **Composting Dead Sheep and Lambs** (Alberta Sheep)
- **Disposal of Dead Goats** (Maryland)

Swine

- **Swine Mortality Composting** (Alberta)
- **Composting Swine Mortalities in Iowa** (Iowa)
- **Composting for Mortality Disposal on Hog Farms** (Virginia)
- **Composting as a Suitable Technique for Managing Swine Mortalities** (North Carolina)
- **Composting Dead Swine** (Missouri)
- **Composting Swine Mortality Principles and Operation** (Ohio)

Burial

- **Water Quality Impacts of Burying Livestock Mortalities**
- **Burial** (Manitoba)

Emergency Mortality Disposal

- **Catastrophic Mortality Disposal**
- **Emergency Livestock Mortality Composting** (Iowa)
- **Management of Animal Mortality in Georgia**
- **Poultry Mortality Disposal Methods Following Catastrophic Loss** (George)

Incineration

- **Mortality Management - Incineration** (US)

Legislation and Guidelines in Other Jurisdictions

Canada

- **Disposal of Dead Animals and Other Farm Wastes** (Newfoundland)
- **Guidelines for Disposal of Dead Farm Livestock** (Prince Edward Island)
- **La recuperation des animaux morts** (Quebec)

- **Livestock Manure and Mortalities Management Regulation** (Manitoba)
- **Incinerators Regulation** (Manitoba)
- **Overview of the Destruction and Disposal of Dead Animals Regulation** (Alberta)
- **Mortality Disposal** (British Columbia)

United States

- **Dead Animal Disposal Laws in Missouri** (Missouri)
- **Illinois *Dead Animal Disposal Act* (Regulations)** (Illinois)
- **Livestock Composting Regulations** (Nebraska)

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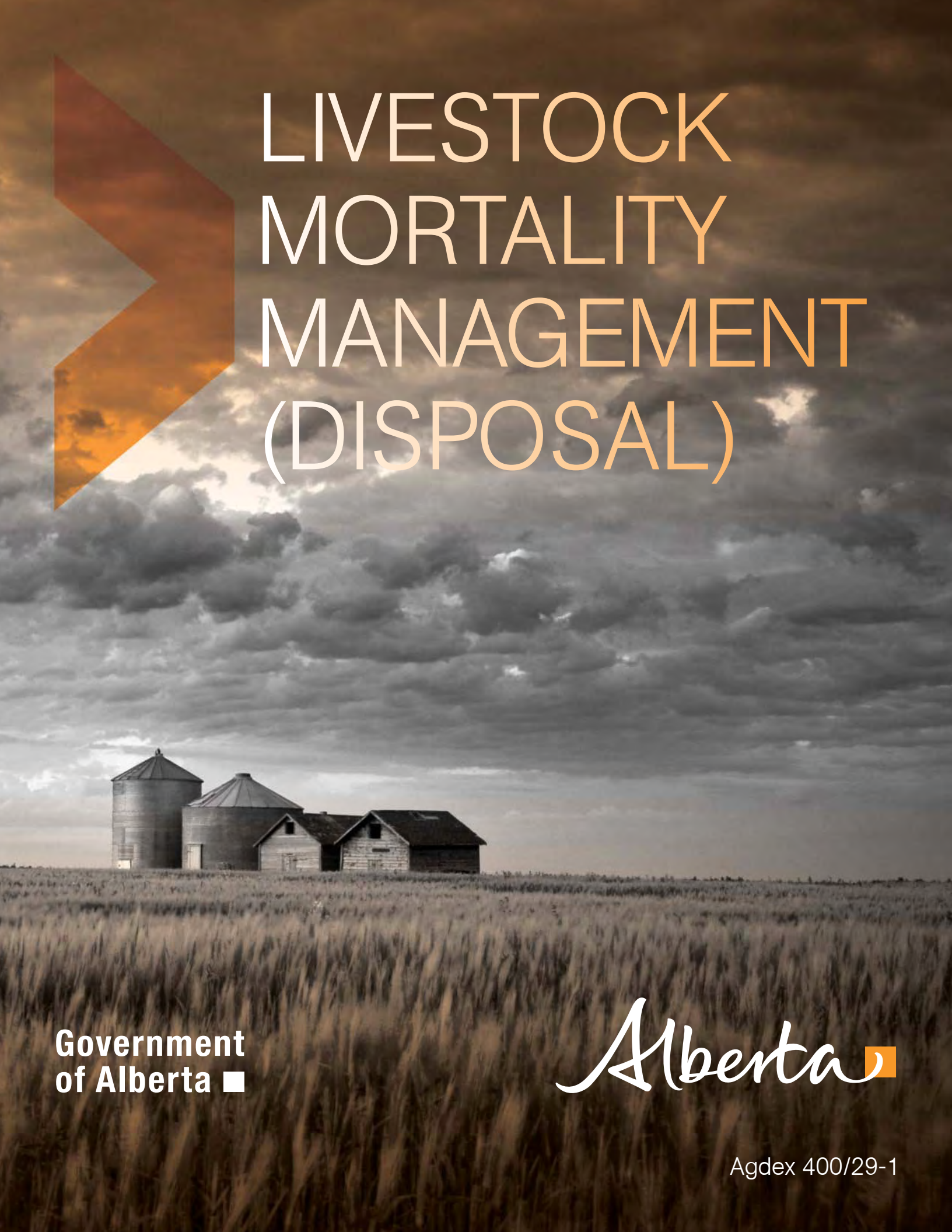
LAST MODIFIED: NOVEMBER 24, 2011

LIVESTOCK MORTALITY MANAGEMENT (DISPOSAL)



Government of Alberta

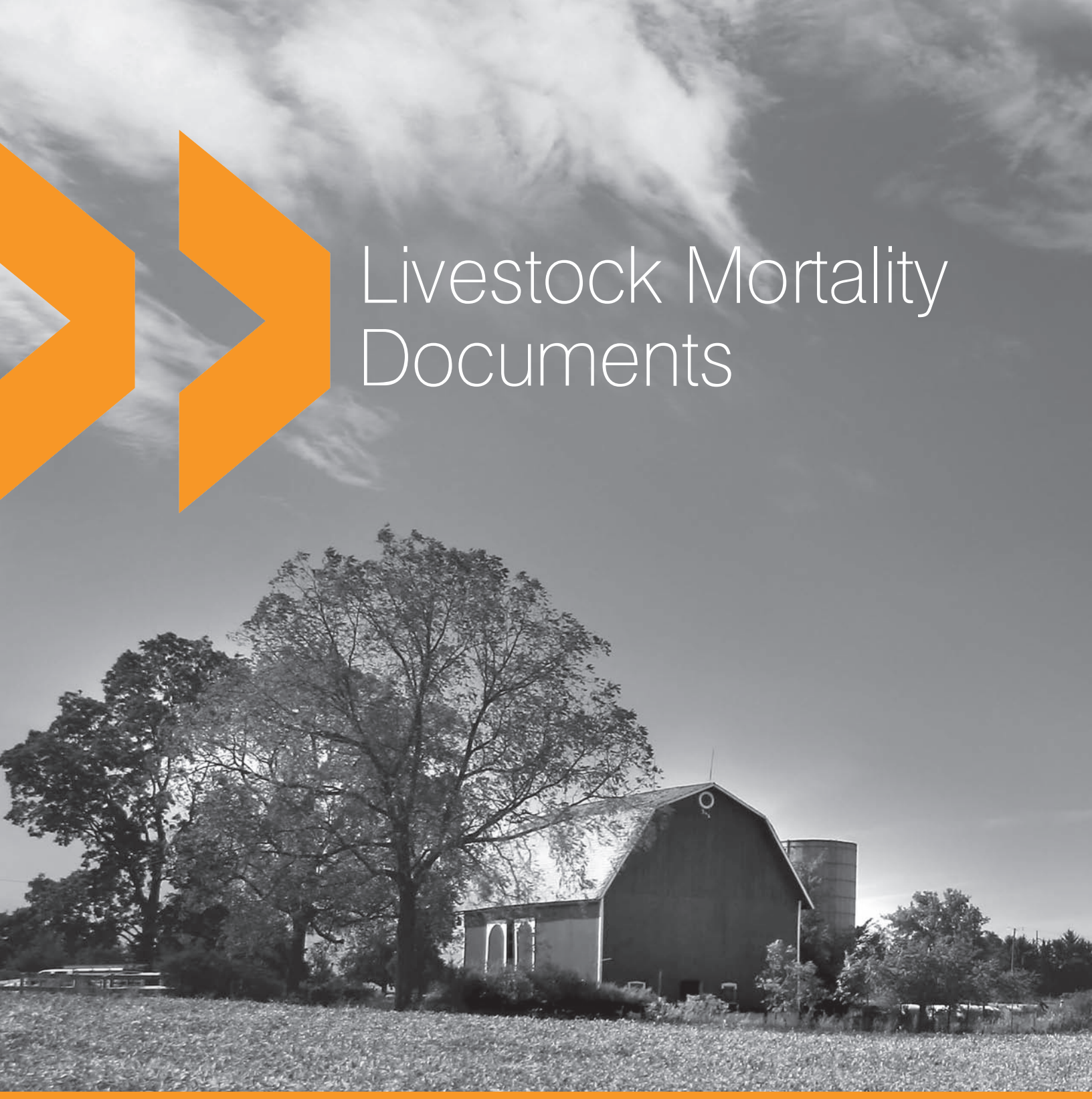
Alberta

Agdex 400/29-1

LIVESTOCK MORTALITY management (disposal)

contents

Livestock Mortality Documents



Poultry Mortality Composting Agdex 450/29-1

Swine Mortality Composting Agdex 440/29-1

Large Animal Mortality Composting Agdex 400/29-4

Livestock Mortality Burial Techniques Agdex 400/29-2

mortality disposal

Livestock producers are in the business of producing marketable meat products. However, every livestock producer must face the reality of carcass disposal, regulated by the Destruction and Disposal of Dead Animals Regulation of the *Animal Health Act*, Appendix A. Dead animals must be disposed of in an acceptable manner within 48 hours of death. Mortalities can be composted, incinerated, buried, rendered or naturally disposed.

Proper disposal of carcasses is important for both the prevention of livestock disease transmission and the protection of air and water quality. Access to carcasses by scavengers is only permitted under the guidelines for natural disposal.

The environmental considerations for improper disposal include:

- Odour – decomposition of organic matter, particularly the anaerobic (lacking oxygen) breakdown of proteins by bacteria, will produce a foul odour.
- Scavengers – ravens, magpies, coyotes, etc. and insects can transmit disease and are a nuisance.
- Pathogens – disease-causing spores may still be viable.
- Excess Nutrients – concentrated source of nitrogen.
- Nuisance – visible carcasses and bones fuel social issues and can puncture tires.

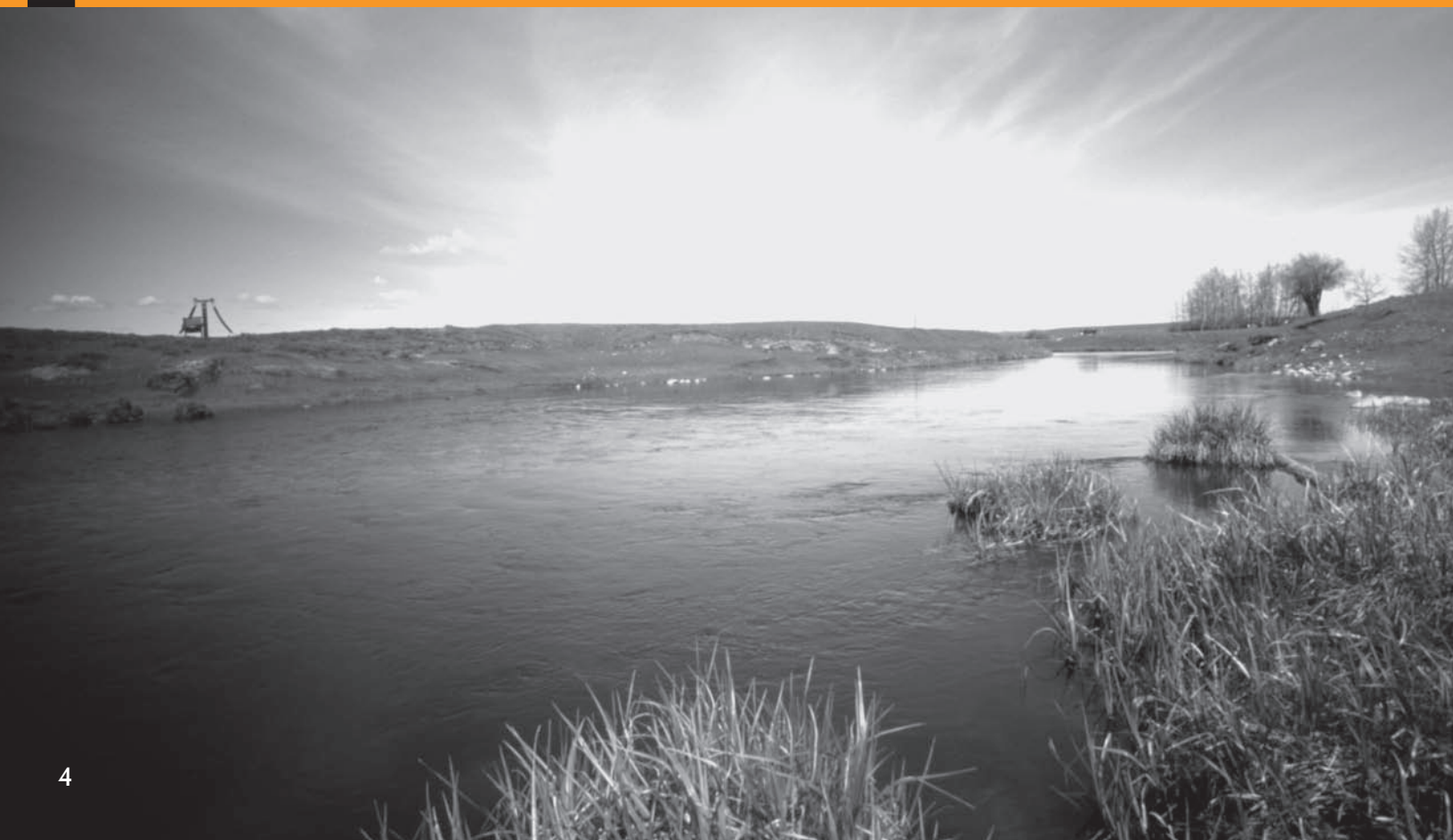
potential environmental and biosecurity risk

POTENTIAL RISK

lowest risk

- Compost in a properly managed system or burn in an approved incinerator on the farm.
- Bury in appropriate soils or store frozen for spring burial or rendering plant pick-up (Refer to Livestock Mortality Burial Techniques, Agdex 400/29 – 2).
- Partially buried or carcass left outside for scavengers or to decay.

highest risk



disposal options

Incineration

Thorough and complete incineration of carcass (including all bones) is one option for livestock producers. While incineration can be convenient for those with access to the necessary equipment, producers need to realize that "complete incineration" will not result from a simple burn pile or barrel; furthermore, a simple burn pile or barrel cannot meet emissions standards for combustion. Double chambered incinerators reach temperatures greater than 850 °C (1560 °F) and provide oxygen to complete the burning process thus reducing particulate and gas emissions.

Incinerators must be loaded and operated according to manufacturer's recommendations to maximize equipment life and minimize emission problems. Ashes should be removed frequently to maximize combustion and prevent damage to equipment. Nuisance complaints generated by poor maintenance and operational efforts are common.

Fuel for incinerating carcasses is a significant expense. The cost of operation and discipline required to prevent complaints has reduced the popularity of incineration in recent years.

Producers choosing to install an on-farm incinerator must operate it in accordance with the Code of Practice for Small Incinerators (Alberta Environment 2005) or the Substance Release Regulation (AR 124/93) of the *Environmental Protection and Enhancement Act* (Government of Alberta 2006).

incineration

Advantages:

- Complete reduction of volume.
- Rapid oxidation to carbon and water.
- Environmentally safe (may require an air permit).
- Can dispose of mortalities as they are generated, therefore no temporary storage required.
- Residue from properly incinerated carcasses will not attract insects or rodents.
- System can be mobile or a co-op could be formed to purchase an incinerator to be shared between farms.

Disadvantages:

- Major capital investment along with expensive fuel costs.
- Must be maintained (burners wear out and soot must be scrubbed out to prevent stack fires).
- Ash has no fertilizer potential and there may be a trace of heavy metals from micronutrients fed to the animals.
- Safety hazards associated with high temperature incinerators.

Livestock Burial

Burial is a suitable practice for summer yet difficult during winter due to frozen ground conditions. Dead animals can be placed in a pit which is then backfilled each time a carcass is added. Carcasses must be covered with either

- A minimum of 1 m (3.3 ft) of compacted soil.
- 0.15 m (6 in) of soil, 0.5 kg (1 lb) of quicklime for every 10 kg (22 lbs) of mortality, and a lid.

For more information see Livestock Mortality Burial Techniques, Agdex 400/29-2.

Burial requires great care in site selection because as carcasses decompose they release materials that pollute groundwater. Burial sites should be located in low permeable soils. Areas with a high groundwater level or shallow aquifer must be avoided. The weight of dead animals in the pit may not exceed 2500 kg (5500 lbs). Refer to Appendix A for site selection criteria.

Advantages:

- Inexpensive (if using your own equipment).
- Biosecure (no trucks coming from other farms to pick up carcasses).
- Convenient.

Disadvantages:

- Difficult to impossible in winter.
- Can cause groundwater pollution.
- No burial sites where the bottom of the pit is less than 1 m (3.3 ft) above the seasonal high water table.

Rendering

Another popular option is transporting carcasses to an approved disposal plant. Rendering is a convenient, clean and waste-free solution that ultimately recycles the remains into other products. The renderer generally provides on-farm pick up for a fee. However, some companies are selective about which species they accept and which geographic locations they serve. Since transportation is expensive, pick up will be scheduled when the renderer can make several stops in the same area.

Rendering processes dead animals into feed ingredients such as bone meal, meat meal, feather meal, and liquid animal fat. Animals that die during the winter can be frozen and delivered to the renderer at convenient intervals. Rendering companies will generally not accept carcasses that do not remain intact when handled. Depending upon the end product of the rendering process, there may be other restrictions on carcass quality and condition.
Refer to the Yellow Pages Directory under "Rendering Companies" for companies providing this service.

Timely pick up is the biggest challenge when using rendering as a mortality disposal method, specifically during the warm and hot seasons. Collection vehicles must employ proper biosecurity measures to prevent disease transmission between farms. Costs for rendering continue to increase and the expense and logistics of collecting small volumes of carcasses on a frequent basis prevents this disposal method from being widely accepted.

Some pick up fees have been instituted regardless of the volume of mortalities, therefore some producers have chosen to invest in on-site preservation methods such as refrigeration, acid preservation and fermentation. The costs of on-farm storage of carcasses should be determined as they may outweigh the benefit of less frequent pickups by the renderers.

Refrigeration:
Generally limited to poultry or young animals, refrigeration units are expensive to purchase and operate. As a preservation method, refrigeration works very well; however, the unit must have sufficient refrigeration capacity to rapidly remove heat from the carcass.

Acid Preservation:
Punctured carcasses are placed in an acid solution (e.g. 3% sulfuric acid) which preserves the nutrient content and inactivates pathogens and microorganisms. The renderer can process the acid – preserved organic matter – into a high nutrient feed ingredient. Acids and the associated equipment are expensive and safety is a primary issue.

Fermentation:
Lactic acid fermentation is a process that provides a way to store carcasses for at least 25 weeks. Carcasses are mixed with a carbohydrate source and a culture innoculant. When the pH is reduced to 4.5, the microorganisms are inactivated and the decomposition process ceases. This process is referred to as pickling.

Advantages:
- The carcass is completely removed from the farm.
- The rendering process destroys most diseases.

Disadvantages:
- Pathogenic transmission during pick up and transportation is possible (care must be taken to prevent the pathogens from moving through the system).
- Increasing cost due to reduced marketability of rendered products.

Composting

Composting is a controlled process. During the process, bacteria, fungi and other organisms break down organic materials to a stable mixture called compost, while consuming oxygen and releasing heat, water and carbon dioxide. The finished compost resembles humus and can be used as a soil amendment. Composting reduces the volume of the parent materials and most pathogens are destroyed if the process is controlled.

Composting of carcasses is gaining popularity. For more details on composting, see Poultry Mortality Composting, Agdex 450/29-1, Swine Mortality Composting, Agdex 440/29-1 and Large Animal Mortality Composting Agdex 400/29-4.

Proper management of the composting facility is required to ensure composting of the carcasses occurs. The basic requirements for successful composting are:

- Aerobic conditions (in the presence of oxygen).
- Proper temperature, moisture, pH and carbon to nitrogen ratio.
- Maintaining a temperature of 55 °C (131 °F) for at least three days.

Other factors that must be considered when composting are:

- Properly constructed facilities and the use of primary and secondary areas.
- Facility design must limit access of scavengers.
- Equipment needs including the use of a front-end loader.
- Management, monitoring and turning requirements of compost.
- Ensuring compost is applied to crop land without direct contact with livestock.
- Availability of necessary inputs of litter, straw and manure.
- The location of compost, Appendix A.
- Contaminated run-off must be collected and surface water directed away from the composting facility.

Advantages:

- Biosecure.
- Year-round use.
- Relatively inexpensive.
- Environmentally sound.
- Value-added product to sell or use (sales regulated by the *Fertilizer Act*).
- Best and recommended method to handle catastrophic losses.
- Heat of composting process kills most pathogens, weed seeds and insect larvae.
- Scavengers do not bother actively heating compost.

Disadvantages:

- May be labour intensive.
- Requires an impervious pad.
- Bin composting requires rot resistant walls and a cover to repel rain.
- Takes practice to develop the technique.
- Requires a carbon source.

Natural Disposal

Disposal of carcasses by scavengers is a permitted method in Alberta but because of the very high probability of disease spread and of creating a public nuisance, this method is not recommended. All regulations concerning natural disposal are outlined in Appendix A.

caution

If an animal is known or suspected to have died from an infectious or reportable disease, the owner must report this to authorities and dispose of the animal in the manner they recommend. For an animal that has been euthanized, owners need to prevent scavengers from gaining access to the dead animal. These animals cannot be disposed of by natural disposal.

Reportable Diseases are those which require action to control or eradicate because they are a threat to animal or human health, food safety or the economy.

Notifiable Diseases are those which simply require monitoring for trade purposes or to understand their presence in Alberta. No action will be taken.

Anyone who knows or ought to know that any of these diseases are or may be present in an animal MUST report that fact to the Office of the Chief Provincial Veterinarian within 24 hours by calling 1-800-524-0051.

SRM Alert – Cattle Carcass Disposal (Canadian Food Inspection Agency 2009)

In 2007, the Canadian Food Inspection Agency's (CFIA) enhanced feed ban was enacted to control the handling, transporting and disposal of specified risk material (SRM). SRM includes the skull, brain, trigeminal ganglia (nerves attached to the brain), eyes, tonsils, spinal cord and dorsal root ganglia (nerves attached to the spinal cord) of cattle aged 30 months or older and the distal ileum (portion of the small intestine) of all cattle. Under the regulations, a permit is required to receive, remove from any premises, use, convey (other than from one area to another on the same premises), treat, store, export, sell, distribute, confine or destroy SRM in any form, including bovine dead stock from which SRM has not been removed. The location receiving the SRM must have a separate permit.

The Health of Animals Regulations allows for cattle producers to dispose of SRM on the premises where the animal was found dead without the need for a CFIA permit. The CFIA has defined "site" as being contiguous properties whether or not there is a public access or right of way which traverses the properties. Therefore, a permit is needed to move SRM from one property to another if traveling on public land (roads) even if the sites are both owned by the same person.

A farmer may obtain an annual CFIA permit to transport SRM to this non-contiguous site. However, the receiving site requires an annual permit to receive the SRM and needs to meet defined minimal requirements as outlined on the permit.

The SRM permit application form is available online at www.inspection.gc.ca/bse. It should be completed and submitted to the nearest CFIA district office. If the situation is time-sensitive or occurs outside of normal business hours, call 1-800-442-2342 to request an emergency SRM permit. You will be directed to a CFIA inspector on-call who will request the following information:

- The transporter's name, address, phone number, e-mail address.
- A description of the conveyance used to transport the SRM (license plate of truck or description of tarp/bucket).
- The SRM permit number of the site that will be receiving the SRM (unless it is the farm of origin of an animal dying in transit).
- The number of carcasses and approximate weight of SRM being transported;
- CCIA or ATQ tag number(s).

The inspector will provide the permit number which will be valid for 48 hours or less. An actual copy of the SRM permit will be provided during an ensuing inspection.

CFIA's SRM permits to transport, accept and dispose of SRM are free. For more information, visit www.inspection.gc.ca/bse, call 1-800-442-2342 or visit your local CFIA office.

appendix A act and regulation

1 In this Regulation,

(a) "composting", in respect of a dead animal, means decomposing the dead animal or a part of it through a controlled bio-oxidation process that results in a stable humus-like material;

(b) "dead animal" means

(i) a domestic mammal or bird, or part of a domestic mammal or bird, that has died from a cause other than having been slaughtered for human consumption, and

(ii) inedible offal or condemned material from animals slaughtered for human consumption;

(c) "licensed", in respect of a rendering plant, means licensed under the *Health of Animals Act* (Canada);

(d) "natural disposal", in respect of a dead animal, means disposing of the dead animal in order to allow scavenging;

(e) "owner", in respect of a dead animal, means the owner of the dead animal or a person who is in possession or control of it;

(f) "rendering plant" means a rendering plant as defined in the *Health of Animals Act* (Canada);

(g) "reportable disease" means

(i) a disease designed as a reportable disease under the *Health of Animals Act* (Canada), or

(ii) a communicable disease referred to in section 1 of the Designated Communicable Diseases Regulation (AR 8/98).

Methods of Disposal

2 (1) The owner of a dead animal shall dispose of the animal within 48 hours of its death in accordance with this section.

(2) When an animal is known or suspected to have died from an infectious disease or from a reportable disease, the owner of the animal shall dispose of it in accordance with the directions of an inspector appointed under the *Health of Animals Act* (Canada) or a chief provincial veterinarian or an inspector appointed under section 6(2) of the *Animal Health Act*, but in no case may the animal be disposed of by natural disposal.

(3) The owner of the dead animal that has been euthanised with drugs or other chemical substances shall immediately take steps to prevent scavengers from gaining access to the dead animal between the time the animal is euthanised and the final disposal of the animal.

(4) Subject to subsection (2), the owner of the dead animal shall dispose of it by

(a) burying it in a farm burial pit, if

(i) the weight of dead animals in the pit does not exceed 2500 kg, unless subsection (4.1) applies,

(ii) the pit is

(A) at least 100 metres from wells or other domestic water intakes, streams, creeks, ponds, springs and high water marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(B) at least 100 metres from any residences,

(C) at least 100 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(D) at least 300 metres from a primary highway,

(E) at least 100 metres from a secondary highway, and

(F) at least 50 metres from any other road allowance,

(iii) the pit is covered with

(A) a minimum of one metre of compacted soil, or

(B) a wooden or metal lid that is designed to exclude scavengers, if quicklime is applied to the dead animal in sufficient quantities to control flies and odour, and

(iv) the bottom of the pit is at least one metre above the seasonal highwater table,

(b) burying it in a Class I or Class II landfill as defined in the Waste Control Regulation (AR 192/96), if the site has a full-time operator who agrees to immediately bury the dead animal,

(c) burning it in accordance with

(i) the Substance Release Regulation (AR 124/93), or

(ii) the Code of Practice for Small Incinerators, published by the Department of Environment,

(d) composting

(i) in a Class I compost facility as defined in the Waste Control Regulation (AR 192/96) that is designed, constructed and operated in accordance with sections 6 and 7 of the Code of Practice for Compost Facilities, published by the Department of Environment, or

(ii) subject to subsection (5), in a farm open compost pile that is

(A) located at least 100 metres from wells or other domestic water intakes, streams, creeks, ponds, springs and highwater marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(B) located at least 100 metres from any residences,

(C) designed in a manner that will exclude scavengers, and

(D) at least 100 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(e) transporting it to a licensed rendering plant for disposal, or

(f) subject to subsection (6), natural disposal.

(4.1) Where because of flood, fire, starvation or other similar disaster there are multiple deaths of animals and the weight of the dead animals exceeds 2500 kg, the animals may be buried in a farm pit subject to the approval of and in accordance with the direction of a chief provincial veterinarian or an inspector appointed under section 6(2) of the *Animal Health Act*.

(5) Where under subsection (4)(d)(ii) animals are to be composted in a farm open compost pile,

(a) repealed AR 189/2007 s2,

(b) the maximum volume of the animals or parts of them must not exceed 25% of the total compost pile, and

(c) the animals or parts of them must be covered by at least 15 cm of composting material.

(6) Subject to subsection (2), a dead animal, other than inedible offal or condemned material, may be disposed of by natural disposal if

(a) the animal is disposed of on property owned or leased by the owner of the animal,

(b) the animal was not euthanised with drugs or other chemical substances,

(c) the total weight of the animals being disposed of at any one site does not exceed 1000 kg,

(d) there is a distance of at least 500 metres between disposal sites,

(e) the disposal site is

(i) at least 500 metres from wells or other domestic water intakes, streams, creeks, ponds, water wells, springs and high water marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(ii) at least 400 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(iii) at least 400 metres from any residences,

(iv) at least 400 metres from any road allowance, and

(v) at least 400 metres from any provincial park, recreation area, natural area, ecological reserve, wilderness area or forest recreation area, and

(f) disposing by natural disposition does not create a nuisance.

(7) Notwithstanding, subsection (1), the owner of a dead animal may store the dead animal for more than 48 hours after its death if it is stored

(a) for not more than one week in an enclosed structure with impervious walls and floors that have been constructed for the storage of dead animals,

(b) outside during winter months when the ambient temperature is low enough to keep the dead animal completely frozen,

(c) in a freezer unit, or

(d) in accordance with the directions of an inspector appointed under the *Health of Animals Act* (Canada) or the chief provincial veterinarian or an inspector appointed under section 6(2) of the *Animal Health Act*.

AR 229/2000 s2;238/2002;255/2004;189/2007;288/2009

Rendering Plant

3 (1) The owner or operator of a rendering plant shall ensure that

(a) a dead animal rendered at the plant is subjected to such temperature and pressure as is necessary to render every portion of the carcass free from all viable pathogenic organisms, and

(b) microbiological quality assurance processes are in place to prevent the occurrence of viable pathogenic organisms.

(2) The owner or operator of a rendering plant when shipping material from a dead animal to another rendering plant shall ensure that

(a) the material is shipped in such a manner so as to prevent

(i) any dissemination of pathogenic organisms into the environment from the leakage of blood or other body fluids, and

(ii) the contamination of any animal or human food,

(b) the other rendering plant will render the material free of all viable pathogenic organisms, and

(c) a complete record is kept of the shipment, including the date of shipment, method of transport and the name and address of the rendering plant to which it was shipped.

Diagnosis of Animal Diseases

4 Nothing in this Regulation prohibits the collection and transport of a dead animal as may be required by a veterinarian or the owner of the dead animal for the diagnosis of animal diseases.

Dead Animal as Food

5 No person shall feed a dead animal to other food producing animals unless

(a) the material from the dead animal has been properly rendered at a licensed rendering plant and the prohibition to feed prohibited material to ruminants under the Health of Animals Regulation (Canada) is complied with, or

(b) the feeding of the material is a recognized means of stimulating natural immunity for specific disease conditions and the prohibition to feed prohibited material to ruminants under the Health of Animals Regulation (Canada) is complied with.

Advisory Committee

6 The Minister may appoint an advisory committee under section 7 of the *Government Organization Act* consisting of both government and industry representatives to oversee the implementation of this Regulation.

Repeal

7 The Regulations Regarding the Destruction and Disposal of Dead Animals (AR 128/66) are repealed.

Expiry

8 For the purpose of ensuring that this Regulation is reviewed for ongoing relevancy and necessity, with the option that it may be repassed in its present or an amended form following a review, this Regulation expires on November 30, 2012.

AR 229/2000 s8;354/2003;241/2009;136/2010

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for more information

Emergency Carcass Disposal

Contact your local rural municipality for assistance.

Reportable Diseases

Office of the Chief Provincial Veterinarian
780-427-3448 or toll-free by first dialing 403-310-0000
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/cpv4264

Alberta's Notifiable and Reportable Diseases Website

http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/afs12455

Canadian Food Inspection Agency

Visit www.inspection.gc.ca/bse, call 1-800-442-2342 or visit your local CFIA office listed on the following page.

Canadian Food Inspection Agency (CFIA) Offices

Canadian Food Inspection Agency (CFIA)
Alberta South Calgary
110 Country Hills Landing Northwest
Calgary, Alberta T3K 5P3
Telephone: 403-299-7660

Canadian Food Inspection Agency (CFIA)
Lethbridge Office – Animal Programs
3605-14th Avenue North
Lethbridge, Alberta T1H 6P7
Telephone: 403-382-3121

Canadian Food Inspection Agency (CFIA)
Coutts Office – Animal Programs
PO Box 130
Coutts, Alberta T0K 0N0
Telephone: 403-344-3808

Canadian Food Inspection Agency (CFIA)
Medicine Hat District Office
7 Strachan Bay Southeast, Suite 105
Medicine Hat, Alberta T1B 4Y2
Telephone: 403-528-6850

Canadian Food Inspection Agency (CFIA)
Animal Programs – Edmonton
7000-113th Street
Edmonton, Alberta T6H 5T6
Telephone: 780-495-3333

Canadian Food Inspection Agency (CFIA)
Edmonton Regional Office – Animal Health
7000-113th Street
Edmonton, Alberta T6H 5T6
Telephone: 780-495-3333

Canadian Food Inspection Agency (CFIA)
Grande Prairie District Office
10135-100th Avenue
Grande Prairie, Alberta T8V 0V4
Telephone: 780-831-0335

Canadian Food Inspection Agency (CFIA)
Vermilion District Office – Animal Health
5016-49th Avenue, Unit B
Vermilion, Alberta T9X 1B7
Telephone: 780-853-5637

Canadian Food Inspection Agency (CFIA)
Red Deer
6503-67th Street
Red Deer, Alberta T4P 1A3
Telephone: 403-340-4204

Canadian Food Inspection Agency (CFIA)
Wetaskiwin District Office
5729-40th Avenue
Wetaskiwin, Alberta T9A 2Z1
Telephone: 780-352-3955

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Brian Koberstein
Vince Murray
Julie Popowicz
Kayla Vaage
Amanda Vanee
Trevor Wallace
Wayne Winchell
all of Alberta Agriculture and Rural Development

Graphic Design:
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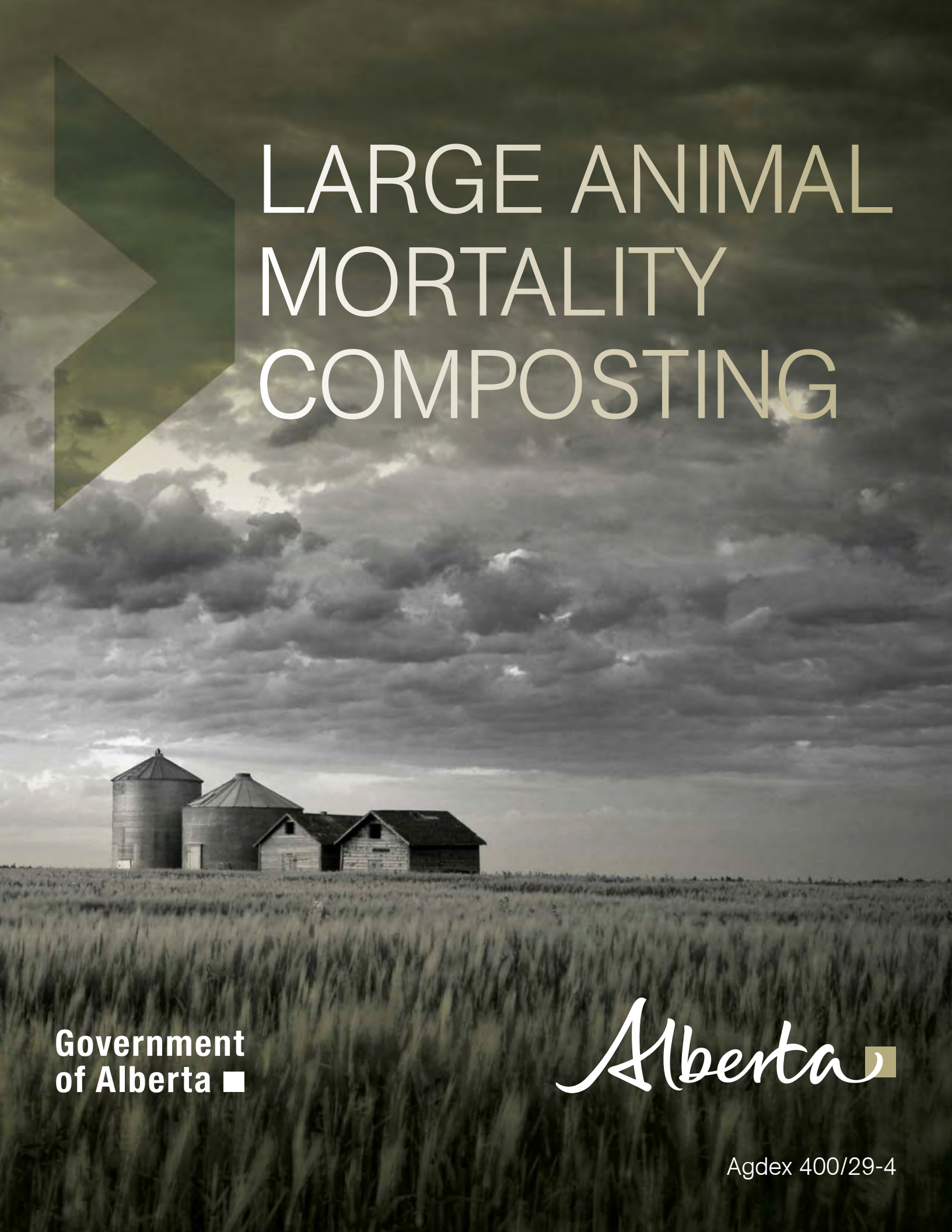
Printed in Canada

LARGE ANIMAL MORTALITY COMPOSTING



Government of Alberta

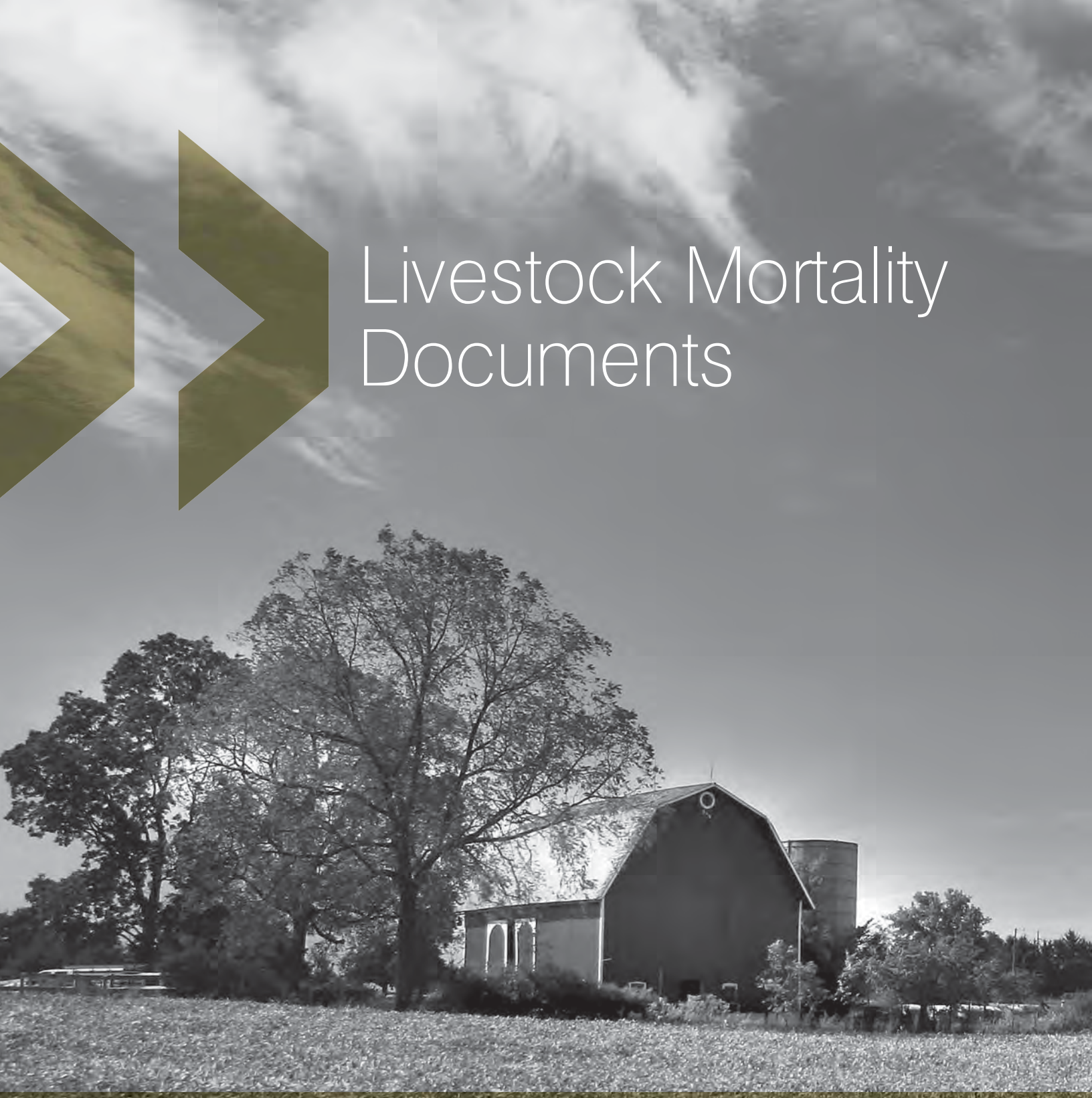
Alberta

Agdex 400/29-4

LARGE ANIMAL MORTALITY composting

contents

Livestock Mortality Documents



Livestock Mortality Management (Disposal) Agdex 400/29-1

Swine Mortality Composting Agdex 440/29-1

Poultry Mortality Composting Agdex 450/29-1

Livestock Mortality Burial Techniques Agdex 400/29-2

mortality disposal

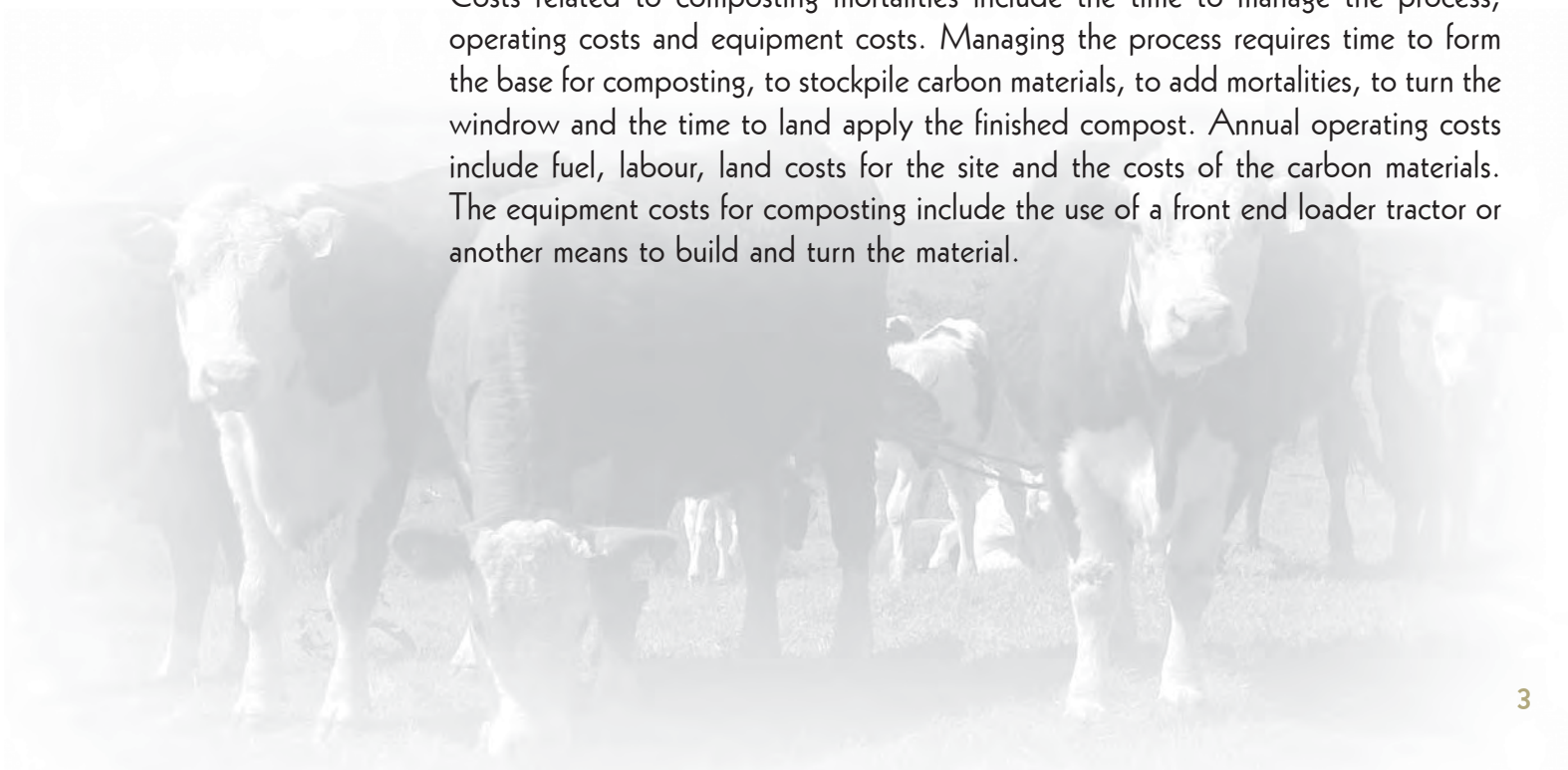
Mortalities happen. Under Alberta's Destruction and Disposal of Dead Animals Regulation of the *Animal Health Act*, Appendix A, the owner of a dead animal shall dispose of the animal within 48 hours of its death. Mortalities can be composted, incinerated, buried, rendered, or naturally disposed. Today, animal agriculture is challenged to discover innovative ways to dispose of livestock mortalities. Composting of livestock mortalities is one option. There are two general approaches to livestock mortality composting: bin systems and windrow systems.

The environmental considerations for improper disposal include:

- Odour – decomposition of organic matter, particularly the anaerobic (lacking oxygen) breakdown of proteins by bacteria, will produce a foul odour.
- Scavengers – ravens, magpies, coyotes, etc. and insects can transmit disease and are a nuisance.
- Pathogens – disease-causing spores may still be viable.
- Excess Nutrients – concentrated source of nitrogen.
- Nuisance – visible carcasses and bones fuel social issues and can puncture tires.

Composting in a properly managed system will work to prevent livestock disease transmission, protect air and water quality and reduce the nuisance of carcasses and bones. Composting improperly in an unmanaged system can result in a large nuisance and risks social repercussions.

Costs related to composting mortalities include the time to manage the process, operating costs and equipment costs. Managing the process requires time to form the base for composting, to stockpile carbon materials, to add mortalities, to turn the windrow and the time to land apply the finished compost. Annual operating costs include fuel, labour, land costs for the site and the costs of the carbon materials. The equipment costs for composting include the use of a front end loader tractor or another means to build and turn the material.



potential environmental and biosecurity risk

POTENTIAL RISK

lowest risk

- Compost in a properly managed system or burn in an approved incinerator on the farm.
- Bury in appropriate soils or store frozen for spring burial or rendering plant pick-up (Refer to Livestock Mortality Burial Techniques, Agdex 400/29 – 2).
- Partially buried or carcass left outside for scavengers or to decay.

highest risk

livestock mortality composting

- Inexpensive alternative for large animal disposal.
- Can kill pathogens and reduce chance to spread disease.
- Destroys the viability of weed seeds.
- Environmentally safe and valuable soil carbon material.
- Can be operated year round.
- Utilizes equipment available on-farm.
- Low odour generated.
- Low labour and management requirements.
- Publically acceptable.
- "Green" option – recycles and promotes biosecurity.
- Expands social acceptance.

Composting is the biological breakdown of organic materials in an aerobic (presence of oxygen) environment. Livestock mortality composting requires a high-carbon material with moderate moisture levels and good porosity to surround the carcasses which have a high moisture content and nearly zero porosity. The carcasses and carbon materials are layered into the pile and no mixing is done until after the high-rate (primary) stage of composting has occurred. In and around the animal, the process is anaerobic but as gasses are produced and move away, they enter an aerobic zone. Here the gasses are trapped in the surrounding material which supports bacteria to form a biological filter, or a biofilter. Composting livestock mortalities is best described as an "above ground burial in a biofilter with pathogen kill by high temperature."

The carbon material around the carcass serves several key functions:

- Surrounds the carcasses making them less accessible and attractive to pests.
- Absorbs excess liquids released by decomposing carcasses.
- Provides structure and porosity which promotes air movement throughout the material.
- Provides an energy source for microbial growth.

Avoid turning the pile during the primary stage. After this time, the pile is moved to begin the secondary stage. Moving the pile introduces air and mixes the contents leading to uniformity in the finished compost. The secondary pile is then turned and placed in a pile for storage. Bones sometimes remain intact after completion of the storage process. They are generally quite brittle and pose no health risks or danger to equipment when land applied.

While composting is a natural process, it requires proper conditions to occur rapidly, minimize odour and prevent nuisance problems.

keys to success

Nutrient Balance (C:N)

The proper compost mix requires both carbon (C) and nitrogen (N) at the proper ratio near 30:1. This will result in a composting process that generates little odour yet offers an environment where microorganisms can flourish. Fresh carcasses have a low C:N of 14:1. Plant materials such as wood chips, sawdust, chopped corn stover, shredded paper or straw have a high C:N for on-farm mortality composting.

Moisture

Like all living things, microorganisms need water. To encourage their growth and rapid composting, water content of the mixture should be 50 – 60% w.b. (wet basis). It is important to avoid excess water due to the potential for odour and excess liquids released by decomposing carcasses. When fresh large animal carcasses are used, there is usually no need to add extra moisture. If the carbon material is extremely dry (>85% dry matter) or the carcasses have dried out before composting, water may be needed.

Temperature

Temperature is a good indicator of the "health" of the compost process. A probe-type dial thermometer with a 1 m (39 in) stem is good for monitoring temperatures, Figure 1. Temperatures should be checked frequently throughout the pile. Normally, temperatures in the primary stage should rise to 55 – 65 °C (131 °F –149 °F) in 1 or 2 days and peak at 60 – 70 °C (140 °F –158 °F) within 7 to 10 days.

Temperatures above 55 °C (131 °F) over 3 days will kill parasites and fecal and plant pathogens within the pile. However, to maintain high temperatures, the pile must be adequately sized, 2.4 – 3.6 m (8 – 12 ft) wide at the base and 1.5 – 2.1 m (5 – 7 ft) tall. At temperatures above 66 °C (150 °F), microbial activity declines rapidly as compost temperature exceeds 71 °C (160 °F).

Although experience indicates that temperatures above 75 °C (167 °F) are rare, a remote possibility exists that temperatures could rise to spontaneous combustion levels. If temperatures appear to be rising towards 75 °C (167 °F), the compost should be spread on the ground to cool.

Figure 1. Temperature Measurement

Carbon material selection

Sawdust is an ideal carbon material for large animal mortality composting due to:

- Small particle size.
- Open spaces (porosity).
- Bulk density of approximately 24 to 111 kg/m^3 (40 to 186 ft/yd^3).
- pH of 7.0 to 8.0.
- Ease of handling.
- Absorbency.
- High carbon content.

If sawdust is not available, other plant materials such as wood chips or straw can be used. Since these tend to be less absorptive and have poorer insulating properties than sawdust, their use requires more care during cold or wet weather.

Table 1. Guidelines for composting: major factors

Major factors	Reasonable range	Preferred range
Nutrient balance, C:N	20:1 – 40:1	30:1 – 35:1
Moisture	45 – 65% w.b.	50 – 60% w.b.
Temperature	45 – 68 °C (113 – 155 °F)	54 – 66 °C (130 –150 °F)
Particle size	0.8-1.2 cm (1/8 – 1/2 in)	Depends on material
Porosity	30 – 50%	35 – 45%
Bulk density	<640 kg/m3 (1100 lbs/yd^3)	
pH	5.8 – 9.0	6.5 – 8.0
Oxygen concentration	>5%	>10%

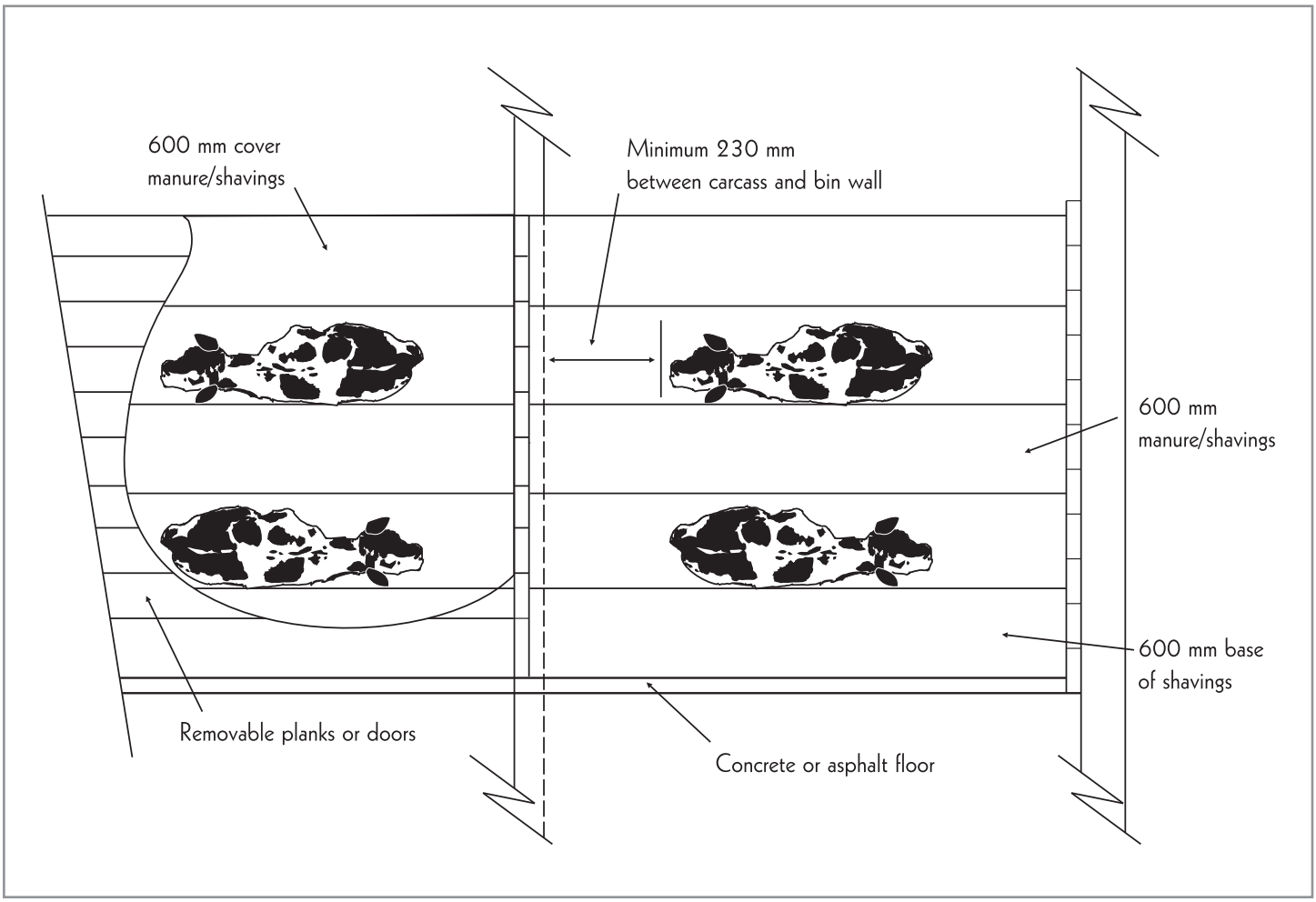
build and manage compost piles

Large animal composting can be accomplished by layering in either a bin or a windrow. The material is layered the same for both systems. Begin by placing a 600 mm (24 in) layer of carbon material such as sawdust on the bottom, Figure 2 and 3.

Carcasses are placed on top of the base layer at least 230 mm (9 in) away from the edge of the base. Carcasses should be 600 mm (24 in.) apart. Too many carcasses in one spot leads to localized wet areas and poor composting. Small pigs may be grouped or placed with less carbon material between them.

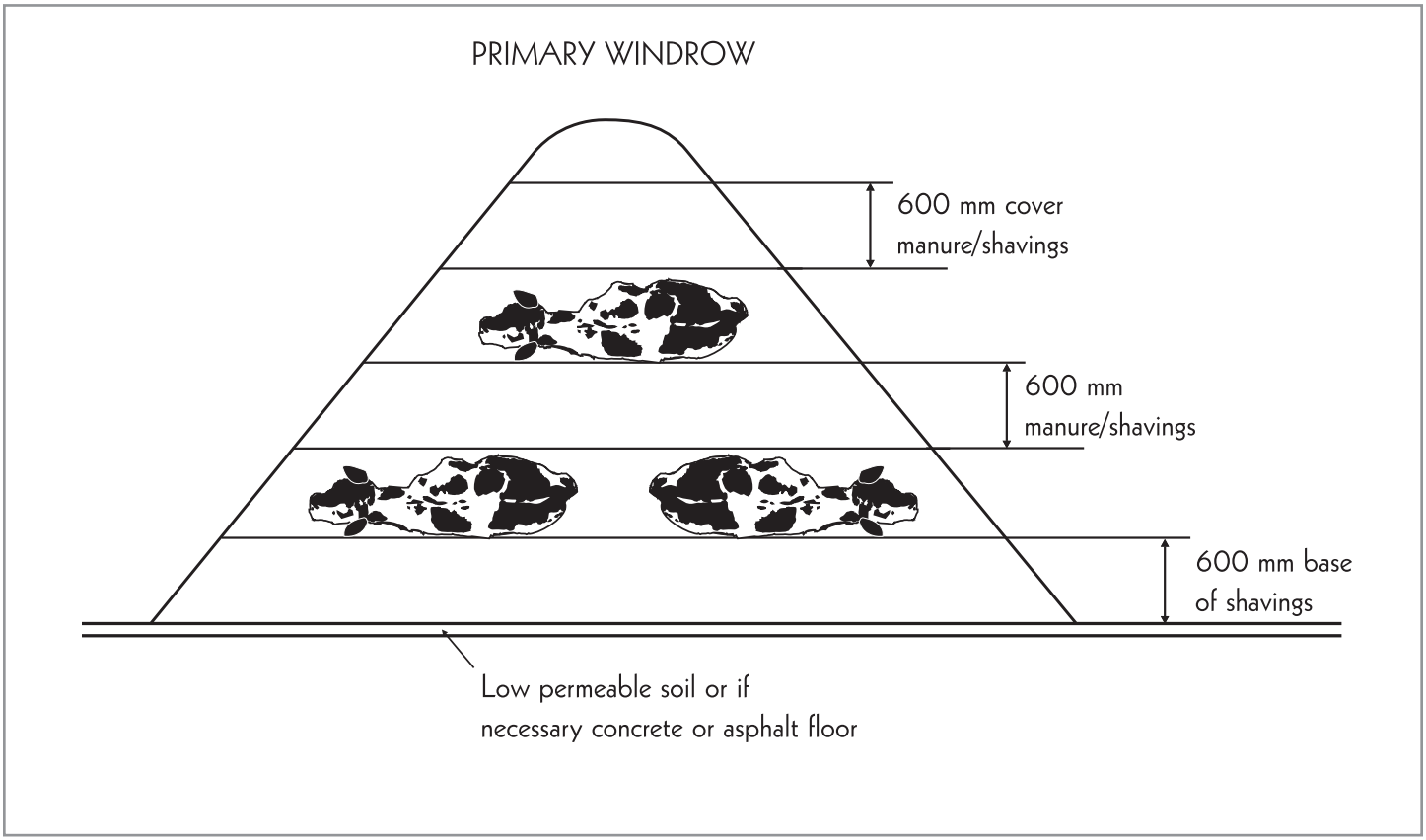
After the carcasses are positioned, they are covered immediately with 600 mm (24 in) of carbon material. Layering of carcasses and carbon material continues until the pile is 1.2 – 1.8 m (4 – 6 ft) tall. Cover the pile with **600 mm (24 in)** of carbon materials.

Figure 2. Composting bins built in layers



Too many carcasses in one spot leads to localized wet areas and poor composting.

Figure 3. Composting windrows built in layers



Two Stage Process

After the initial piling of a windrow or completely filling a bin, the material will heat up quickly and then gradually start to cool. The cooling is a normal sign that organisms are starting to be deficient in one of the ingredients. This primary stage for large animal mortalities lasts approximately 3 months. It may be necessary to extend this period of time if an unusual number of large carcasses are composted or if ambient temperatures are low. Mix the pile to re-introduce oxygen and redistribute the composting material to encourage rapid decomposition causing the temperatures to rise again. This secondary stage lasts approximately another 3 months.

By the end of the second heating stage, carcasses are normally reduced to a few brittle bone fragments that are clean and free of tissues that cause odours and attract insects and scavengers. Large carcasses may need a third heating stage.

Failure to manage the system will result in odours that attracts flies, scavengers and other vermin to the site.

Composting is considered complete when there is:

- No soft animal tissue.
- No bones or bone fragments larger than 15 cm (6 in) in any dimension.
- No other animal matter larger than 2.5 cm (1 in) in any dimension.
- No offensive odours.

The compost structure is designed for daily losses and occasional periods of high loss.

To do this, there are two basic designs bin and windrow composting

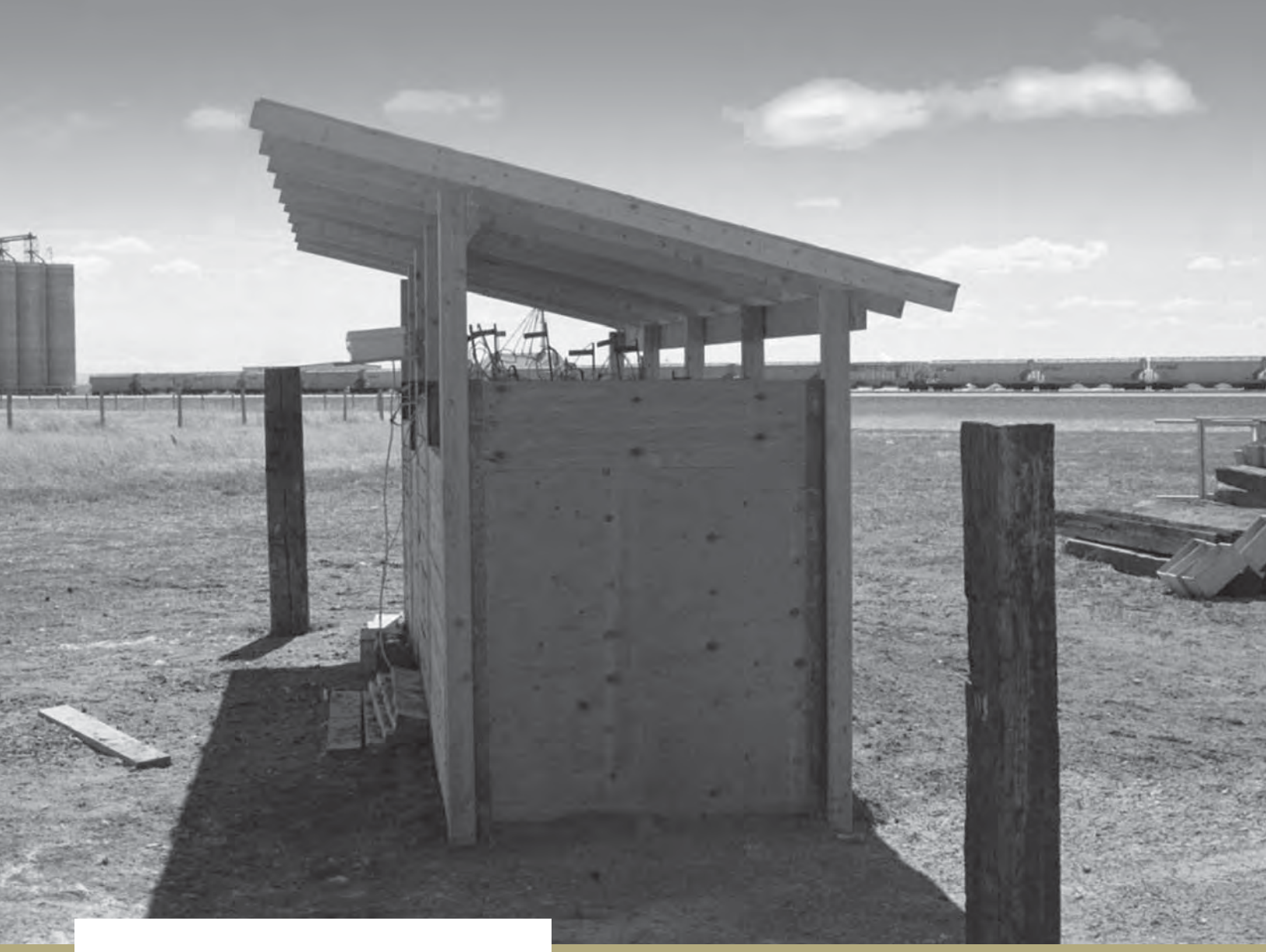
composter design

Bin Composting

Bin composting improves the aesthetics of mortality composting. As described previously, the primary stage lasts 3 months before moving to a second bin or to a windrow for the secondary stage. The layout of the composter should be flexible. This will accommodate existing features, restrictions, traffic patterns, equipment or other factors particular to a given operation. No specific layout is best in all cases.

The following points should be taken into consideration when designing a mortality bin composter.

1. Surface water should be diverted away or around the compost site to eliminate contamination.
2. Depth of compost bins should not exceed 2 carcasses high. This will reduce compaction effects and the potential for spontaneous combustion.
3. Since small carcasses are usually placed inside the primary compost bins by hand, the front of the bin should be designed so that carcasses will not have to be lifted too high. This can be done with removable drop boards that slide into vertical channels or with doors that split horizontally.
4. The width of compost bins is usually selected to accommodate loading/unloading equipment. Tractor front-end loaders or skidsteers are typically used. Bin width should be at least 0.3 m (12 in) wider but preferably 0.6 – 1 m (2 – 3 ft) wider than the bucket. If wheels on the equipment are wider than the bucket, the bin should be widened accordingly.
5. The length of the compost bins is generally 3 – 4.5 m (10 – 15 ft) for large animal. A disadvantage of longer bins is that they are more difficult to enter and exit.
6. Several smaller primary composting bins work more efficiently than a few very large bins.
7. Even though calculations may indicate fewer, a minimum of two primary bins is required. This allows use of the second bin while the last additions to the first bin are composting.
8. Secondary composting volume may be provided in bins that are duplicates of primary bins or a large bin.
9. It may be desirable to add one or two extra primary composting bins. These bins can be used to store ingredients such as litter, sawdust, etc. If unusually high mortalities occur, the extra bins could be put into service. Experience has shown that some ingredient storage at the composter site greatly facilitates management of the process.



Extra space is inexpensive and provides valuable flexibility for contingencies such as busy times of the year when bins cannot be emptied on time or occasional batches requiring additional time to decompose completely.

Temporary bins for mortality composting have been constructed using large bales as sidewalls with no roof. This type of construction is less expensive and provides flexibility, such as the number of bins and their location, that a permanent structure would not. When the need arises, bale bins can also be used along with a permanent structure facility to provide additional composting capacity.

Sizing the Composter

The design, number and size of bins can be calculated once an estimate of the number and weight of mortalities has been determined. Appendix B contains these calculations.

Bins with 15 – 30 m^3 (530 – 1060 ft^3) of capacity are recommended for large animal carcasses. These bins have a floor area of approximately 10 – 20 m^2 (108 – 216 ft^2).

Extremely large bins that take a long time to fill are undesirable as they lead to unnecessarily long heating times since the first carcasses were placed. Total bin volume recommendations suggested are based on average daily death losses.

Bin systems constructed for composting large animal typically require 1.25 m^3/kg (20 ft^3/lb) of room for primary composting and the same for secondary composting. For example, a farm averaging 50 kg (110 lb) of loss each day would need approximately 62.5 m^3 (2200 ft^3) of primary capacity and the same amount for secondary bin space.

Appendix B illustrates the method for determining the number of primary bins needed for a large animal mortality composting system. Primary bins may be arranged in any configuration. Generally, it is more efficient to arrange the bins so that primary compost can be quickly and easily moved to the secondary composting area.

Figure 4, Layout A is a schematic of a composter with 5 primary bins and a large floor area for stockpiling the secondary compost. It also includes ingredient storage. This building can be enclosed on three sides (one end door) and the wall above the primary bins can be screened. These added features improve visual aesthetics, reduce odours and restrict bird access for better disease control.

Figure 4, Layout B is a schematic of a composter with 2 primary bins and 1 secondary bin. The bins are enclosed on 3 sides. The work apron provides easy accessibility to each of the bins.

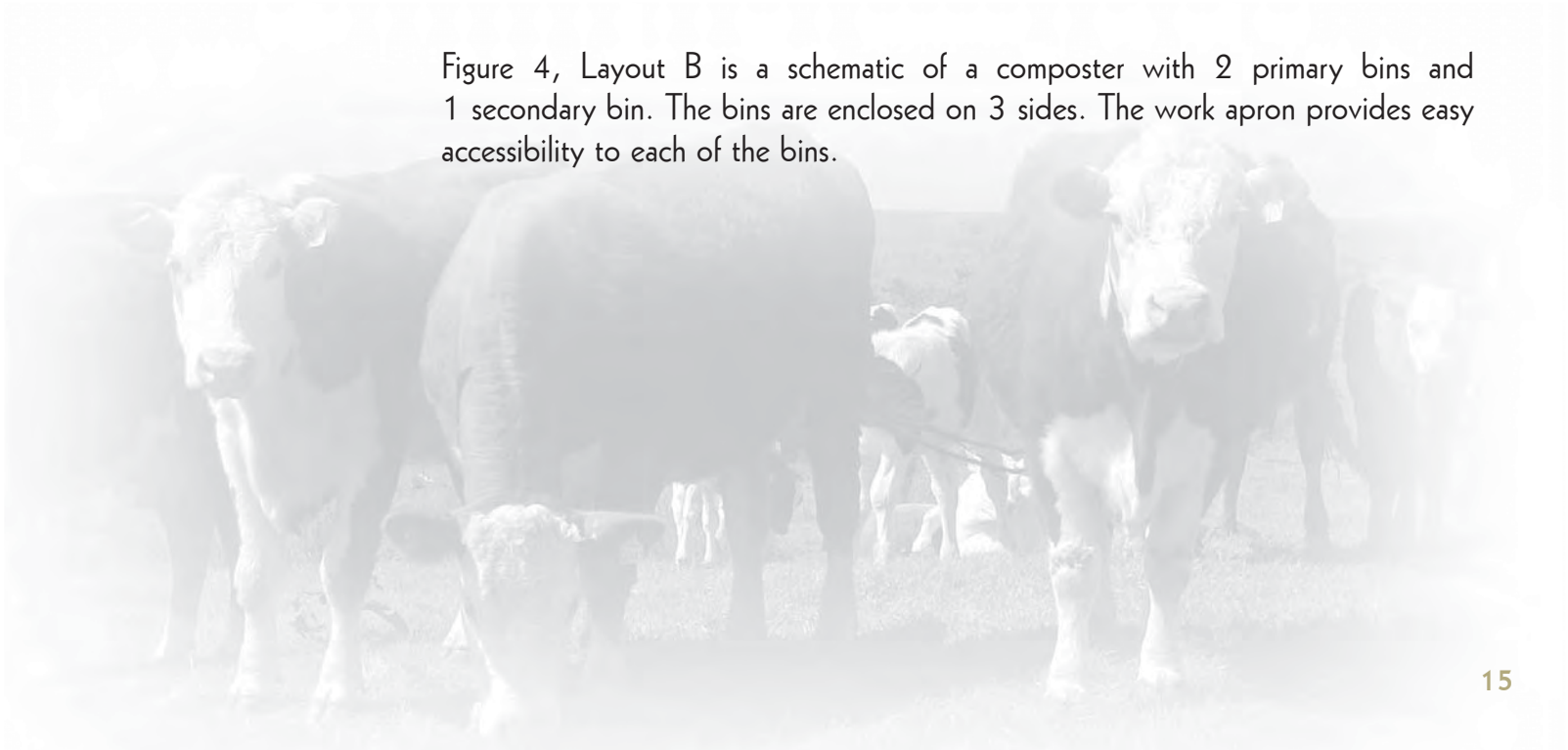
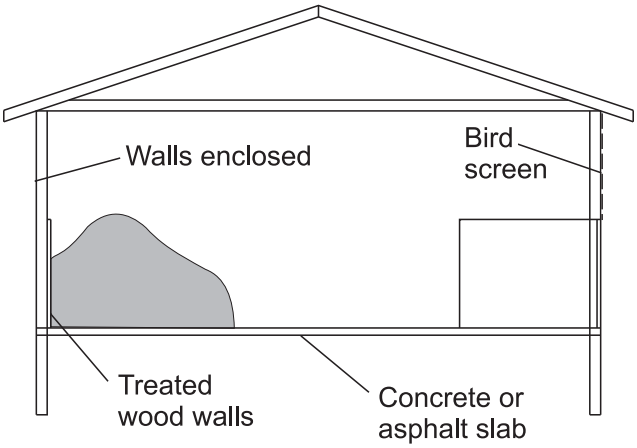
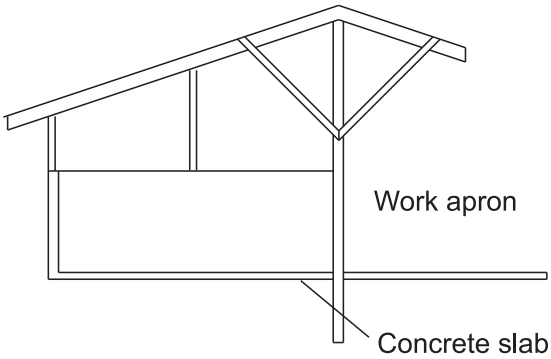
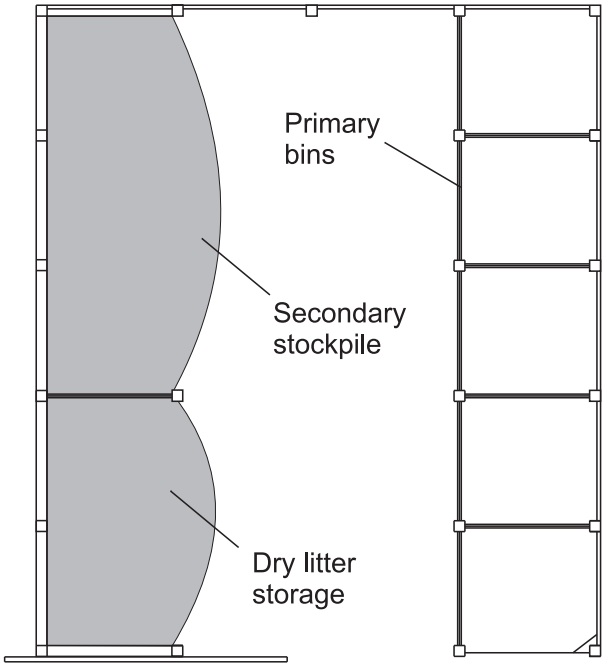
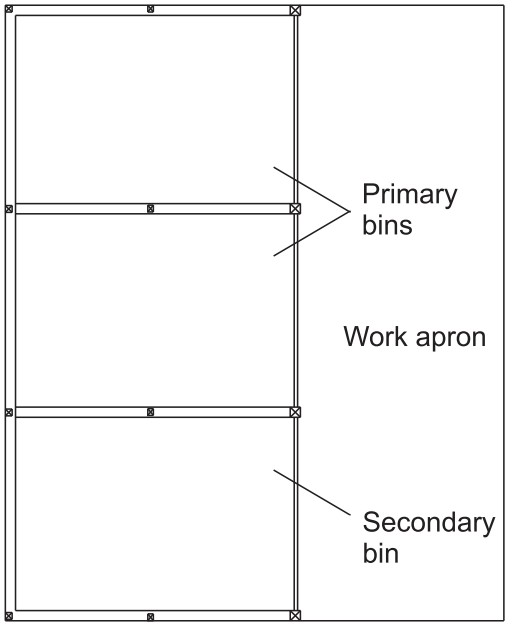


Figure 4 – Two typical composting unit layouts









Layout A
Composting bins and stockpiling with central work area.

Layout B
Composting bins in open front shed.

Windrow Composting

Windrow composting is a relatively simple and inexpensive way to manage loss scenarios due to disease, ventilation failures or other unpredictable events which would require large facilities. As described previously, the primary stage lasts 3 months before mixing the windrow to begin the secondary stage. Windrows are generally not sheltered from the wind, rain and snow which can affect the process. Because walls and roofs are not required in these designs, it is easier to load, unload and mix the materials. Windrows are constructed on all weather surfaces such as low permeable soils or concrete.

The length of the windrow is extended as mortalities occur.

The following points should be taken into consideration for site preparation and operation.

1. A composting pad with a 2% slope should be constructed on 0.5 m (1.6 ft) of clay with permeability less than 5×10^{-8} m/s (1.6×10^{-7} ft/s) or an alternative with equivalent protection such as concrete.

2. The site should have a run-on control system to prevent surface water flowing onto the composting area.

3. The site should have a run-off control system to protect surface water from contamination.

4. To mix the material, start at one end of the windrow and move the contents to form a new windrow .

5. If the material is dry, add water while turning.

6. Cover any exposed carcass tissue after the windrow has been turned.

7. Be sure the piles are mounded to shed rainfall.

Sizing the Windrow

The number of carcasses and the average weight needs to be known. Recommended windrow dimensions are 3.6 m (12 ft) wide at the base and no more than 2.1 m (7 ft) tall. To assist you in determining yearly losses, sawdust requirements and windrow volume, refer to Appendix B.

When choosing a composting location, consult the local office of the Natural Resources Conservation Board (NRCB).

Calgary Office
3rd Floor, 640 5th Avenue S.W.
Calgary AB T2P 3G4
Phone: 403-662-3990
Fax: 403-662-3994

Edmonton Office
4th Floor Sterling Place
9940-106 Street
Edmonton, AB T5K 2N2
Phone: 780-422-1977
Fax: 780-427-0607

Fairview Office
Provincial Building
10209-109 Street
Box 159, Fairview AB T0H 1L0
Phone: 780-835-7111
Fax: 780-835-3259

Lethbridge Office
Agriculture Centre
100, 5401-1st Avenue S.
Lethbridge, AB T1J 4V6
Phone: 403-381-5166
Fax: 403-381-5806

Morinville Office
Room 201, Provincial Building
10008-107 Street
Morinville, AB T8R 1L3
Phone: 780-939-1212
Fax: 780-939-3194

Red Deer Office
Provincial Building
303, 4920-51 Street
Red Deer AB T4N 6K8
Phone: 403-340-5241
Fax: 403-340-5599

planning considerations

Actual construction of a composter can take many different forms, all producing good results. Some features to consider are location, type of structure, construction materials and ingredient storage.

Location/Access

Location of a composter should follow the criteria in Section 2 subsection (4)(d)(ii) of the Destruction and Disposal of Dead Animals Regulation of the *Animal Health Act*. It states that the compost pile must be:

- At least 100 m (328 ft) from wells or other domestic water intakes, streams, creeks, ponds, springs and high water marks of lakes and at least 25 m (82 ft) from the edge of a coulee, major cut or embankment.
- At least 100 m (328 ft) from any residences.
- At least 100 m (328 ft) from any livestock facilities, including pastures, situated on land owned or leased by another person.

The location should also take into account any impact it may have on the farm residence and neighbouring residences. While offensive odours are not usually generated in the composting process, the handling of dead birds, manure and litter may not be aesthetically pleasing. When locating a composter, consideration should be given to traffic patterns required for moving dead birds, the required ingredients and removing the finished compost from the composter. The composter site should be well-drained and provide all-weather access roads and work areas.

Foundation/Floor

Composting should have an impervious, weight-bearing foundation for all composting areas. This feature ensures all-weather operation, helps secure the composter against rodent access and generally minimizes the potential for contamination of the surrounding area. Consideration should also be given to providing a concrete floor in traffic areas and work alleys. Experience has shown that with the frequent loading and unloading activities associated with composting, dirt or even gravel areas tend to become rutted and potholed.

Construction Materials

Any portion of the compost structure such as poles and sidewalls that will be in contact with dirt or composting material should be constructed with pressure treated lumber or other rot-resistant materials.

Temporary bins can also be constructed with bales of low-quality hay or straw. This type of construction is less expensive and provides flexibility such as the number of bins and their location that a permanent structure would not.

Roof

A roof covering compost bins controls rainwater and the moisture content of the composting mass. Roofing the working area also facilitates all-weather activities. Additionally, any ingredient storage areas or bins should be roofed to preserve the ingredients at the desired moisture content. Roof heights must be adequate to ensure clearance for front-end loaders.

Ingredient Storage

Having sufficient amounts of ingredients such as sawdust and litter present at the compost site greatly facilitates the day-to-day management of the process. In determining the amount of storage needed, consideration should be given to the frequency with which ingredient transfer and restocking can be managed. Storage requirements may vary considerably among different operations. Bins used for storage can double as primary composting bins during periods of high death loss or they may facilitate the expansion of the composter if the farm is increased. Ingredient storage does not have to be in bins. If the composter can be constructed in conjunction with a litter storage facility ingredient, handling may be greatly simplified.

Utilities

A water line with a freeze-proof hydrant at the compost facility will aid in adjusting the moisture content of the recipe (if needed) and further facilitate cleanup and wash down of personnel, equipment and the composting area. A minimum 20-amp electrical circuit will allow for the use of power tools, lights or other appliances that may be required at the compost facility.

compost uses

Well composted mortalities can be used as a soil conditioner and nutrient source for crops. The soil-amending and plant food properties of compost make it a valuable by-product of poultry production.

Users of compost are encouraged to obtain a nutrient analysis of the product prior to its use. It is recommended that mortality compost not be spread on active pastureland or home gardens. Poorly composted animal mortalities may contain bones and other mortality residue that may damage equipment and be unsightly when land applied.

troubleshooting

Symptom	Problem	Recommendation
Pile fails to reach high temperatures	The pile is lacking oxygen because the material is too dense or contains too much moisture	Rebuild the pile with coarser material to allow for air to circulate
	The pile is too small	Increase size to at least 1.2 x 1.2 x 1.2 m (4 x 4 x 4 ft)
	Winter composting with not enough of an insulation layer	Provide an insulation layer of carbon material, 600 mm (2 ft)
	Pile is too dry	Add water
Temperature in the pile begins to drop near the end of the primary stage	The pile is lacking oxygen	Turn the pile to reintroduce air and mix the materials
	The pile is lacking moisture	Turn the pile and check to ensure the moisture content is between 45 and 65%
Odour	Too wet	Add bulking material and turn
	Too low C:N	Evaluate bulking material and adjust as necessary
Flies	Inadequate cover	Cover with 600 mm (2 ft) of carbon material
	Poor sanitation conditions	Provide an adequate base of carbon material to absorb all liquids from the mortalities. Provide run-on and run-off protection, due to precipitation, at the site by grading the pad to a 1-2% slope
	Too wet	Add bulking material and turn the pile
	Failure to reach proper temperature	Assess C:N
Scavenging animals	Inadequate cover	Maintain 600 mm (2 ft). Avoid initial entry with fence or barrier. Ensure the pile is heating properly

caution

If an animal is known or suspected to have died from an infectious or reportable disease, the owner must report this to authorities and dispose of the animal in the manner they recommend. For an animal that has been euthanized, owners need to prevent scavengers from gaining access to the dead animal. These animals cannot be disposed of by natural disposal.

Reportable Diseases are those which require action to control or eradicate because they are a threat to animal or human health, food safety or the economy.

Notifiable Diseases are those which simply require monitoring for trade purposes or to understand their presence in Alberta. No action will be taken.

Anyone who knows or ought to know that any of these diseases are or may be present in an animal MUST report that fact to the Office of the Chief Provincial Veterinarian within 24 hours by calling 1-800-524-0051.

appendix A act and regulation

1 In this Regulation,

(a) "composting", in respect of a dead animal, means decomposing the dead animal or a part of it through a controlled bio-oxidation process that results in a stable humus-like material;

(b) "dead animal" means

(i) a domestic mammal or bird, or part of a domestic mammal or bird, that has died from a cause other than having been slaughtered for human consumption, and

(ii) inedible offal or condemned material from animals slaughtered for human consumption;

(c) "licensed", in respect of a rendering plant, means licensed under the *Health of Animals Act* (Canada);

(d) "natural disposal", in respect of a dead animal, means disposing of the dead animal in order to allow scavenging;

(e) "owner", in respect of a dead animal, means the owner of the dead animal or a person who is in possession or control of it;

(f) "rendering plant" means a rendering plant as defined in the *Health of Animals Act* (Canada);

(g) "reportable disease" means

(i) a disease designed as a reportable disease under the *Health of Animals Act* (Canada), or

(ii) a communicable disease referred to in section 1 of the Designated Communicable Diseases Regulation (AR 8/98).

Methods of Disposal

2 (1) The owner of a dead animal shall dispose of the animal within 48 hours of its death in accordance with this section.

(2) When an animal is known or suspected to have died from an infectious disease or from a reportable disease, the owner of the animal shall dispose of it in accordance with the directions of an inspector appointed under the *Health of Animals Act* (Canada) or a chief provincial veterinarian or an inspector appointed under section 6(2) of the *Animal Health Act,* but in no case may the animal be disposed of by natural disposal.

(3) The owner of the dead animal that has been euthanised with drugs or other chemical substances shall immediately take steps to prevent scavengers from gaining access to the dead animal between the time the animal is euthanised and the final disposal of the animal.

(4) Subject to subsection (2), the owner of the dead animal shall dispose of it by

(a) burying it in a farm burial pit, if

(i) the weight of dead animals in the pit does not exceed 2500 kg, unless subsection (4.1) applies,

(ii) the pit is

(A) at least 100 metres from wells or other domestic water intakes, streams, creeks, ponds, springs and high water marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(B) at least 100 metres from any residences,

(C) at least 100 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(D) at least 300 metres from a primary highway,

(E) at least 100 metres from a secondary highway, and

(F) at least 50 metres from any other road allowance,

(iii) the pit is covered with

(A) a minimum of one metre of compacted soil, or

(B) a wooden or metal lid that is designed to exclude scavengers, if quicklime is applied to the dead animal in sufficient quantities to control flies and odour, and

(iv) the bottom of the pit is at least one metre above the seasonal highwater table,

(b) burying it in a Class I or Class II landfill as defined in the Waste Control Regulation (AR 192/96), if the site has a full-time operator who agrees to immediately bury the dead animal,

(c) burning it in accordance with

(i) the Substance Release Regulation (AR 124/93), or

(ii) the Code of Practice for Small Incinerators, published by the Department of Environment,

(d) composting

(i) in a Class I compost facility as defined in the Waste Control Regulation (AR 192/96) that is designed, constructed and operated in accordance with sections 6 and 7 of the Code of Practice for Compost Facilities, published by the Department of Environment, or

(ii) subject to subsection (5), in a farm open compost pile that is

(A) located at least 100 metres from wells or other domestic water intakes, streams, creeks, ponds, springs and highwater marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(B) located at least 100 metres from any residences,

(C) designed in a manner that will exclude scavengers, and

(D) at least 100 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(e) transporting it to a licensed rendering plant for disposal, or

(f) subject to subsection (6), natural disposal.

(4.1) Where because of flood, fire, starvation or other similar disaster there are multiple deaths of animals and the weight of the dead animals exceeds 2500 kg, the animals may be buried in a farm pit subject to the approval of and in accordance with the direction of a chief provincial veterinarian or an inspector appointed under section 6(2) of the *Animal Health Act*.

(5) Where under subsection (4)(d)(ii) animals are to be composted in a farm open compost pile,

(a) repealed AR 189/2007 s2,

(b) the maximum volume of the animals or parts of them must not exceed 25% of the total compost pile, and

(c) the animals or parts of them must be covered by at least 15 cm of composting material.

(6) Subject to subsection (2), a dead animal, other than inedible offal or condemned material, may be disposed of by natural disposal if

(a) the animal is disposed of on property owned or leased by the owner of the animal,

(b) the animal was not euthanised with drugs or other chemical substances,

(c) the total weight of the animals being disposed of at any one site does not exceed 1000 kg,

(d) there is a distance of at least 500 metres between disposal sites,

(e) the disposal site is

(i) at least 500 metres from wells or other domestic water intakes, streams, creeks, ponds, water wells, springs and high water marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(ii) at least 400 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(iii) at least 400 metres from any residences,

(iv) at least 400 metres from any road allowance, and

(v) at least 400 metres from any provincial park, recreation area, natural area, ecological reserve, wilderness area or forest recreation area, and

(f) disposing by natural disposition does not create a nuisance.

(7) Notwithstanding, subsection (1), the owner of a dead animal may store the dead animal for more than 48 hours after its death if it is stored

(a) for not more than one week in an enclosed structure with impervious walls and floors that have been constructed for the storage of dead animals,

(b) outside during winter months when the ambient temperature is low enough to keep the dead animal completely frozen,

(c) in a freezer unit, or

(d) in accordance with the directions of an inspector appointed under the *Health of Animals Act* (Canada) or the chief provincial veterinarian or an inspector appointed under section 6(2) of the *Animal Health Act*.

AR 229/2000 s2;238/2002;255/2004;189/2007;288/2009

Rendering Plant

3 (1) The owner or operator of a rendering plant shall ensure that

(a) a dead animal rendered at the plant is subjected to such temperature and pressure as is necessary to render every portion of the carcass free from all viable pathogenic organisms, and

(b) microbiological quality assurance processes are in place to prevent the occurrence of viable pathogenic organisms.

(2) The owner or operator of a rendering plant when shipping material from a dead animal to another rendering plant shall ensure that

(a) the material is shipped in such a manner so as to prevent

(i) any dissemination of pathogenic organisms into the environment from the leakage of blood or other body fluids, and

(ii) the contamination of any animal or human food,

(b) the other rendering plant will render the material free of all viable pathogenic organisms, and

(c) a complete record is kept of the shipment, including the date of shipment, method of transport and the name and address of the rendering plant to which it was shipped.

Diagnosis of Animal Diseases

4 Nothing in this Regulation prohibits the collection and transport of a dead animal as may be required by a veterinarian or the owner of the dead animal for the diagnosis of animal diseases.

Dead Animal as Food

5 No person shall feed a dead animal to other food producing animals unless

(a) the material from the dead animal has been properly rendered at a licensed rendering plant and the prohibition to feed prohibited material to ruminants under the Health of Animals Regulation (Canada) is complied with, or

(b) the feeding of the material is a recognized means of stimulating natural immunity for specific disease conditions and the prohibition to feed prohibited material to ruminants under the Health of Animals Regulation (Canada) is complied with.

Advisory Committee

6 The Minister may appoint an advisory committee under section 7 of the *Government Organization Act* consisting of both government and industry representatives to oversee the implementation of this Regulation.

Repeal

7 The Regulations Regarding the Destruction and Disposal of Dead Animals (AR 128/66) are repealed.

Expiry

8 For the purpose of ensuring that this Regulation is reviewed for ongoing relevancy and necessity, with the option that it may be repassed in its present or an amended form following a review, this Regulation expires on November 30, 2012.

AR 229/2000 s8;354/2003;241/2009;136/2010

appendix B design worksheet

To assist you in determining yearly losses, sawdust requirements, number and size of bins, and windrow volume, refer to the following worksheets. Use the example worksheets as a guide for filling out your own.

Large Animals Loss and Sawdust Calculations

Mortality Material to be Handled

(a) Full grown animal losses

_____ (# animals) * _____ lbs (Avg. Wt.) * _____ /100 (% loss) = _____ lbs loss/year

(b) newborn losses (including still borns)

_____ (animals born/year) * _____ lbs (Avg. Wt.) * _____ /100 (% loss) = _____ lbs loss/year

(c) Young losses

_____ (young animals/year) * _____ lbs (Avg. Wt.) * _____ /100 (% loss) = _____ lbs loss/year

(d) Finisher losses

_____ (animals finished /year) * _____ lbs (Avg. Wt.) * _____ /100 (% loss) = _____ lbs loss/year

Total Mortality = _____ lbs loss/year

Annual Sawdust Requirements

_____ (lbs loss/yr) * 0.0037 (conversion factor) = _____ cu yards/year

Up to 50% of the sawdust can be replaced by finished compost.

Conversion

_____ cu yds/yr (sawdust requirements) * 0.7645 (conversion factor) = _____ cu meters/year

EXAMPLE Large Animals Loss and Sawdust Calculations

Mortality Material to be Handled

(a) Full grown animal losses

100	*	590 lbs	*	3 /100	=	1770	lbs loss/year
# animals		Avg. Wt.		% loss			

(b) newborn losses (including still borns)

90	*	113 lbs	*	4.4 /100	=	447	lbs loss/year
animals born/year		Avg. Wt.		% loss			

(c) Young losses

	*		*		=		lbs loss/year
young animals/year		Avg. Wt.		% loss			

(d) Finisher losses

15	*	333 lbs	*	/100	=	599.4	lbs loss/year
animals finished /year		Avg. Wt.		% loss			

Total Mortality = 2816.9 lbs loss/year

Annual Sawdust Requirements

2816.9 lbs loss/yr.	*	0.0037	=	10.4	cu yards/year
total death loss		conversion factor			

Up to 50% of the sawdust can be replaced by finished compost.

Conversion

10.4 cu yards/year	*	0.7645	=	8.0	cu meters/year
sawdust requirements		conversion factor			

Average Daily Mortality

lbs/yr (total mortality) / 365 (days/yr) = _____ lbs loss/day

Bin Volumes

Primary Bin Volume = _____ (lbs loss/day) * 20 (cu ft/lb of loss) = _____ cubic feet

Secondary Bin Volume = Primary Bin Volume = _____ cubic feet

Bin Wall Height

Bin Wall Height = _____ ft Recommended 5 ft

Floor Areas

Primary Bin Floor Area = _____ cu ft (primary bin volume) / _____ ft (bin wall height) _____ sq ft

Secondary Bin Floor Area = Primary Bin Floor Area = _____ sq ft

Select Bin Size

Typical Bin Dimensions: 10 ft x 10 ft, 10 ft x 12 ft, 12 ft x 12 ft, 10 ft x 14 ft, 12 ft x 14 ft, 10 ft x 16 ft, 12 ft x 16 ft

The bin area you choose should fall between 100 and 200 square feet.

Number of Primary Bins

# of primary bins = _____ sq ft (primary bin floor size) / _____ sq ft (bin size) = _____ bins

Number of Secondary Bins

# of secondary bins = # of primary bins = _____ bins

Be sure to round up to the next whole number.

Alternatively, 1 secondary bin can be used for every 2 primary bins if finished compost is utilized every 90 days (i.e. finished compost is not stored in bins).

Total Number of Bins

bins = _____ (# of primary bins) + _____ (# of secondary bins) + _____ (# of additional bins) = _____ bins

Additional bins can be used for storage of finished compost, sawdust, etc.

EXAMPLE Bin Design and Selection for Large Animals

Average Daily Mortality

2816.9 lbs loss/yr. (total mortality) / 365 (days/yr) = 7.7 lbs loss/day

Bin Volumes

Primary Bin Volume = 7.7 (lbs loss/day) * 20 (cu ft/lb of loss) = 154 cubic feet

Secondary Bin Volume = Primary Bin Volume = 154 cubic feet

Bin Wall Height

Bin Wall Height = 5 ft Recommended 5 ft

Floor Areas

Primary Bin Floor Area = 154 cu ft (primary bin volume) / 5 ft (bin wall height) 31 sq ft

Secondary Bin Floor Area = Primary Bin Floor Area = 31 sq ft

Select Bin Size

Typical Bin Dimensions: 10 ft x 10 ft | 10 ft x 12 ft | 12 ft x 12 ft | 10 ft x 14 ft | 12 ft x 14 ft | 10 ft x 16 ft | 12 ft x 16 ft

The bin area you choose should fall between 100 and 200 square feet.

Number of Primary Bins

# of primary bins = 154 sq ft (primary bin floor size) / 140 sq ft (bin size) = ~~1.1~~ 2 bins

Number of Secondary Bins

# of secondary bins = # of primary bins = 2 bins

Be sure to round up to the next whole number.

Alternatively, 1 secondary bin can be used for every 2 primary bins if finished compost is utilized every 90 days (i.e. finished compost is not stored in bins).

Total Number of Bins

bins = 2 (# of primary bins) + 2 (# of secondary bins) + 2 (# of additional bins) = 6 bins

Additional bins can be used for storage of finished compost, sawdust, etc.

Windrow Height

Windrow Height = _____ ft

A tall windrow generally makes better use of the pad area and carbon material.
(5 to 7 feet works best)

Producers using this design will load the carcasses while continually extending the length of the compost windrow.

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for more information

Reportable Diseases

Office of the Chief Provincial Veterinarian
780-427-3448 or toll-free by first dialing 403-310-0000
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/cpv4264

Alberta's Notifiable and Reportable Diseases Website

http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/afs12455

CFIA

http://www.inspection.gc.ca/english/anima/animae.shtml

Acknowledgements

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Special acknowledgement for contributions by:

Rick Atkins
Michael Bevans
Jason Cathcart
Kris Chawla
Brian Koberstein
Vince Murray
Julie Popowicz
Kayla Vaage
Amanda Vanee
Trevor Wallace
Wayne Winchell
all of Alberta Agriculture and Rural Development

Graphic Design:
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Alberta Agriculture and Rural Development

Printed in Canada

MANAGING LIVESTOCK MORTALITIES

LIVESTOCK

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 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.

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, as of 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 Bovine Spongiform Encephalopathy (BSE) surveillance requirements (greater than 30 months of age), submit a sample to CFIAs' 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. A non-insulated

Fenced enclosure

Saskatchewan Ministry of Agriculture

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.

Air curtain incinerator

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.

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 above 850 C (1,560 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 such as 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.

Insufficient cover material

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.

"In-vessel" composter

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.

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 Ministry of Agriculture's publication 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 4 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 4 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.

See Appendix A for contact information.

Bural pit cover

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 0.75 cubic metres (1 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 (1 ft.) of soil. In the winter, 0.6 m (2 ft.) of straw is an acceptable interim cover.

Maintain at least 1 m (3 ft.) between the top surface of the carcasses and the natural ground surface. Mound the final soil cover about 1 m (3 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 Engineer for your area.

CATASTROPHIC MORTALITIES

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

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 an unlisted infectious disease, a fire, flood or another natural disaster, the appropriate municipal authorities and various provincial government departments 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.

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 10-7 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 10-7 m/sec.

BSE: Bovine Spongiform Encephalopathy, also referred to 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 10-9 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: (306) 242-2606
2. Saskatoon Processing Company: (306) 934-4887 or 1-800-803-9714
3. Saskatchewan Environment – Air Quality: (306) 787-6196
4. Saskatchewan Watershed Authority - Groundwater Approvals: (306) 694-3980

APPENDIX B – REPORTABLE DISEASES as of January 2011

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

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

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

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

Regina
#301 – 1800 – 11th Avenue, PO Box 8060
Regina, Saskatchewan, S4P 4E3
Telephone: (306) 780-5180
Facsimile: (306) 780-5177

Saskatoon
421 Downey Road, Room 201
Saskatoon, Saskatchewan, S7N 4L8
Telephone: (306) 975-4185
Facsimile: (306) 975-6959

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

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

Yorkton
204 Smith Street East
Yorkton, Saskatchewan, S3N 3S6
Telephone: (306) 786-5301
Facsimile: (306) 786-5310

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:**
   - a) type of building or process to be served by the incinerator _____
     _____
   - b) type and quantity of waste to be incinerated _____
     _____
   - c) manner in which incinerator is to be operated _____
     _____

3. **Incinerator Specifications:**
   a) size _____ b) age _____

   c) capacity _____ d) design efficiency _____

   e) make and model _____

   II Method of charging waste into the incinerator _____
   _____

   III Type and size of grate or hearth _____
   _____

   IV Maximum operating temperature _____
   _____

   V Describe provisions made for supplying fresh air for combustion _____
   _____

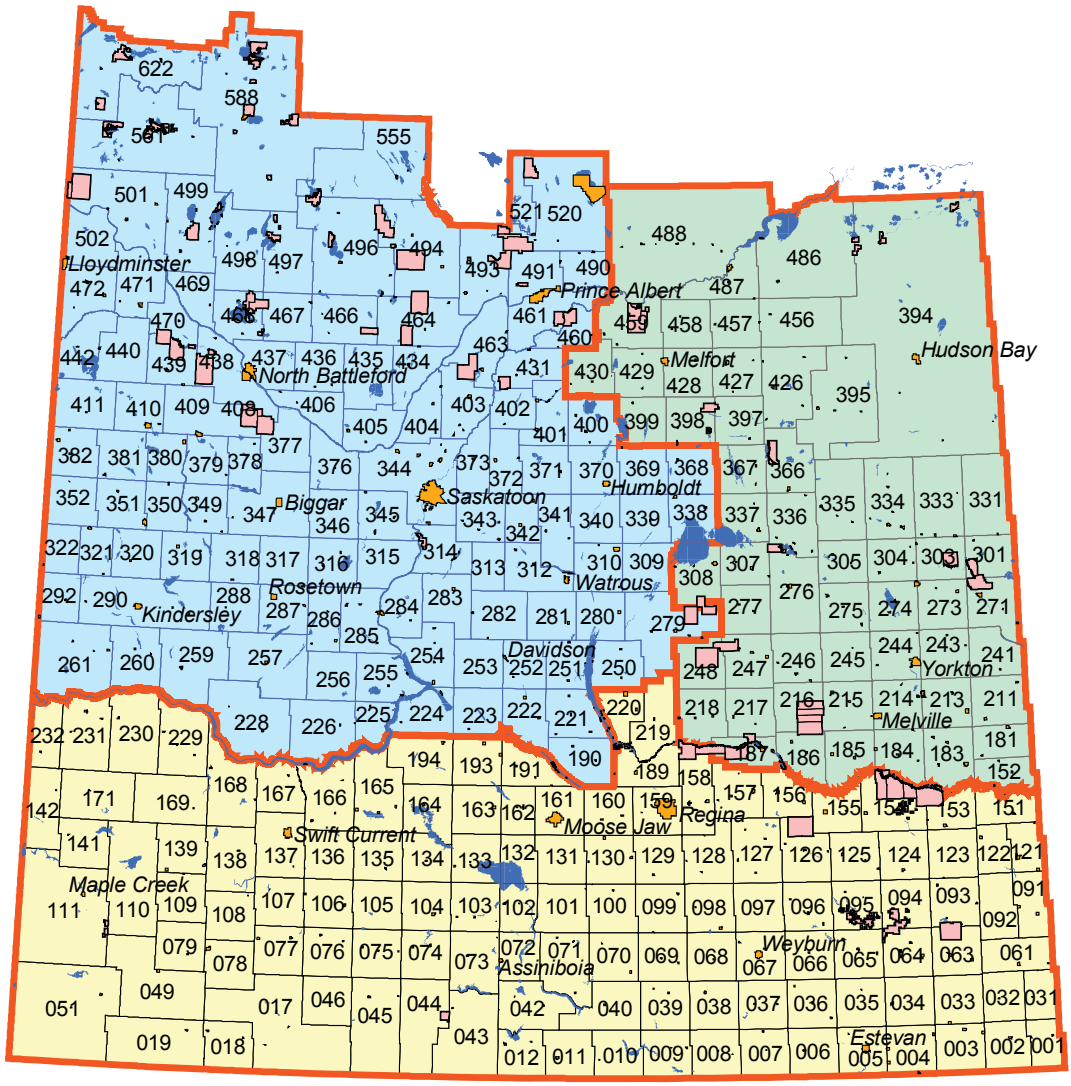
   VI Retention time of gases in combustion chamber _____

   VII 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



Ag Ops - 20101029

Legend

- Saskatoon Region
- Moose Jaw Region
- Yorkton Region

Agricultural Operations Regional Offices

Saskatoon	David Cook	933-5322
	Bryce Sundbo	933-5095
Moose Jaw:	Christopher Pinno	694-3673
	Michael Didowycz	694-3672
Yorkton:	Brian Campbell	786-1505
	Sheldon Diduck	786-1429
General Inquiries:		787-4680

APPENDIX F - DEATH LOSS

Type	Kind of Animal	Weight	Annual Death Loss (%)
Beef Cattle			
	Cows and bulls	550 kg or 1.212 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 1,323 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 pig	100 kg or 220 lb.	3
	Weanling pigs	16 kg or 298 lb.	1.5
Poultry			
	Hens, cockerels, capons	1.8 kg or 4 lb.	6
	Chick, broilers	1.5 kg or 3.3 lb.	2
	Hen turkeys, geese, ducks	8 kg or 18 lb.	5
	Heavy tom turkeys	2 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 1,323 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 1.212 lb.	0.25
	Calves	135 kg. or 250 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

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

COMPOSTING ANIMAL MORTALITIES:
A PRODUCER'S GUIDE

AGRICULTURE

LIVESTOCK

Introduction

The management of animal mortalities is an important consideration for livestock producers. Livestock producers have been challenged to discover innovative ways to manage livestock and poultry mortalities.

Composting is one option for managing mortalities. While there are benefits, producers must decide if composting fits into their operations. As with any other farm operation, successful composting requires a commitment to good management.

This manual describes the composting process and provides information on general planning considerations, building and managing the compost pile, and universal worksheets for sizing composting facilities for all types of animal mortalities. A troubleshooting guide is also included.

Composting Phases

Composting is a naturally occurring process in which bacteria, fungi and other microorganisms convert organic material into a stabilized product called compost. This means that the microorganisms do the composting work for you. Your role in managing the compost process is to make sure that the microorganisms have the environment they need in order to do their work quickly and effectively.

Mortality composting involves two phases. In the primary phase of mortality composting, the animal carcass is placed in a composting bin or windrow. A bulking agent that is high in carbon, such as sawdust or straw is placed around the carcass to completely surround it.

During this primary composting phase, anaerobic microorganisms (those not requiring oxygen) work in the carcass to degrade it, releasing fluids and odorous gases such as hydrogen sulfide and ammonia. These diffuse into the bulking agent where aerobic microorganisms (those requiring oxygen) degrade these materials to odour-free carbon dioxide (CO_2) and water (H_2O). The aerobic process produces considerable heat, causing the temperature of the compost pile to rise. The active bacteria in both the aerobic and anaerobic zones are heat-tolerant. However, the heat kills common viruses and bacteria that may be present in the carcass.

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Unlike traditional composting, in mortality composting the pile is left undisturbed until its temperature drops continuously for 10 to 14 days in a row. This means that the aerobic microorganisms are working less efficiently and have exhausted much of the food and air in their environment. By the end of the primary stage of composting, some large bones and hair may still be present, but no soft tissues.

The Mortality Composting Process	
Phase One	• Carcasses and bulk agent layered in pile • High rate of anaerobic and aerobic activity • Temperature increases • Temperature subsides • Breakdown of flesh and small bones
Phase Two	• Turning the pile initiates increased aerobic activity • Temperature increases • Breakdown of long bones, skull and pelvis • Stabilization of compost material

Table 1: The Mortality Composting Process

It is possible to accelerate the primary process by cutting open or mincing large carcasses. Using a bulking agent with smaller pieces, like fine sawdust, and turning the pile halfway through can also shorten the process. However, turning the pile part way through the primary decomposition of the carcasses will likely expose a number of large bones, so it is important to ensure that these are properly buried in the new pile. By accelerating the process, producers would require less space for the compost bins.

The second phase of the process involves regularly turning the pile and introducing air. Large bones and hair remaining from the primary phase will now decompose. At this stage the pile will need to be turned approximately once a week or more to introduce oxygen into the pile and increase aerobic activity. This increase in microbial activity will cause the temperature to rise again. The compost is finished and ready for storing or spreading on the field when the temperature of the pile has dropped to the ambient (outside air) temperature.

During the primary and secondary phases, the volume and weight of materials are reduced due to the loss of carbon dioxide and water to the atmosphere. The bulky raw materials are transformed into crumbly fine-textured compost. Properly finished compost should appear as a dark, nearly black granular material resembling humus or potting soil. It may have a slightly musty odour. Some resistant bones (skull parts, teeth) will be visible, but they should be soft and easily crumbled by hand.

Figure 2: Turning the compost pile. Courtesy of Starlite Hutterian Brethren Colony

The amount of time required to complete the entire composting process will depend on the type of bulking agent, temperature, moisture, management and carcass size. Normally, the second stage of composting will take the same length of time as the primary phase (Table 2). Turning the pile frequently to maintain aerobic activity could reduce the time required for the secondary phase by two thirds (i.e. 90 days can be reduced to 30 days.)

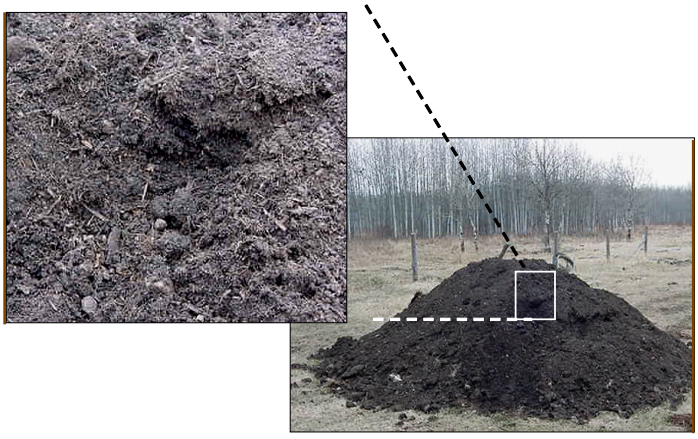

Figure 3: This compost pile is 13 months old and looks like a dark crumbly potting soil. *Courtesy: Birch Bay Pork.*

Carcass Size (kg.)	(lb.)	Primary Phase (Days)
0-5	0-10	15
5-10	10-25	30
10-135	25-300	90
135-340	300-750	120
340-635	750-1,400	180

Table 2: Average times for primary composting

What are the benefits of composting?

Biosecurity: Composting allows for immediate year-round management of mortalities so that disease is not spread. There is no entry of off-farm vehicles that could bring disease onto the farm from other operations. The high temperatures generated in the composting process kill pathogens.

Environmentally sound: Well-sited and managed composting operations will control risks to ground and surface water. Odours, flies and rodents are kept to a minimum. Composting turns a waste into a beneficial fertilizer and soil amendment resulting in on-farm recycling of nutrients.

Cost-effective: Composting has low to moderate start-up costs and minimal operating costs, although this will vary with the design of the facility. Volume and weight of the raw materials is reduced.

Easy to accomplish: Composting requires good management, but only minimal training. It requires little equipment that is not already available on-farm and utilizes readily available organic materials.

General Planning Considerations

There are two general approaches to composting mortalities: enclosed or bin system or an open-pile or windrow system. Producers should check with Saskatchewan Ministry of Agriculture staff to see what legislation and/or regulations pertain to the management of mortalities.

There are, however, some general planning considerations that relate to either type of composting.

Bins versus windrows: Bins may be preferred over windrows as they are contained and therefore somewhat screened. Covered bins are also more successful in variable climates as they simplify management and maximize the potential for success regardless of weather conditions. Covered bins can minimize the potential for seasonal odour problems caused by overly wet compost.

Bins use less space, improve heat retention in cold weather conditions and help to avoid problems with scavenging insects and animals. Bin systems do not have to be complicated or costly. Three-sided straw walled structures, open-front livestock buildings and other types of unused farm structures can be converted for composting at a relatively low cost.

The labour, material and management resources required to operate windrow systems during adverse weather conditions will be higher than for bin systems.

Site Selection: Good site selection is very important for the success of any type of composting site. Producers will need to consider soil type, topography, location of water sources, access for handling and hauling, distance from neighbours, wind direction and aesthetics. Some sites may be suitable for composting with only minimal development, whereas other sites may require more engineering.

Surface and Groundwater Protection: Avoid locating compost sites on slopes where runoff may be a problem or in depressions where the compost may become saturated with water. In general, the composting and curing site should be slightly sloped, clay-lined and have berms and runoff control structures.

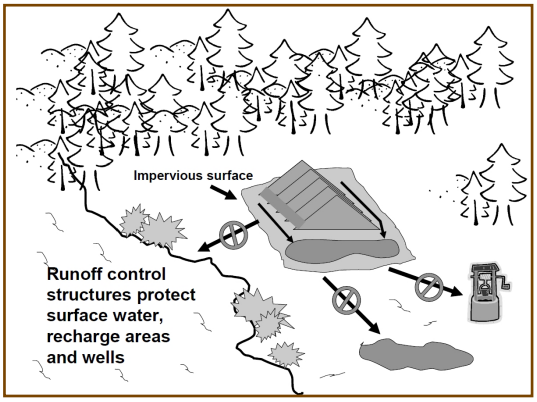

Figure 4: A properly planned composting structure.

Roofs: In areas with high rainfall, composting facilities may need to be covered in order to prevent excessive runoff or leaching. A roof is recommended to help control moisture levels. An open compost bin may receive too much rainfall in a given period or too much snow accumulation in winter.

There are two problems with excess moisture:

1. The pile may leach into underground water systems or runoff into your yard or surface water systems;

2. The pile may become anaerobic (without oxygen), deactivating the decomposer microbes and creating odour issues.

One drawback to having a roof is the need to add water to maintain appropriate moisture levels in hot, dry weather. In addition, roofed facilities will need to be designed with adequate head clearance, will require ongoing maintenance and may trap wind, creating issues related to temperature and dust.

Aesthetics: While offensive odours are not usually generated in a well-managed composting process, the handling of carcasses, manure and litter on a daily basis may not be aesthetically pleasing. Planting trees around the composting site improves its aesthetic appeal.

Size: It is important to size the composting facility properly. Inadequate facilities will force the compost through the operation before the process is complete, contributing to problems with odour and flies. The type of composting method chosen will influence the amount of space required. The windrow method requires the most land. Bin composting would require less space.

To size a composter, it is necessary to know or estimate the average daily weight of mortalities expected. Once the average daily mortality weight is known, the number and size of composters can be calculated.

Traffic Patterns: When locating a composter, consideration should be given to traffic patterns required for moving the mortalities and the required composting ingredients, and for removing the finished product from the composter. All-weather roads and work areas make access and movement easier.

Equipment: Equipment usually includes, at minimum, a front-end loader large enough to bring the carcasses to the compost bin and capable of turning the material.

Utilities: A freeze-proof hydrant at the composting facility is useful for wetting down the piles when moisture is required and for cleaning up and washing down equipment and the composting area.

A minimum 20 amp electrical circuit will allow the use of power tools, lights or other appliances that may be required at the compost facility.

Access: When using bin systems make sure that the front of the bin is removable, so that carcasses do not have to be lifted over. Removable dropboards that slide into a vertical channel on each side of the bin, doors that split horizontally, or gates can be used.

Bulking agent/cover material: The material used to cover the carcasses is an important part of the composting system. The ideal cover material retains heat, absorbs excess moisture and provides a barrier that helps discourage insects and scavengers. Cover materials also provide much of the carbon that is necessary for the microbes that decompose the mortalities. The physical characteristics of the bulking agent will affect how well the compost piles work.

In addition to choosing a bulking agent with an appropriate C:N ratio (see Composting Management section), you will want to find a bulking agent with a large enough particle size to let air flow, but not to the point that it cools the pile. Sawdust is generally considered the best cover material as it retains heat well and is very absorbent. However, as sawdust is not always available or may be too costly, alternative cover materials include chopped straw (2.5 cm or 1in. pieces) and small woodchips. You can also use finished compost as part of the bulking agent (up to 30 per cent). This has the advantage of inoculating the pile with microorganisms. Avoid using materials that are saturated with liquid or that contain high proportions of manure as these conditions may retard the composting process.

You can estimate the annual volume of bulking agent required using Table B in Appendix 2. This estimate is useful for planning purposes but it may need to be adjusted as you gain some experience with your particular bulking agent.

Availability and storage of cover material: Cover materials should be available from one or more sources in sufficient quantities throughout the year. Having sufficient amounts of ingredient such as sawdust, straw and litter present at the composting site greatly facilitates the day-to-day management of the process. When using a bin system, bins used for storage can double as primary composting bins if needed (e.g., during periods of high death loss), or they may facilitate the expansion of the composter if the farm is expanded. Ingredients do not have to be stored in bins, but the ingredient storage area should be roofed to keep the materials dry.

Figure 5: A hay moisture probe with a long stem works well to measure the moisture content of a compost pile. This pile is at the correct moisture level of about 45 per cent.

Composting Management

Compost piles have to be managed to ensure that the composting microorganisms have the right food and environment to be effective. There are four management considerations: C:N ratio; air flow; moisture content and temperature.

Carbon: Because animal carcasses are very high in nitrogen, you must add large amounts of carbon, in the form of the bulking agent, to the pile in order to provide the right environment and food for the composting microorganisms. The C:N ratio describes the amount of carbon compared to the amount of nitrogen in the pile. **A reasonable range is between 25:1 and 40:1.**

However, you don't need to be too worried about measuring the C:N ratio, since the composting process is fairly forgiving and will occur under a variety of C:N ratios, as long as you keep the overall C:N ratio in mind.

If you have too much carbon (a high C:N ratio) the low nitrogen supply can limit microbial activity. The temperature of the compost pile will decrease and the decomposition will be slowed. If you have too little carbon (a low C:N ratio) the high nitrogen supply is converted to ammonia and is emitted from the pile, resulting in increased odour. Leaching may also occur when there is excess nitrogen that converts to nitrate.

Air Flow (oxygen): Since aerobic microorganisms need oxygen to work, oxygen must be able to move into the pile and carbon dioxide and water vapour must be able to escape. This means that the bulking agent must have a particle size that allows air to move freely. **A particle size of 0.6 cm to 5 cm (1/4 in. to 2 in.) is reasonable.** Bulking agents such as newsprint can pack down, inhibiting air flow to the microorganisms, which will slow or even stop the composting process and produce odours. Large particles such as branches can let too much air in, cooling the pile and slowing down the work of the microorganisms. Ideally, 25 to 30 per cent free airspace is required.

Moisture Content: Microorganisms require water as a medium for chemical reactions, to transport nutrients and to move about. Compost with too little moisture will not supply sufficient water for microorganisms to survive. Too much moisture inhibits oxygen flow through the pile, causing aerobic microorganisms to slow down, which can lead to odours. **A moisture level of about 45 per cent will ensure a good composting environment.**

A hay moisture probe (a reasonably accurate probe is generally available at farm supply stores for approximately $250) can be used to monitor compost moisture levels. Several samples should be taken at random throughout the pile to get an average moisture reading. Recording the moisture readings will help you to make decisions on managing the pile, as moisture levels will affect temperature. Moisture content should not exceed 55 to 60 per cent. The compost should feel moist, but you should not be able to squeeze any liquid out. Covering a compost facility with a roof will reduce excess moisture accumulations, especially in areas of high rainfall, but may necessitate adding water to keep the pile active.

Temperature: Heat is required for the microorganisms to work and is also generated as a result of the composting process. The warmer the pile, the faster the microorganisms will work, the more heat they produce, the warmer the pile and so on. **Compost that is properly managed will have temperatures from 54 C to 71 C (130 F to 160 F).** Internal temperatures can be monitored using a 0.9 to 1.2 m (36 to 48 in.) temperature probe. For an accurate picture, it will be necessary to probe the pile in several locations (5 to10) to determine the average temperature.

It is quite normal to find hot and cool spots within the same bins. Recording the temperatures will allow you to track the level of activity in the pile. Temperatures lower than 49 C (120 F) indicate reduced microbial action, which means that decomposition is occurring slowly; this may affect the destruction of weed seeds and pathogens and may also result in odours. If temperatures reach 77 C (170 F) or higher, spontaneous combustion can occur. Temperatures should be maintained between 54 C to 71 C (130 F to 160 F), for several days or weeks to maximize the composting process and destroy weed seeds and pathogens. The troubleshooting guide in Appendix 1 is useful for identifying possible problems and solutions for your compost pile.

Figure 6: This pile is at an optimum temperature of 146 F (63 C)

Record keeping: A composting logbook is needed to record dates and weights of carcasses placed in the composter, temperature readings, amounts of bulking agent added, dates when compost is turned and amounts of finished compost.

Composting Bins

There are many different ways to build compost bins. Regardless of what system is used, the objective is to have enough capacity to manage all mortalities on-farm. Composting facilities can include wooden or concrete bins, hoop structures or bales. Alternatively, existing facilities like machine sheds can be adapted as long as the roof is high enough to allow the loader to lift and turn the compost.

Bins are usually laid out as three-sided enclosures with the open side wide enough (at least 0.6 m or 2 ft. wider than bucket width) to allow access with a front-end or skid-steer loader. Square bins are best, although length-to-width ratios of up to 2:1 are acceptable. Bins are usually filled to a depth of 1.5 to 1.8 m (5 to 6 ft.).


Figure 7: Design for 350-sow, farrow-finish system. ***Courtesy: Preun Farms.***

Layout should consider snow and wind loads. If problems with dogs or other animals occur, removable gates are helpful.

Size and number: The number and size of bins vary depending on the type and size of the operation. Bin dimensions depend on carcass size: large animals require more width than small animals to compost. Bin volume will depend on the size of the operation and the expected death

loss. The worksheets for **Designing Your Bins** are provided in Appendices 3 and 4.

Figure 8: This bin has a concete base with a 4 in. curb. *Courtsey: Birch Bay Pork.*

In most cases, a minimum of three bins will be required, two of which are used for primary composting and the third for secondary composting. In a typical situation, one bin is full and composting while the other bin is being filled. Larger operations will require more than the minimum three bins. Experience has shown that having extra bins available for the storage of the bulking agent and finished compost is beneficial.

Base: It is recommended that the base should be a concrete pad with a 10 to 15 cm (4 to 6 in.) curb or lip to prevent leaching and runoff. A well-packed clay base is also appropriate. A buffer of crushed rock around the compost bin will discourage rodents. Due to its absorptive properties, sawdust is quite effective to control runoff and leaching.

Materials: Composting bins should be constructed of rot-resistant material including pressure-treated lumber, concrete or chain-link fencing. Bins are generally 2.1 to 2.4 m (7 to 8 ft.) high and solid to keep out scavengers. To avoid corrosion, ventilation is required and hot-dipped galvanized nails should be used. Field experience suggests that composting bins can be constructed using large round bales of hay (1.5 to 1.8 m or 5 to 6 ft. in diameter). Bales are placed end-to-end to form walls for three-sided enclosures or bins, as shown in Figure 9. A moveable gate (i.e. chain-link fencing) will keep scavengers out of the opening and allow easy access for disposal.

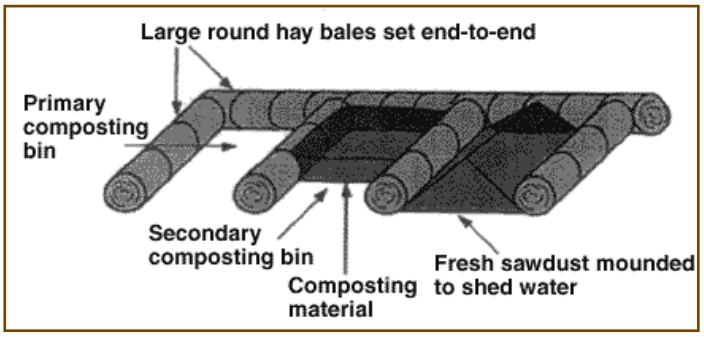

Figure 9: Compost bin made out of bales. Source: *Composting Dead Swine.* University of Missouri, 1999.

Building the Compost Pile

Start with a storage pile of sawdust or straw bales. Place a layer of material at least 0.45 to 0.6m (1.5 to 2 ft.) deep on the base of the first bin. This layer is necessary to provide good surface area contact with the carcass and to soak up any leachate. Lightly dampen the bulking agent. Pile on fresh mortalities, making sure they do not touch the bin sides.

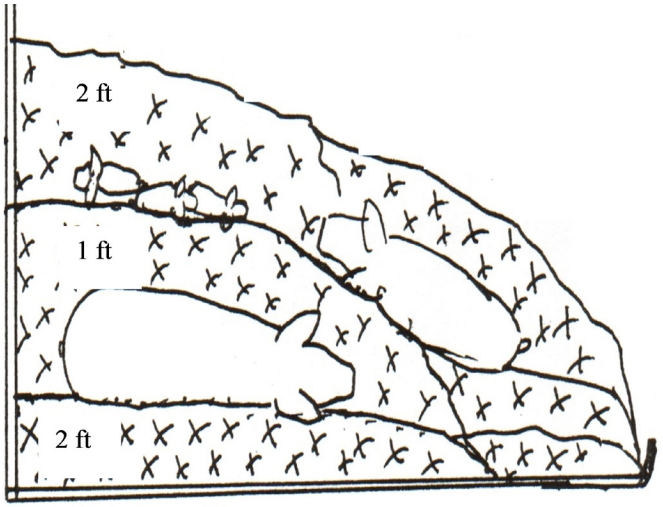

Figure 10: Simple cross-section of a compost pile.

Make sure you cover the carcass with a 0.45 to 0.6 m (1.5 to 2 ft.) layer of dry material. Proper coverage will reduce the odour and will prevent scavengers from digging up the carcasses. Start in one of the back corners of the bin and work your way forward slowly as the pile increases in height.

Lance the rumens to avoid bloating and possible explosions. Explosive releases of gases can result in odour problems and may blow the cover material off the composting carcasses.

For subsequent layers, scrape back the top dry portion of material leaving about one foot between carcasses, as shown in Figure 10. Continue layering mortalities and dry material, using either a shovel for small material or a tractor for heavy material.

Make sure new carcasses have adequate carbon material surrounding them. At no time should the carcasses be in contact with each other. When carcasses touch, you may have a rotting carcass rather than a composting one. Small animals may be grouped. Add fresh material occasionally, especially if the compost is becoming too soft or liquid.

The pile may need to be watered down occasionally, especially if conditions are dry or if it is covered with a roof. You will know this is necessary when the rate of decomposition begins to slow down.

When starting a new bin, 30 per cent of the dry matter can come from composted material. Advantages of recycling finished compost include: the need for less bulking agent; active bacteria and heat contained in finished compost; faster process; and less finished compost to be hauled for land spreading.

Windrow composting

Windrow composting can be used in conjunction with bin composting for the secondary stage where the pile is aerated. Alternatively, both the primary and secondary phase of composting can be done in a windrow rather than a bin. The costs for windrows may be somewhat less than for bins but the management requirements are often more intense, especially in adverse weather conditions which can affect the composting process.

When windrows are used, they should be constructed on an impervious surface and have proper runoff control. As with bin systems, windrows that are used to compost mortalities do not have to be turned during the primary stage of composting. However, the windrow will have to be turned (aerated) during secondary composting, so when designing the compost facility it is important to allow enough space between windrows for access by equipment.

Figure 11: Windrows

Building the Windrow

The worksheets for **Designing Your Windrows** appear in Appendices 3 and 4. The windrow volumes will be similar to the volumes required for bins.

The window should be properly sited on an impervious base with appropriate runoff control structures.

To prepare the windrow, first lay down a 0.3 to 0.45 m (12 to 18 in.) deep bed of the bulking agent (generally about 4.3 m or 14 ft. wide). This layer will absorb liquids from the decomposing carcasses. Mortalities are then put down in layers, with the bulking agent separating the layers. As with bins, lance the rumen to avoid bloat, explosions and odours. Layers are built until the pile is 1.5 to 2.1 m (5 to 7 ft.) tall.

The final layer should consist of the bulking agent and be at least 0.45 m (18 in.) deep. Using adequate material will ensure an adequate mass for composting, provide sufficient insulation, reduce odours and discourage scavengers. The calculation for estimating the amount of bulking agent required appears in Appendix 2.

As with bins, it is very important to completely cover the carcasses on all sides with bulking agent to a minimum of 0.3 to 0.45 m (12 to 18 in.) on all sides. Small animals may be grouped, but a minimum of 0.3 to 0.45 m (12 to 18 in.) of bulking agent should still be applied between layers. Never leave hooves, legs, ears or snouts sticking out of the pile. Most problems with composting mortalities occur when insufficient material is used to cover the carcasses.

Figure 12: covering a cow with material.

Use a pointed rod or dowel to measure the thickness of the bulking material. Large carcasses may need to be re-covered after a day or two, especially when using sawdust as it will tend to settle and may expose part of the carcass. The windrow should be shaped so that it will shed rainwater.

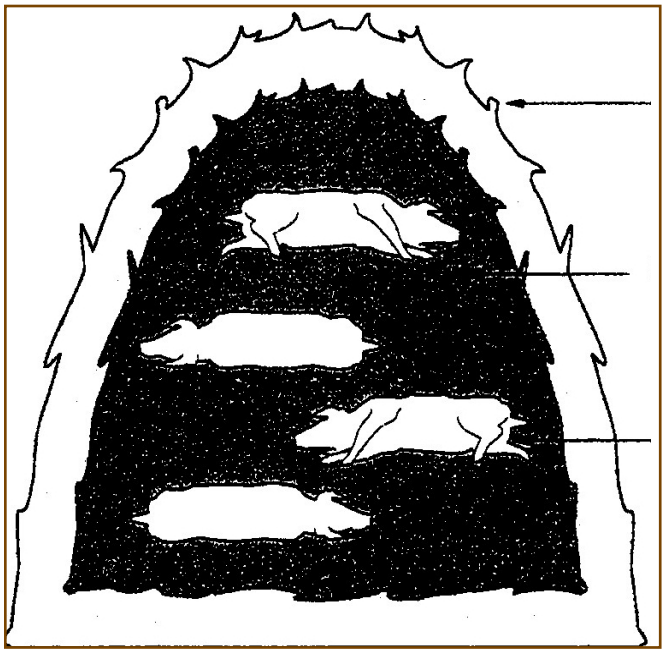

Figure 13: Layering the windrow.

To accelerate the composting process, especially in cold weather, the bulking agent can be warmed by adding extra material – over and above the 0.3 to 0.45 m (12 to 18 in.) layer, so that new carcasses are actually added to a warm bed. Alternatively, a 0.3 to 0.45 m (12 to 18 in.) layer of an absorbent material like sawdust or straw can be used to form the base of the pile and to this base a 0.3 m (12 in.) layer of hot (composting) manure can be added. The carcasses are then placed between the layers of hot manure, ensuring that they are covered on all sides with at least 0.3 to 0.45 m (12 to 18 in.) of material.

Emergency Composting

In the event of a catastrophic death loss, you may have too many carcasses to compost in your existing facility. Other arrangements will likely have to be made, or temporary facilities designed. For more information on emergency composting, livestock operators in Saskatchewan should contact the Agricultural Operations Unit with the Saskatchewan Ministry of Agriculture.

Composting Sick and Diseased Animals

Composting may not always be an appropriate method to manage dead animals. Animals that die as a result of a reportable disease should be disposed of according to guidelines provided by the Canadian Food Inspection Agency, Agriculture and Agri-Food Canada. When unsure of the appropriate action, contact your local veterinarian.

Appendix 1
Troubleshooting Guide

Problem	Probable Cause	Other Clues	Solution
Pile fails to heat	Materials too dry	Cannot squeeze water from material or moisture reading is below 20%	Add water, liquid manure or wet bulking agent
	Materials too wet	Materials look and feel soggy; pile slumps; or moisture reading is more than 60%	Add dry bulking agent
	Slow decaying, or not enough nitrogen	C:N ratio greater than 50:1; large amount of woody materials	Add more carcasses, perhaps cut or poke holes in the carcasses
	Poor pile structure or bulking agent used is too porous	Pile settles quickly while not excessively wet.	Add/mix existing bulking agent with sawdust
	Cold weather and/or small pile size	Pile height less than four feet	Enlarge or combine piles; add highly degradable materials (manure)
Failure to maintain temperature	Compost has dried out	Looks very dry; wind is blowing materials	Open pile and add water or liquid manure
	Cold weather		Ensure adequate cover with bulking agent and avoid adding frozen carcasses
	Too much moisture	Looks soggy; moisture reading is above 60%	Add fresh bulking agent to absorb moisture
Failure to decompose carcass tissues	Improper C:N ratio		Improper mix of ingredients or very old sawdust or straw
	Carcasses layered on top of each other	Carcass is intact even after two to three weeks from adding to the primary pile	Make sure 12 in. of bulking material between layers
	Carcasses placed on the outside edge of the pile		Maintain at least 1 ft. of space between carcass and outside edge of the bin
Smell of decaying flesh	Inadequate cover of bulking material over the carcass		Cover the carcass with at least 1ft. of bulking material
	Extended period of low temperature		Add manure and partially cut up the carcasses and cover with 2 ft. of bulking material
Pile overheating: temperature greater than 160 F (71 C.)	Insufficient aeration in the bulking material over the carcass	Pile is too moist	Add drier material and mix with the moist material
	Pile is too large	Height is greater than 7 ft.	Decrease pile size
	Low moisture		Add water or liquid manure

Problem	Probable Cause	Other Clues	Solution
Extremely high temperature: greater than 170 F (77 C)	Spontaneous combustion	Low moisture content; pile interior looks and/or smells charred	Decrease pile size; add water to charred or smoldering sections; break down pile.
High temperatures or odors in the curing (secondary) pile	Compost is not stable		Turn and mix pile till temperature and moisture are within limits
	Pile is too large	Higher than 7 ft.	Decrease pile size
Ammonia odors coming from pile	High nitrogen level		Add more bulking agent
	High ph level		Add manure
Rotten-egg odour coming from the pile	Anaerobic conditions	Low pile temperatures	Add dry bulking agent and mix top layer (if in primary bin) or the whole pile (if in secondary bin)
	Materials too wet; poor pile structure; pile compacted		
Run-off and/or leaching problems	Heavy rainfall		Build a roof over bin, make sure you have a curb on the base to catch run-off
	Too much moisture	Looks soggy; moisture reading is above 60%	Add fresh bulking agent to absorb moisture
Fly problems	Inadequate cover over the carcass		Maintain 1 ft. layer on top of carcass
	Poor sanitation conditions		Avoid having standing water around the facility - keep the surrounding site clean and free of garbage or debris
	Too high moisture	Looks and feels soggy	Add more cover of bulking material
Scavenging animals	Inadequate cover over the carcasses		Maintain 1 ft. cover on top of the carcasses
			Keep gates closed at all times
Pile doesn't reheat after turning in the secondary bin	Low moisture	Cannot squeeze water from material; moisture reading is below 20%	Add water and mix
	Composting near completion	Approaching expected composting time period	None required
Compost contains lumps of materials and large bones; texture is generally not uniform	Poor mixing of materials or insufficient mixing/turning in the secondary bin	Visible raw material; lumps of compost	You should have mixed the pile in the secondary bin as frequently and as thoroughly as possible!
	Active composting not complete	Curing pile heats or develops odours	Increase secondary composting time or improve composting conditions

Appendix 2

Table A: Annual Death Lost Estimates (%)

Type	Animal	Weight kg/lb.	Death Loss (%)	Cycle Length (days)
Beef Cattle	Cows and bulls	550/1,212	1	365
	Feeder cattle	450/992	1.5	120
	Replacement heifers	360/794	1	240
	Calves	135/298	4	200
Dairy Cattle	Cows/bulls	600/1,323	4	365
	Replacement heifers	450/992	4	365
	Calves	135/298	5	210
Hogs	Boars/sows	150/331	3	365
	Feeder pigs	100/220	1	126
	Weanling pigs	16/35	1.5	53
Poultry	Hens, cockerels, capons	1.8/4	5.5	294
	Chicks, broilers	1.5/3.3	6.5	40
	Hen turkeys, geese, ducks	8/18	9	92
	Heavy tom turkeys	12/26	11.5	114
Sheep	Rams and ewes	45/99	2	365
	Lambs	20/44	5	80
Goats	Does and Bucks	45/99	2	365
	Kids	20/44	5	180
Horses	Mares and studs	600/1,323	1	365
	Replacement horses	400/882	1	365
	Colts or ponies	135/298	4	365

Table B: Primary compositing phase, bin and bulking agent factors

Carcass Size (kg)	(lb.)	Primary Phase (Days)	Bin Factor (m^3/kg/day)	(ft^3/lb./day)	Bulking Agent Factor (m3/100 kg)	(ft^3/100 lb.)
0-5	0-10	15	0.2	3	0.13	2
5-10	10-25	30	0.3	5	0.19	3
10-135	25-300	90	0.9	15	0.62	10
135-340	300-750	120	1.6	25	0.94	15
340-635	750-1,400	180	2.2	35	1.25	20

Appendix 3

Designing Your Bins (Metric)

This worksheet is designed to calculate the number of bins required for your operation.

Example: A 1,200-sow farrow-to-finish operation containing 1,200 sows, 3,000 weanlings and 8,000 feeders.

1. Mass of carcasses composted (kg/cycle)

Number of animals in each cycle × average mass (kg) × death loss : Table A (%) ÷ 100 = (kg/cycle)	
EXAMPLE 1,200 sows × 150 kg × 3 % ÷ 100 = 5,400 kg/cycle 3,000 weanlings × 16 kg × 1.5 % ÷ 100 = 720 kg/cycle 8,000 feeders × 100 kg × 1 % ÷ 100 = 8,000 kg/cycle	**Your Numbers**

2. Mass of carcasses composted (kg/day)

(kg/cycle) ÷ number of days in each cycle : Table A = (kg/day)	
EXAMPLE Sows: 5,400 kg/cycle ÷ 365 days = 15 kg/day Weanlings: 720 kg/cycle ÷ 53 days = 14 kg/day Feeders: 8,000 kg/cycle ÷ 126 days = 64 kg/day	**Your numbers**

3. Total weight of carcasses composted (kg/day)

(kg/day) + (kg/day) + (kg/day) = Total (kg/day).
EXAMPLE (Sows) 15 kg/day + (Weanlings) 14 kg/day + (Feeders) 64 kg/day = 93 kg/day
Your numbers

Appendix 3
cont'd.

4. Total bin volume (m^3)

$\text{Total (kg/day)} \times \text{Bin factor : Table B } (m^3/kg/day) = \text{Bin volume} (m^3)$	
EXAMPLE $93\ kg/day \times 0.9\ m^3/kg/day = 84\ m^3$	**Your numbers**

5. Total bin area (m^2)

- Assume each bin will be 1.5 to 1.8 m in height.

$\text{Bin volume} (m^3) \div \text{Bin height(m)} = \text{Total bin area} (m^2)$	
EXAMPLE $84\ m^3 \div 1.5\ m = 56\ m^2$	**Your numbers**

6. Individual bin size

Between 10 and 20 m^2
Ideally, bins should be between10 and 20 m^2. To complete the calculations, you must pick a bin size between 10 and 20 m^2 that works for you and results in an even number of bins (i.e. 3 bins or 6 bins, but not 4.9 bins, see example in #7).

7. Number of primary bins

$\text{Total bin area} (m^2) \div \text{Individual bin area} (m^2) = \text{Number of primary bins}$	
CORRECT EXAMPLE $56\ m^2 \div 14.0\ m^2 = 4\ \text{bins}$ **NOT CORRECT** 56 m^2 ÷ 15 m^2 = 3.7 bins rounding up or down does not work	**Your numbers**

Note: An equal number of *secondary* bins are also required.

Appendix 3
cont'd.

8. Bin width

- Bin width should be at least the width of the loader bucket plus 0.6 m

$\text{Bucket width (m)} + 0.6\ \text{m} = \text{Bin width (m)}$	
EXAMPLE $1.8\ \text{m} + 0.6\ \text{m} = 2.4\ \text{m}$	**Your numbers**

9. Bin length (m)

$\text{Individual bin area (m}^2\text{)} \div \text{Bin width (m)} = \text{Bin length (m)}$	
EXAMPLE $14.0\ \text{m}^2 \div 2.4\ \text{m} = 5.8\ \text{m}$	**Your numbers**

The result is now four primary bins; each bin is 2.4 m x 5.8 m in size. As somewhat square bins have been found to be more efficient for management and composting, you can adjust the dimension of the bins (width x length) to result in a more square design. An example is provided below.

10. Adjusting the bin width (m)

Bin width is usually no greater than twice the width of the bucket.	
EXAMPLE $2.4\ \text{m} + 0.6\ \text{m} = 3.0\ \text{m}$ = revised bin width	**Your numbers**

11. Adjusting the size of the bin length (m). Divide the individual bin area by the bin width to find bin length.

Individual bin area (m^2) ÷ bin width (m) = adjusted bin length (m)	
EXAMPLE $14.0\ \text{m}^2 \div 3.0\ \text{m} = 4.7\ \text{m}$	**Your numbers**

- **The result is now four primary bins; each bin is 3.0 m x 4.7 m in size.**

Appendix 3
cont'd.

12. Total number of bins

As noted earlier, an equal number of *secondary* bins of the same size is required. In addition, one extra bin is required to accept new carcasses.

Total number of bins = (Number of primary bins x 2) + 1	
EXAMPLE (4 x 2) + 1= 9	**Your numbers**

- In most cases, a minimum of three bins will be required, two of which are used for primary composting, and the third for secondary composting. In a typical situation, one bin is full and composting while the other bin is being filled. Larger operations will require more than the minimum three bins. Additionally, it is beneficial to have extra bins available for the storage of bulking agent and finished compost.
- Throughout this example, all animal sizes were composted together. Consider separate facilities for animals of different ranges of weight.
- Refer to Table B to determine primary composting time. Secondary composting time will be similar to (or less than) the number of days in the primary phase.

Estimating the Volume of Bulking Agent (Metric)

This worksheet is designed to estimate the volume of bulking agent required for your operation.

Example: A 1,200-sow farrow-to-finish operation using bulking agent.

1. Weight of carcasses composted annually (kg/year).
Multiply the total weight of carcasses composted daily by 365. The daily weight of carcasses composted was determined in step three of the previous example.

(kg/day) x 365 days/year = kg/yr	
EXAMPLE 93 kg/day x 365 days/year = 33,945 kg/year	**Your numbers**

2. Volume of bulking agent required annually (m^3/year).
Refer to Table B to find a "bulking agent factor" for the expected carcass size. Multiply the weight of carcasses composted annually by the factor, and divide by 100.

$\frac{\text{(kg/yr) x bulking agent factor (Table B)}}{100} = (m^3/yr)$	
EXAMPLE $\frac{33,945 \times 0.62}{100} = 210\ m^3/yr$	**Your Numbers**

This example finds that approximately 233 m^3 of bulking agent is required each year. Remember, this is only an estimate. New bins could be started with about 30 per cent finished compost. The amount of bulking agent will therefore vary with the amount of finished compost recycled.

Designing Your Windrows (Metric)

This worksheet is designed to calculate your windrow requirements.

Example: 5,000-head feedlot.

1. Mass of carcasses composted (kg/cycle).

Number of animals in each cycle × Average mass (kg) × Death loss : Table A (%) ÷ 100 = (kg/cycle)	
Example	**Your Numbers**
5,000 feeders × 450 kg × 1.5 % ÷ 100 = 33,750 kg/cycle	

2. Mass of carcasses composted (kg/day)

(kg/cycle) ÷ Number of days in each cycle = (kg/day)	
EXAMPLE	**Your numbers**
33,750 kg/cycle ÷ 120 days = 281 kg/day	

3. Total mass of carcasses composted (kg / day)

(kg/day) + (kg/day) + (kg/day) = Total (kg/day)
EXAMPLE 281 kg/day (only one type of animal in this example)
Your numbers

4. Total windrow volume (m^3)

Total (kg/day) × Bin factor : Table B (m^3/kg/day) = Windrow volume (m^3)	
EXAMPLE	**Your numbers**
281 kg/day × 2.2 m^3/kg/day = 618 m^3	

5. Windrow height (m).

Ideally, each windrow will be 1.5 to 2.1 m in height. Select the windrow height from the table below to give you the windrow base width and the cross sectional area. Assume the side slopes are 1:1 and the top width is 0.3 m.

Windrow Height (m)	Cross Sectional Area (m^2)	Base Width (m)
1.5	2.7	3.3
1.8	3.8	3.9
2.1	5.0	4.5

6. Windrow length (m).

$$\text{Windrow volume}\,(\text{m}^3) \div \text{Cross sectional area}\,(\text{m}^2) = \text{Total length}\,(\text{m})$$

EXAMPLE	Your numbers
$618\,\text{m}^3 \div 5.0\,\text{m}^2 = 124\,\text{m}$	

This example finds a total windrow length of 124 m; the windrows are 2.1 m in height and 4.5 m in width. Depending on the site and equipment, five windrows each 25 m in length may be easier to manage than one long windrow.

Appendix 3

Designing Your Bins (Imperial)

This worksheet is designed to calculate the number of bins required for your operation.

Example: A 1,200-sow farrow-to-finish operation containing 1,200 sows, 3,000 weanlings and 8,000 feeders.

1. Weight of carcasses composted (lb./cycle)

Number of animals in each cycle × average weight (lb.) × death loss : Table A (%) ÷ 100 = (lb./cycle)	
EXAMPLE 1,200 sows × 331 lb. × 3 % ÷ 100 = 11,916 lb./cycle 3,000 weanlings × 35 lb. × 1.5 % ÷ 100 = 1,575 lb./cycle 8,000 feeders × 220 lb. × 1 % ÷ 100 = 17,600 lb./cycle	**Your Numbers**

2. Weight of carcasses composted (lb./day)

(lb./cycle) ÷ number of days in each cycle : Table A = (lb./day)	
EXAMPLE Sows: 11,916 lb./cycle ÷ 365 days = 33 lb./day Weanlings: 1,575 lb./cycle ÷ 53 days = 30 lb./day Feeders: 17,600 lb./cycle ÷ 126 days = 140 lb./day	**Your numbers**

3. Total weight of carcasses composted (lb./day)

(lb./day) + (lb./day) + (lb./day) = Total (lb./day).
EXAMPLE (Sows) 33 lb./day + (Weanlings) 30 lb./day + (Feeders) 140 lb./day = 203 lb./day
Your numbers

Appendix 3
cont'd.

4. Total bin volume (ft^3)

$\text{Total (lb./day)} \times \text{Bin factor : Table B } (ft^3/\text{lb./day}) = \text{Bin volume } (ft^3)$	
EXAMPLE $203 \text{ lb./day} \times 15 \text{ ft}^3/\text{lb./day} = 3{,}045 \text{ ft}^3$	**Your numbers**

5. Total bin area (ft^2)

- Assume each bin will be 5 to 6 feet in height.

$\text{Bin volume } (ft^3) \div \text{Bin height(ft.)} = \text{Total bin area} (ft^2)$	
EXAMPLE $3{,}045 \text{ ft}^3 \div 5 \text{ ft.} = 609 \text{ ft}^2$	**Your numbers**

6. Individual bin size

Between 100 and 200 ft^2
Ideally, bins should be between100 and 200 ft^2. To complete the calculations, you must pick a bin size between 100 and 200 ft^2 that works for you and results in an even number of bins (i.e. 3 bins or 6 bins, but not 4.9 bins, see example in #7)

7. Number of primary bins

$\text{Total bin area} (ft^2) \div \text{Individual bin area} (ft^2) = \text{Number of primary bins}$	
CORRECT EXAMPLE $609 \text{ ft}^2 \div 122 \text{ ft}^2 = 5 \text{ bins}$ **NOT CORRECT** 609 ft^2 ÷ 124 ft^2 = 4.9 bins rounding up or down does not work	**Your numbers**

Note: An equal number of *secondary* bins are also required

8. Bin width

- Bin width should be at least the width of the loader bucket plus two feet.

$\text{Bucket width(ft.)} + 2 \text{ feet} = \text{Bin width(ft.)}$	
EXAMPLE $6 \text{ ft.} + 2 \text{ ft.} = 8 \text{ ft.}$	**Your numbers**

9. Bin length (ft.)

$\text{Individual bin area(ft}^2\text{)} \div \text{Bin width(ft.)} = \text{Bin length(ft.)}$	
EXAMPLE $122 \text{ ft}^2 \div 8 \text{ ft.} = 15 \text{ ft.}$	**Your numbers**

The result is now five primary bins; each bin is 8 ft. x 15 ft. in size. As somewhat square bins have been found to be more efficient for management and composting, you can adjust the dimension of the bins (width x length) to result in a more square design. An example is given below.

10. Adjusting the bin width (ft.)

Bin width is usually no greater than twice the width of the bucket.	
EXAMPLE $8 \text{ ft.} + 2 \text{ ft.} = 10 \text{ ft.}$ = revised bin width	**Your numbers**

11. Adjusting the size of the bin length (ft). Divide the individual bin area by the bin width to find bin depth.

Individual bin area (ft^2) ÷ bin width (ft.) = adjusted bin length	
EXAMPLE $122 \text{ ft}^2 \div 10 \text{ ft.} = 12 \text{ ft.}$	**Your numbers**

- The result is now five primary bins; each bin is 10 ft. x 12 ft. in size.

12. Total # of bins

As noted earlier, an equal number of *secondary* bins of the same size is required. In addition one extra bin is required to accept new carcasses.

Total number of bins = (# of Primary bins x 2) + 1	
EXAMPLE (5 x 2) + 1= 11	**Your numbers**

- In most cases, a minimum of three bins will be required, two of which are used for primary composting and the third for secondary composting. In a typical situation, one bin is full and composting while the other bin is being filled. Larger operations will require more than the minimum three bins. Additionally, it's beneficial to have extra bins available for the storage of bulking agent and finished compost.
- Throughout this example, all animal sizes were composted together. Consider separate facilities for animals of different ranges of weight.
- Refer to Table B to determine primary composting time. Secondary composting time will be similar to (or less than) the number of days in the primary phase.

Estimating the Volume of Bulking Agent (Imperial)

This worksheet is designed to estimate the volume of bulking agent required for your operation.

Example: A 1,200-sow farrow-to-finish operation using bulking agent.

1. Weight of carcasses composted annually (lb./year).
Multiply the total weight of carcasses composted daily by 365. The daily weight of carcasses composted was determined in step three of the previous example.

(lb./day) x 365 days/year = lb./yr	
EXAMPLE 203 lb./day x 365 days/year = 74,095 lb./year	Your numbers

2. Volume of bulking agent required annually (ft^3/year).
Refer to Table B to find a "bulking agent factor". Multiply the weight of carcasses composted annually by the factor and divide by 100.

$\frac{\text{(lb./yr) x bulking agent factor (Table B)}}{100} = (ft^3/yr)$	
EXAMPLE $\frac{74{,}095 \times 15}{100} = 11{,}114$	Your Numbers

This example finds that approximately 11,100 ft^3 of bulking agent is required each year. Remember that this is only an estimate. New bins could be started with about 30 per cent finished compost. The amount of bulking agent will therefore vary with the amount of finished compost recycled.

Table B: Primary composting phase, bin and bulking agent factors

Carcass Size		Primary Phase	Bin Factor		Bulking Agent Factor	
(kg)	(lb.)	(Days)	(m^3/kg/day)	(ft^3/lb./day)	(m^3/100 kg)	(ft^3/100 lb.)
0-5	0-10	15	0.2	3	0.13	2
5-10	10-25	30	0.3	5	0.19	3
10-135	25-300	90	0.9	15	0.62	10
135-340	300-750	120	1.6	25	0.94	15
340-635	750-1400	180	2.2	35	1.25	20

Designing Your Windrows (Imperial)

This worksheet is designed to calculate your windrow requirements.

Example: 5,000-head feedlot.

1. Weight of carcasses composted (lb./cycle).

Number of animals in each cycle × Average weight (lb.) × Death loss : Table A (%) ÷ 100 = (lb./cycle)	
EXAMPLE	**Your Numbers**
5,000 feeders × 992 lb. × 1.5 % ÷ 100 = 74,400 lb./cycle	

2. Weight of carcasses composted (lb./day)

(lb./cycle) ÷ Number of days in each cycle = (lb./day)	
EXAMPLE	**Your numbers**
74,400 lb./cycle ÷ 120 days = 620 lb./day	

3. Total weight of carcasses composted (lb./day)

(lb./day) + (lb./day) + (lb./day) = Total (lb./day)
EXAMPLE **620 lb./day (only one type of animal in this example)**
Your numbers

4. Total windrow volume (ft^3)

Total (lb./day) × Bin factor : Table B (ft^3/lb./day) = Windrow volume (ft^3)	
EXAMPLE	**Your numbers**
620 lb./day × 35 ft^3/lb./day = 21,700 ft^3	

Designing Your Windrows (Imperial) cont'd.

5. Windrow height (ft).

Ideally, each windrow will be five to seven 7 feet in height. Select the windrow height from the table below to give you the windrow base width and the cross sectional area. Assume the side slopes are 1:1 and the top width is 1 ft.

Windrow Height (ft.)	Cross Sectional Area (ft^2)	Base Width (ft.)
5	30	11
6	42	13
7	56	15

6. Windrow length (ft).

$$\text{Windrow volume}\,(ft^3) \div \text{Cross sectional area}\,(ft^2) = \text{Total length}\,(ft.)$$

EXAMPLE	Your numbers
$21{,}700\ ft^3 \div 56\ ft^2 = 388\ ft.$	

This example finds a total windrow length of 388 ft.; the windrows are 7 ft. in height and 15 ft. in width. Depending on the site and equipment, five windrows each 78 ft. in length may be easier to manage than one long windrow.

Appendix 5
Metric Conversion Factors * (Approximate)

Metric to Imperial			Imperial to Metric	
Metric Unit	**Multiply By**	**Imperial Unit**	**Multiply By**	**Metric Unit**
LINEAR				**LINEAR**
centimetre (cm)	x 0.39	inch	x 2.54	centimetre (cm)
AREA				**AREA**
square metre (m2)	x 1.2	square yard	x 0.84	square metre (m2)
hectare (ha)	x 2.5	acres	x 0.4	hectare (ha)
VOLUME				**VOLUME**
litre (L)	x 0.22	gallon	x 4.55	litre
PRESSURE				**PRESSURE**
kilopascals (kPa)	x 0.14	psi	x 6.9	kilopascals (kPa)
WEIGHT WEIGHT				
gram (g)	x 0.04	oz	x 28.35	gram (g)
kilogram (kg)	x 2.2	lb	x 0.454	kilogram (kg)
AGRICULTURAL				**AGRICULTURAL**
litres per hectare (L/ha)	x 0.089	gallons/acre	x 11.23	litres per hectare (L/ha)
litres per hectare (L/ha)	x 0.357	quarts/acre	x 2.81	litres per hectare (L/ha)
litres per hectare (L/ha)	x 0.71	pints per acre	x 1.41	litres per hectare (L/ha)
millilitres per hectare (mL/ha)	x 0.014	fl.oz per acre	x 70.22	millilitres per hectare (mL/ha)
kilograms per hectare (kg/ha)	x 0.89	lb per acre	x 1.12	kilograms per hectare (kg/ha)
grams per hectare (g/ha)	x 0.014	oz/acre	x 70	grams per hectare (g/ha)

*EXAMPLE: To convert centimetres to inches, multiply by 0.39; conversely, to convert inches to centimetres, multiply by 2.54. CAUTION: Herbicide labels are in metric units only. Conversion between the Metric and Imperial system may result in confusion. It is recommended to use metric units only.

Acknowlegements:

This document was made possible by the contributions of the following agencies, universities and authors. Information in whole or part, graphics and photos from the following publications have been included with permission. It was updated in April 2011.

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For more information:

- Contact the Agricultural Operations Unit, Saskatchewan Ministry of Agriculture, 3085 Albert Street, Regina, SK, S4S 0B1, Phone: (306) 787-4680

Low Maintenance On-Farm Cattle Composting

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Unfortunately cows die. With death comes the choice of disposal method. Composting is an environmentally sound disposal practice when done properly. Ok, ok. I know what some of you are thinking, "I already have a great and cheap disposal method. I just drag the carcasses into the bush and within a few days the coyotes have disposed of them for me." Well, besides the legalities of it all, it is just not a good idea. Intentionally feeding coyotes means that they are only going to get bigger and stronger, more food means more coyotes. Also, when pasture season comes and your cows are contently eating away, a large coyote that you have been feeding may just decide to kill one of your calves for supper. Anyhow, the point of this article is not to lecture you, but to provide information on composting cattle mortalities if you should choose to do it.

Why compost

First of all, why should farmers compost mortalities? To name a few reasons, composting can be done at any time of the year, it kills pathogens, and it offers immediate disposal of all sizes of carcasses. In addition, composting is a relatively low cost, labour, and management process. Finally, it is just "neat" to see an entire carcass virtually disappear.

Composting

Composting is a controlled aerobic process in which bacteria, fungi, and other microorganisms convert organic material into a stable humus-like product. Since microorganisms do most of the work, you must provide the best environment for them to live. To provide the best habitat for microorganisms the following is required:

(1) **Good carbon to nitrogen (C:N) ratio.** Animal carcasses are high in nitrogen so you must add large amounts of carbon. A C:N of 20:1 – 40:1 is reasonable, the preferred range is 25:1 – 30:1.
(2) **Adequate moisture.** Microorganisms need water to move around and transport nutrients. A moisture content of 40 – 65% is reasonable, the preferred range is 50 – 60%.
(3) **Good aeration.** Composting is an aerobic process, which means the microorganisms need air to compost properly. Oxygen levels should be maintained above 5%. The target range is about 5-15%.
(4) **Controlled temperatures.** The warmer the pile, the faster the microorganisms work. Temperatures between 43-65 °C (110-150°F) are acceptable, but anything above 70°C (158°F) is too hot for the microorganisms to survive. The preferred range is 54-60°C (130-140°F). Temperatures maintained above 55°C (130°F) for 3 consecutive days kill pathogens.

The above four factors in combination are the key to making microorganisms happy and work hard. If you can achieve these things, then composting will be possible.

Starting a static compost pile

The compost pile must be at least 100 m away from any surface watercourse, sinkholes, springs, or wells. Depending on your soil conditions, a concrete pad or plastic liner may be required. Begin by creating a base with straw, sawdust, woodchips or any other good carbon source. Make sure that the base at least 60 cm (2 ft) thick and is large enough to

allow for 60 cm (2 ft) of clearance around the carcass (Fig.1). Next, lay the carcass flat on top of the base (on its back or side) as shown in figure 2 For larger mortalities (greater than 300 lbs) it is necessary to lance the rumen to prevent bloating and possible explosions, as well as give microorganisms quicker access in order to compost faster. Finally, completely cover the carcass with the carbon source so there is at least 60 cm (2 ft) of material surrounding the entire carcass. A 60 cm (2 ft) cover will insulate the composting material from the outside temperatures, provide the necessary carbon source, reduce odour, and absorb liquids. A fence should also be placed around the compost pile to ensure that no dogs, coyotes, rats, etc. can get into the compost pile.

Fig. 1. Sawdust composting base

Fig. 2. Carcass laid on the sawdust base

Fig. 3. Entire carcass covered with sawdust

The composting process

Unlike manure composting, mortality composting does not require frequent turning. A mortality composting pile may only need to be turned once. There are two main stages or heat cycles in mortality composting, primary and secondary. The primary stage starts once the compost pile is constructed. The primary stage takes approximately 3 to 6 months and should be monitored daily. Since microbial activity is directly related to heat, temperature is a good indicator whether or not the compost pile is working properly. Once the temperature reaches 55°C (130°F) and stays above this temperature for at least one week and then drops, the pile is ready to be turned. The primary compost pile should be turned onto a 60 cm (2ft) layer of amendment to absorb any liquids.

Fig. 4. Turning the composting pile (Source: composting.cas.psu.edu)

After the pile is turned the secondary stage of the composting process begins. Secondary composting time is similar to primary composting time (3 to 6 months).

Again, the temperature should be monitored daily. Once the temperature reaches 55°C (130°F) and stays above this temperature for at least one week and then drops, composting may be finished. Finished compost should be dark, humus-like with no signs of flesh (Fig. 5). If there is still flesh in the compost pile, it is necessary to turn the pile again and let it go through another heat cycle. Bones that remain in the compost will be very brittle and can be crushed or removed and added to a new composting pile or buried.

Fig. 5. Finished compost (Source: www.mda.state.mn.us)

Dead Livestock Composting:

A cost effective solution to safe Deadstock disposal

Tim Romanow – Cardston County

Jeff Porter – Southwest Alberta Conservation Partnership

Outline…

- Background
  - Large carnivore scavenging and safety concerns
  - Carcass Disposal Options…
    - Cost effectiveness and who should pay?
- Considerations for on farm composting
- Regulations
- Bins vs. landfill vs. composting
- Update: Community Driven Initiatives to deal with Deadstock
- Blackfoot Challenge Composting and Predator management Tour(2010)
- Regional and Municipal projects in the works:
  - Facility design and compost process
- Resources

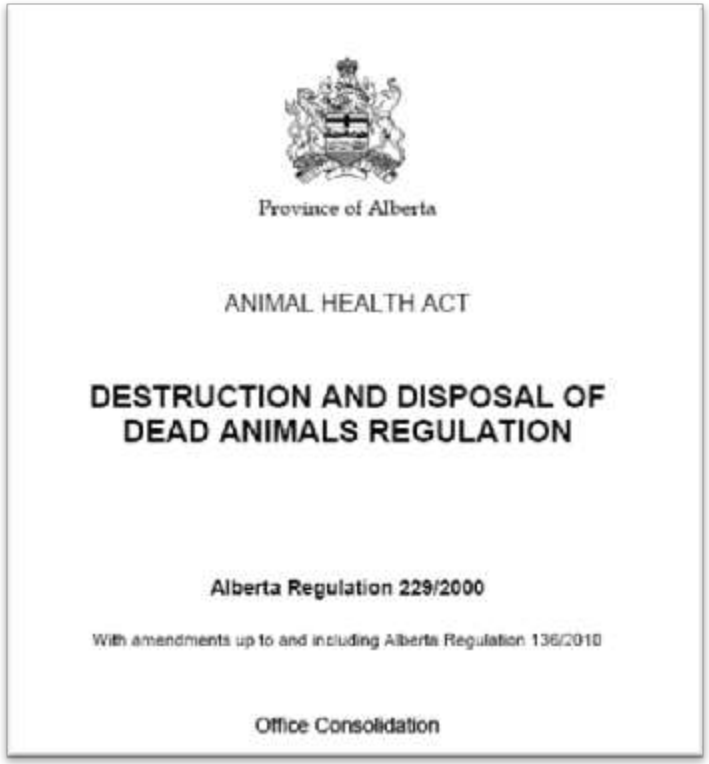
Background

- Large Carnivore numbers, and conflicts are on the rise is SW Alberta.
- Primarily Cow Calf Operations are feeling the burden of increased predation and scavenging.
- Only a matter of time before there is a serious Safety incident.
- "McDonalds in the middle of the Highway for Predators"
- Last 5-8 years most producers have seen incidents and sightings increase exponentially.
- Pre vs. Post BSE conditions has resulted in more Deadstock being left on the landscape
- Producers are having to bare the burden of these animals in the Agricultural Interface areas, often on the homesteads or calving grounds.

Recently: Moved from talk and complaining with GOA to develop landowner driven initiatives such as: Predator attractant reduction programs

Producers options for Deadstock Disposal

Methods of disposal
2(1) The owner of a dead animal shall dispose of the animal within 48 hours of its death in accordance with this section.
(4) Subject to subsection (2), the owner of a dead animal shall dispose of it by
(a) **burying it in a farm burial pit, if**
(b) **burying it in a Class I or Class II landfill** as defined in the *Waste Control Regulation (AR 192/96), if the site has a* full-time operator who agrees to immediately bury the dead animal,
(c) **burning** it in accordance with regs
(d) **Composting** in a Class I compost facility as defined in the *Waste Control Regulation (AR 192/96) or* ***on farm compost***
(e) transporting it to a licensed **rendering plant** for disposal, or
(f) subject to subsection (6), **natural disposal**.



Province of Alberta

ANIMAL HEALTH ACT

DESTRUCTION AND DISPOSAL OF DEAD ANIMALS REGULATION

Alberta Regulation 229/2000

With amendments up to and including Alberta Regulation 136/2010

Office Consolidation

Dead horse excavated by grizzly bear…


29 3:33PM

Grizzly in a bone yard (carcass dump) (Blackfoot River Valley, Montana)

Class 1 Landfills: only a few class one sites available in S.AB

-Concerns over liability/ licensing have few facilities interested in accepting carcasses
- to be covered within 24 hours to prevent scavenging.

Deadstock Rendering

Only 1 option for disposal in areas such as Cardston, Willow Creek, Pincher Creek, and Ranchlands.

Costs of Rendering service is extremely prohibitive.

Good short term solution to scavenging concerns

Not sustainable to continue to go to grant providers and continue to seek funding annually

Why Dead Livestock Composting Makes Sense

- Amount of deads on farm post BSE vs. pre BSE
- Reduces or eliminates attractant source for large carnivores thus reduces or eliminates conflicts and losses due to large carnivores.
- Can be done on farm with minimal cost.
- Sizable reduction in animal carcasses and material to store.
- Converts manure and carcass nutrients into a more stable material.

Cost comparison:

Processor Pickup vs. composting facility Cardston County Example…

- Pre BSE over 1100 carcasses per year picked up by Southern Alberta Processors Average weight per carcass ~ 400lbs (includes calves and adult stock) Free Service.
- Current Fee 13 cents/lb min $75 pickup fee.
  - If… picked up would cost ratepayers/program funders ~ $57,200 annually
- Estimated annual operating expense for composting facility to handle similar capacity (max 440,000lbs) ~ $10,000 per year after initial investment of facility.

Community Driven Initiatives to deal with Deadstock and Large Carnivore Attractants

- **Cardston County and the Chief Mountain Landowner Group**
  - Pilot project area west of the 820 to Waterton Park Carcass pickup program
    - Currently 4 bins, expanding to 6 bins
    - ~40 producers currently, anticipated to expand this winter and spring.
  - Calf carcass drop bins

MD of Ranchland

- Carcass Pickup Program
- Wolf Pilot Project

Drywood Yarrow Conservation Partnership

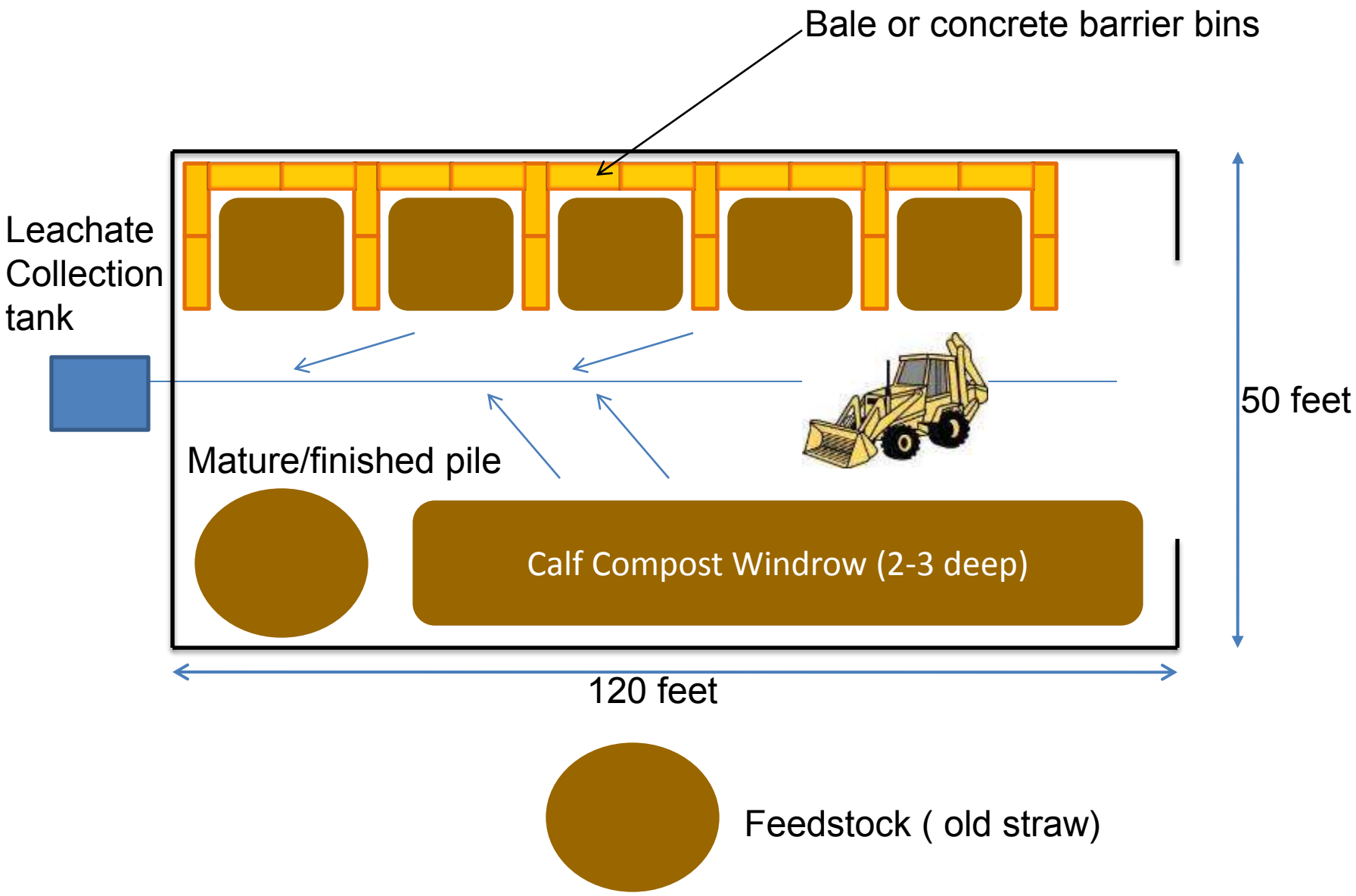
- Carcass pickup
- Dead Livestock Bins
- Feed Storage Bin bear proofing
- Electric Fencing Demo Projects

2010 Blackfoot Challenge Composting Site Tour

Sponsored by the OWC

Municipal Composting Facility(s)?

- Logistics to be determined for a County or MD Compost Facility?
  - Location is key…
  - User pay system?
    - Pickup and delivery options…
  - Partners/potential funders?
  - Approvals process
  - Facility Design and Operational Responsibilities


Bale or concrete barrier bins
Leachate Collection tank
50 feet
Mature/finished pile
Calf Compost Windrow (2-3 deep)
120 feet
Feedstock (old straw)

Cost Estimate??

- Initial Setup Cost for structure/building
  - Coverall/pole-shed ~ 40,000-50,000 inc any possible engineering fees, fencing, carcass winch
- Operational Expenses
  - 20/hr@5hrs/wk ~5,200
  - User pay vs. self serve?

- Equipment
  - Bobcat or loader
  - Possibly dedicated bucket
  - Or pressure washed between jobs

Facility design?

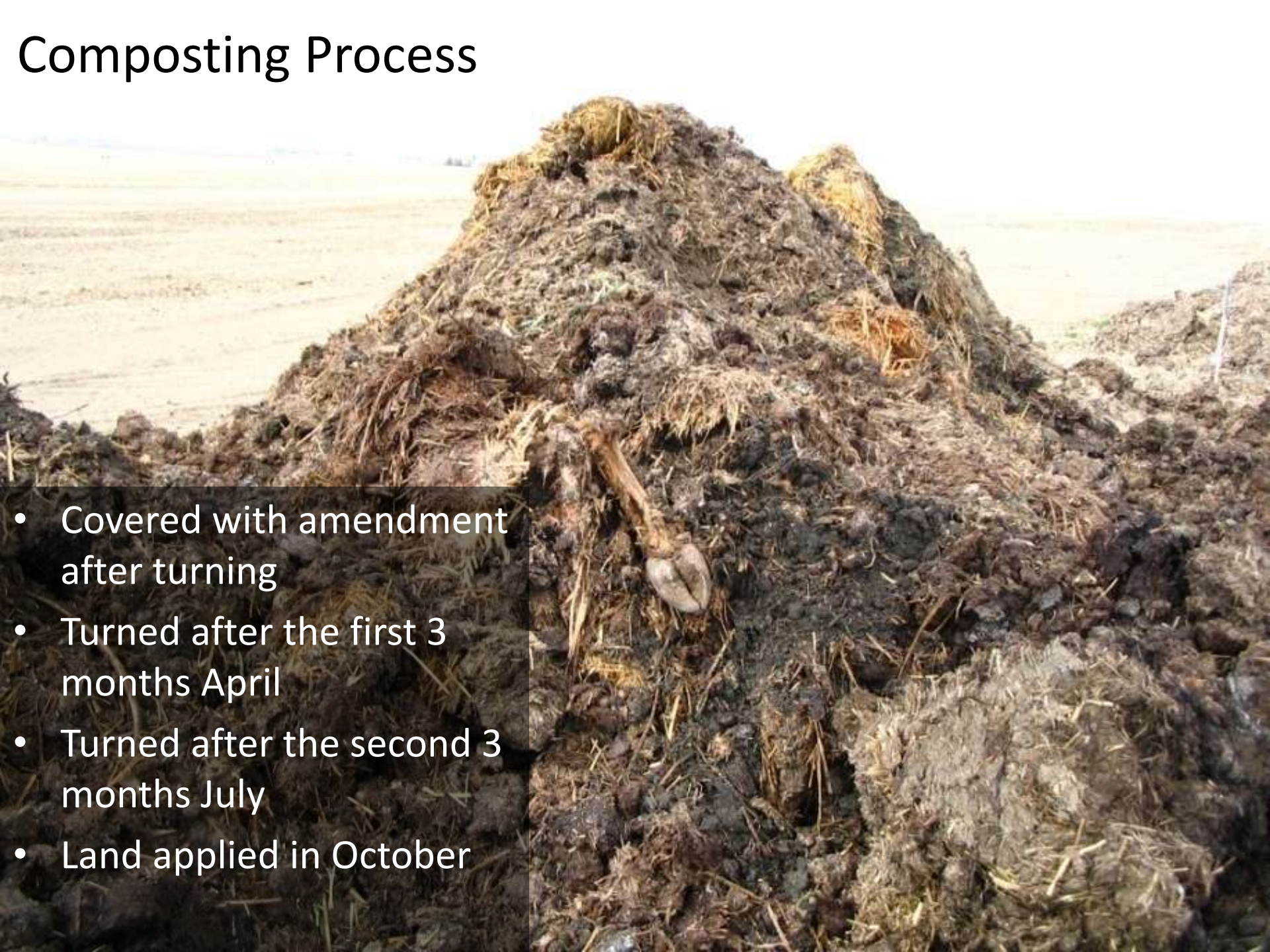
Windrow Construction

- Clay base
- Bottom layer was 0.45 m of straw
- Amendment was 2 parts feedlot manure and 1 part straw
- Minimum 0.3 m apart
- Average animal weight was 910 lbs
- Rumens were punctured
- Minimum 0.3 m of manure & straw between layers

Windrow

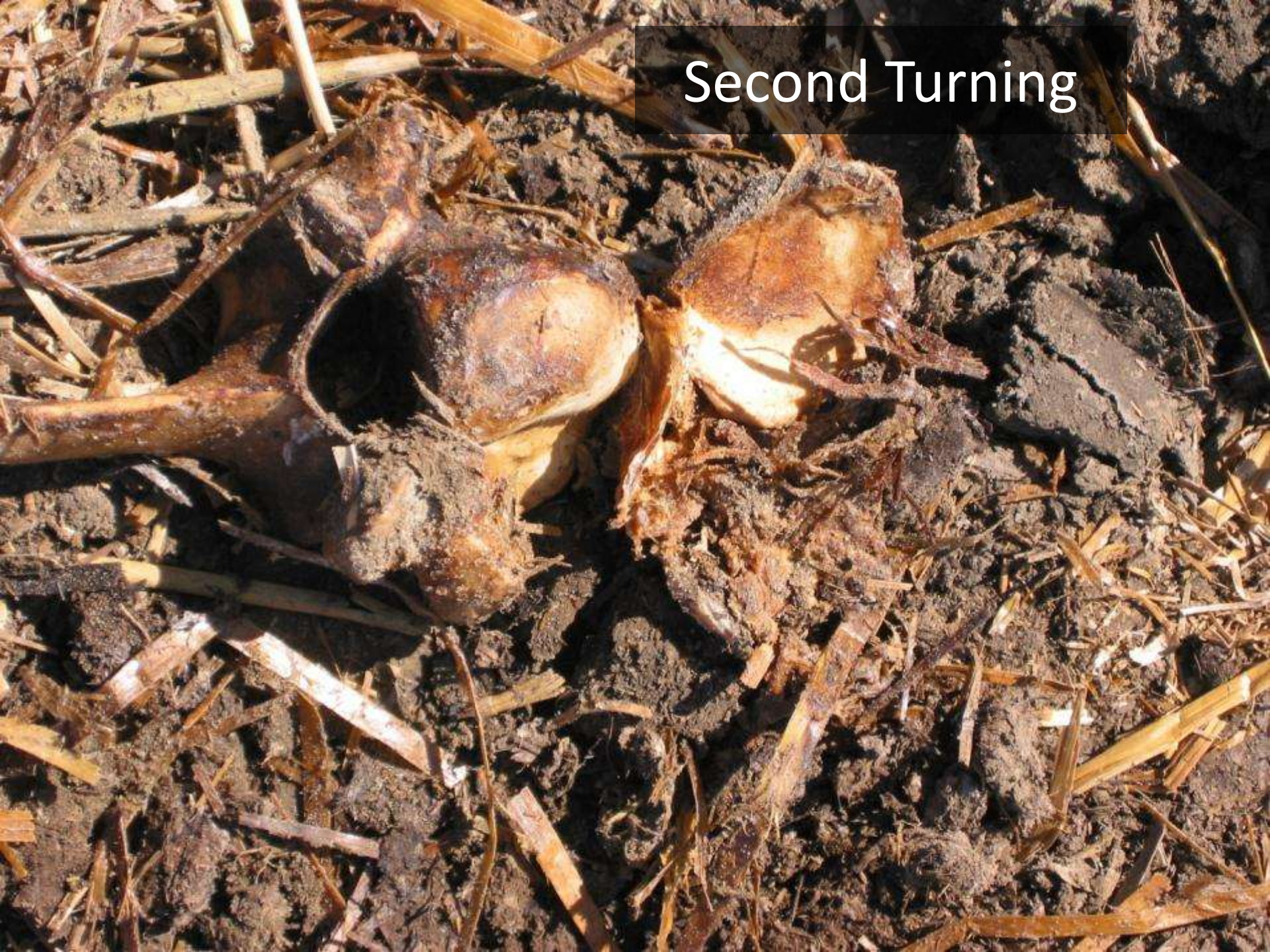
- Final layer covered with 0.45 m of amendment
- Allowed to compost for 3 months
- Temperature recorded

Composting Process



- Covered with amendment after turning
- Turned after the first 3 months April
- Turned after the second 3 months July
- Land applied in October

First Turning


Second Turning

Third Turning

Resources and Contacts

Virginia Nelson-AgTech Centre
Project Engineer
Phone: 403 329-1212 [233]
Email: virginia.nelson@gov.ab.ca

RL1601 – Small animal Composting Manual
Swine Mortality Composting
Poultry Mortality Composting
Agdex # 440/29-1 & 440/29-2

Composting Animal Mortalities: A Producers Guide Sask Agriculture

Cardston County Extension Contact:
Tim Romanow 403-634-9474

MD of Pincher Creek, MD of Ranchlands, and MD of Willow Creek Extension Contact:
Jeff Porter 403-601-6711

Thank you!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"For cryin' out loud, roll down the window if you're going to emit greenhouse gases!"