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Canadian Agri-Food Research Council
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Recommended code of practice for the care and handling of farm animals

Bison

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Available from

Canadian Bison Association
200-1660 Pasqua Street
Regina, Saskatchewan
S4P 3G7
Telephone: 306-522-4766
Facsimile: 306-522-4768
Email: cba1@sk.sympatico.ca

For information on the process for the development of a Code, please write to

Canadian Agri-Food Research Council
Heritage House
Building No. 60
Central Experimental Farm
Ottawa, Ontario
K1A 0C6
Telephone: 613-234-2325
Facsimile: 613-234-2330
Internet: www.carc-crac.ca

Also available in French

Recommended code of practice for the care and handling of farm animals

Bison

Coordinated by
Canadian Agri-Food Research Council (CARC)
CARC Canada Committee on Animals
CARC Expert Committee on Farm Animal Welfare and Behaviour
Canadian Federation of Humane Societies

Review Committee
Participants are listed in Appendix E

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Cover
Courtesy of Bill Bouffioux, Canadian Bison Association

Contents

Acknowledgments

The Canadian Agri-Food Research Council gratefully acknowledges the many individuals and organizations that contributed their valuable time, views and expertise to the development of this Code of Practice. The development of this Code was made possible only through teamwork and cooperation at the national level.

Preface

The Codes of Practice are nationally developed guidelines for the care and handling of the different species of farm animals. The Codes contain recommendations for housing and management practices for farm animals as well as transportation and processing.

The Codes are voluntary and are intended as educational tools in the promotion of sound husbandry and welfare practices. The Codes contain recommendations to assist farmers and others in the agriculture and food sector to compare and improve their own management practices. Institutions maintaining research herds also should be in compliance with the relevant Canadian Council on Animal Care (CCAC) guidelines.

In 1980, the Canadian Federation of Humane Societies began coordinating the process of development of draft Codes of Practice for all livestock species with the introduction of a *Recommended Code of Practice for the Care and Handling of Poultry from Hatchery to Processing Plant*. The federal Minister of Agriculture and Agri-Food Canada provided financial support for the undertaking at that time.

All Codes are presently developed by a Review Committee made up of representatives from farm groups, animal welfare groups, veterinarians, animal scientists, federal and provincial governments, related agricultural sectors and interested individuals.

In 1993, Agriculture and Agri-Food Canada asked the Canadian Agri-Food Research Council (CARC) and its Canada Committee on Animals and Expert Committee on Farm Animal Welfare and Behaviour to take the lead in cooperation with the Canadian Federation of Humane Societies in updating existing Codes and developing new commodity Codes. CARC officially agreed to take on this responsibility in February 1995 upon confirmation of funding from Agriculture and Agri-Food Canada.

In 1996, CARC with the support of the provincial governments began producing four page factsheets in both English and French for such uses as teaching agriculture in the classroom, agricultural fairs and exhibitions.

Codes developed to date:

Species	Original	Revision
Poultry	1983	1989
Pigs	1984	1993
Veal Calves	1988	1998
Ranched Mink	1988	-
Ranched Fox	1989	-
Dairy Cattle	1990	-
Beef Cattle	1991	-
Sheep	1995	-
Farmed Deer	1996	-
Horses	1998	-
Bison	2001	-
Transport	2001	-

Further information on the process of Code development can be obtained from the Canadian Agri-Food Research Council (CARC), Heritage House, Building 60, Central Experimental Farm, Ottawa, Ontario K1A 0C6. Requests for copies of the Codes can be addressed to the national commodity group and/or specific provincial organizations.

The CARC Home Page is www.carc-crac.ca for further information.

Disclaimer

Information contained in this publication is subject to periodic review in light of changing management practices, government requirements and regulations, and new scientific information. No subscriber or reader should act on the basis of any such information without referring to applicable laws and regulations and/or without seeking appropriate professional advice. Although every effort has been made to ensure accuracy, the Review Committee shall not be held responsible for loss or damage caused by errors, omissions, misprints or misinterpretation of the contents hereof. Furthermore, the Review Committee expressly disclaims all and any liability to any person, whether the purchaser of this publication or not, in respect of anything done or omitted by any such person in reliance on the contents of this publication.

READERS' COMMENTS AND SUGGESTIONS

The Canadian Agri-Food Research Council would like to receive your comments and suggestions on the Recommended Code of Practice for the Care and Handling of Farm Animals - Bison. Please send the completed questionnaire to the Canadian Agri-Food Research Council at Building 60, Central Experimental Farm, Ottawa, Ontario, K1A 0C6, or fax: (613) 234-2330. Feedback will be considered in future editions.

1. My work involves:
   a) commercial transportation of bison ☐
   b) raising bison ☐
   c) bison care/handling at an auction market ☐
   d) other (please specify) ☐

2. The bison code is relevant or useful in my work.:
   a) highly ☐
   b) to some degree ☐
   c) not ☐

Additional comments:

_____

_____

_____

_____

_____

3. The organization of the code contents:
   a) is appropriate ☐
   b) needs improvement (please specify) ☐

4. The topics contained in the code cover all appropriate aspects of bison care and management:
   a) yes ☐
   b) no (please specify) ☐

5. The recommendations are presented:

a) in an unclear manner or with inadequate detail ☐

b) clearly and in adequate detail ☐

c) in excessive detail ☐

Additional comments:

6. I suggest the following changes to improve the bison code (use additional sheet if necessary):

Section 1 ◊ Introduction

Cattle and bison belong to the family Bovidae. They can be hybridized with cattle, but this practice is associated with infertility. Two bison races are recognized by the industry: plains bison and wood bison. Wood bison are currently subject to export regulations under the Convention on International Trade of Endangered Species (CITES).

Canada's plains bison population originated over a century ago from several dozen wild-caught calves that were subsequently raised on farms. Because the wild herd was in severe decline at the time, farming was instrumental in saving plains bison from extinction. Today the majority of plains bison in Canada, whether on public or private lands, are in managed herds. Recent conservation efforts to repatriate the wood bison have enhanced both wild and captive herds throughout Canada.

The number of bison raised on farms in Canada has increased at a compounded rate. In 2000, there were about 125,000 bison in Canada. Bison farming in Canada has benefited from the development of improved production practices and markets for bison meat and other unique products.

The Canadian bison industry is composed of sectors including cow-calf, backgrounder and feeder operations. In each sector, successful production practices have developed in response to Canada's diverse climatic and geographic conditions. These practices, in conjunction with attention to the welfare needs of the animals, will ensure bison will continue to thrive on Canadian farms.

All codes of practice for the care and handling of farm animals, including this bison code, are voluntary. Provincial and federal acts and regulations must always take precedence. The codes are intended to promote the continual improvement of standards of animal husbandry and handling. This code is intended to achieve a workable balance between the interests of animals and producers. Humaneness is a prime consideration and animals treated well and protected from stress benefit producers.

The recommendations contained in this code attempt to define high standards of bison production and well-being in commercial, research, and display operations, whether public or privately owned. Production and management practices are subject to change as experience grows and technology develops. Maintaining flexibility in bison production and management systems ensures continued innovation and improvement.

The Canadian bison industry will continue to support research and technology transfer to enhance production and management practices that benefit both humans and bison. Significant parts of this code draw from the *Good Production Practices Manual* of the Canadian Bison Association's Food Safety Program. Individuals requiring further details should refer to local sources of information such as universities, agricultural ministries and local bison producers.

Box 1. PAIN, SUFFERING AND DISTRESS

There is a broad overlap between dictionary definitions of pain, suffering and distress. Common sense will often indicate there is a pain response to some procedures and conditions.

Wild and domestic herbivores are stoic in their response to pain and suffering. This is probably a survival mechanism to avoid standing out from the herd and attracting predators. This is important when attempting to assess pain and suffering or distress.

Veterinarians define 'distress' as a condition requiring immediate assistance. The *Animal Protection Act* of Alberta contains a broad legal definition, stating an animal is in distress if it is:

a) deprived of adequate food, water, care or shelter

b) injured, sick, in pain or suffering, or

c) abused or subjected to undue hardship, privation or neglect.

This definition has received broad acceptance with Alberta's Act being used as a template for similar animal welfare legislation in the western provinces.

Section 2 ◊ Herd Management

2.1 Responsibilities

One of the most important considerations is clear identification of responsibilities. Although everyone must share concern, it must be clear who is ultimately responsible at any stage of the management cycle. There must be no possibility of confusion.

2.1.1 Everyone working with bison or managing bison facilities must understand and accept responsibility for the welfare of bison under their care. Producers have an obligation to train personnel on the principles of safety of bison and personnel, humane handling, equipment use and bison care, and to ensure that those principles are followed at all times.

2.1.2 Producers are responsible for maintaining safe and efficient facilities, including those used for loading, restraint and handling.

2.1.3 Producers are responsible for developing plans to prevent, and to respond rapidly to, any possible emergency (Appendix B).

2.1.4 Absentee owners must ensure that their bison operations are continually in the care of competent managers. The manager assumes all of the owner's responsibilities in the owner's absence.

2.1.5 Prior to assignment of duties, personnel must be adequately instructed on the basic seasonal needs of bison under their care according to gender and age. A working knowledge of bison behaviour and adequate facilities is necessary to ensure safe handling. Procedures must be reviewed and practiced to ensure competence and safety.

2.1.6 Producers must be satisfied that personnel can recognize behavioural signs of discomfort or disease, and aware of when to consult a veterinarian.

2.1.7 Personnel should be alert to the potential danger from aggressive animals and take precautions to ensure their own and others' safety.

2.1.8 Producers, shippers and consignors are all responsible for:

- contracting only qualified transporters who are knowledgeable of the proper care and handling of bison during transportation and who have equipment appropriate for bison;
- ensuring that all bison intended for transport are fit to be transported (Section 9.8 and Appendix C);
- ensuring proper loading and unloading techniques are used at all times (Section 9.3);
- ensuring proper segregation of bison on the vehicle (Section 9.4);
- ensuring that the intended vehicle is compatible with the assembled load;
- ensuring proper rest times and appropriate feeding and watering of bison before and during transit (Section 9.7);
- providing a method for the driver to contact them in the event of an emergency if not accompanying the load (Appendix B).

2.1.9 Transportation starts with loading at the point of origin, continues through sale and reloading at auction markets and assembly yards, and ends after unloading at the final destination. Transport crews are responsible for the continuing care and welfare of the bison during the entire stage of transit they have agreed to undertake.

2.1.10 Transport crews should be properly instructed and know the laws and regulations governing the humane transport of animals under varying climatic conditions.

2.2 Cruelty and Neglect

Situations can arise in which some livestock owners, through ignorance, neglect or wilfulness, inflict unnecessary hardship on livestock in their care.

2.2.1 It is unacceptable and unlawful for any person to mistreat an animal in his/her care, for example:

- fail to supply an animal with adequate resources to maintain body weight within its normal range;
- apply a prod or goad (electric or otherwise) in an excessive or inappropriate manner or location on an animal;
- slaughter, confine, handle or transport bison in a manner which causes avoidable pain, suffering or distress;
- neglect an animal so that it experiences pain, suffering or distress;
- deprive an injured or sick animal of veterinary care including, if necessary, euthanasia.

2.2.2 If animals are neglected, deprived of basic needs or subjected to cruelty or abuse, all those involved in the bison industry have a responsibility to take corrective action, including reporting suspected cases to authorities.

2.2.3 Ignorance is no excuse for inflicting hardship on animals. Charges of animal abuse can be laid under federal and/or provincial legislation.

2.3 Identification and Records

Bison are included in the national livestock identification system administered by the Canadian Cattle Identification Agency (CCIA). Identification and detailed records of individual animals provides opportunities to enhance welfare as well as to allow trace-backs for disease or product quality issues. Consult the *Good Production Practices Manual* of the Canadian Bison Association.

Section 3 ◊ Land, Fences and Facilities

New bison operations begin with the selection and preparation of land, and construction of fences and facilities.

3.1 Pasture and Range

3.1.1 Native rangelands and seeded pastures are suitable for bison. Rangelands with a mix of habitat types provide foraging and shelter options that extend the grazing season, provide shelter from extreme weather and relief from insects and disturbance. However, tame pastures often increase allowable stocking rates and nutrient densities particularly when grazed in rotation.

3.1.2 Stocking rates for bison are slightly greater than for cattle because of the smaller average body size of bison, lower intakes and ability to use a wider range of forage qualities. Stocking rates are related to forage production and allowable offtake.

3.1.3 Pasture or range must be inspected to ensure sufficient quality and quantity of feed and water. Before and regularly during the grazing period, pastures should be monitored for poisonous plants. (http://sis.agr.gc.ca/pls/pp/poison)

3.1.4 Bison should be excluded from dugouts or natural water bodies during periods when ice is not thick enough to be considered safe.

3.1.5 Contingency plans must address risks such as grass fires, severe storms, vandalism, and damaged fences.

3.1.6 Application of fertilizers, pesticides and herbicides must be timed and conducted to minimize risk to grazing animals.

3.1.7 Bison must not gain access to potentially dangerous or toxic materials such as old nails, lead batteries, petroleum products and paints. Mechanical hazards such as farm machinery, lumber and scrap metal also must be removed from areas accessible to bison.

3.1.8 Bison on pastures or range should have well drained resting areas and shelter which protects them from extreme weather conditions and insects.

3.2 Supplemental Feeding Areas

Supplemental Feeding Areas (SFA) often are used to hold bison temporarily for such purposes as wintering, calving, or finishing.

3.2.1 These areas must be kept clean, dry, and should have some protection from wind. A dry sheltered and, if necessary, elevated resting area should be available at all times. SFA should be properly drained with particular attention to feeding and water areas. Excessive buildup of manure must be avoided in keeping with good animal husbandry practices.

3.2.2 The space allowance for bison confined in groups should be calculated in relation to the whole environment, to the size of the group and to the age, sex, weight and behaviour of the stock.

3.2.3 Bison should be segregated into groups of uniformly sized individuals to ensure small or timid animals have equal access to feed and are not bullied by dominant animals.

3.2.4 New arrivals should initially be isolated from other bison. Single bison should be isolated but with a few local bison for companionship.

3.2.5 New arrivals must have access to an adequate supply of feed and water. This supply should be easily identifiable as many new arrivals may be familiar with natural sources only.

3.2.6 New arrivals should be closely monitored for feed and water intake.

3.2.7 Mixing species is not recommended where supplemental feed is offered because of interspecies dominance or aggressive interactions.

3.3 Fencing

3.3.1 External fences must be well constructed and maintained. A variety of fencing styles and materials are suitable.

3.4 Shelter

3.4.1 Natural or constructed shelters or windbreaks should adequately protect animals from weather fluctuations characteristic of the region, taking into consideration the natural ability of bison to withstand most weather extremes.

3.4.2 Mechanical and electrical devices to which bison have access must be safe. Strict attention must be paid to stray voltage.

Box 2. SORTING SYSTEMS

The primary goal of any bison handling system is to move a group of bison through a series of pastures, pens and alleyways to reduce that group to a single individual. Isolating the individuals from the group will be less difficult and less stressful if the system is properly designed.

A passive system is recommended. Bison have a natural tendency to exit (escape) the same way they entered and preferably towards their pasture. The bison are lured into the holding area with feed or water and held until processing time. The bison are then allowed to exit the holding area through or close to the same entrance/exit with a remote controlled sliding gate i.e. long rope, hydraulic cylinder. They are then redirected to the alleyway, keeping stress thus far to a minimum.

Two main sorting systems are in use today. Both systems use a wide 1.8 - 3.7 m (6 - 12 ft.) alleyway, with preferably sliding gates, to move the animals forward and segregate them into progressively smaller groups. One system uses a series of 1.5 x 2.5 m (5 x 8 ft.) boxes (or various other dimensions) to hold the bison prior to entering the chutes or squeeze. The second system uses a crowding tub prior to entering the chutes or squeeze. With horned bison, the crowding tub is preferred to allow timid or smaller bison room to move away from excited, aggressive and potentially dangerous bison. Variations of the two systems include use of a catwalk and totally enclosed alleyway or open (partially open) alleyways and worked from the ground.

It is advisable to stake out the facility in detail before any posts are driven into the ground. The producer should then walk through the system with an experienced person and attempt to locate any areas where the bison might balk or resist forward movement. Look for such things as shadows or strips of light that might cause bison to balk, corners that are too sharp to turn easily, and hills or gullies that would impede movement.

Mechanical and electrical devices to which bison have access must be safe. Strict attention must be paid to stray voltage.

Section 4 ◊ Handling Systems

4.1 Considerations When Handling Bison

4.1.1 Bison are not normally mean or aggressive animals, but bison will not hesitate to react, especially when they feel threatened.

4.1.2 Bison cows are especially reactive during the calving season and will aggressively protect their calves.

4.1.3 Bulls can also be quite reactive during the breeding season or rut. Bison bulls in rut may perceive humans as sexual competitors or threats.

4.1.4 Bison are herd animals and should be handled and maintained in groups, with efforts made to ensure that they are not left alone for long periods of time. It is preferable to allow bison to remain in a group in a crowd pen or tub instead of standing single file in a chute.

4.1.5 Bison often become agitated when forced to wait in single file chutes. Queuing of bison in single file is an unnatural behaviour.

4.1.6 Bison fear novelty but quickly become accustomed to a routine.

4.1.7 Fear in bison can often manifest as aggression in the form of both goring and pushing other animals. Bison held in close proximity with other bison should be of the same size, age and gender.

4.1.8 Bison have good memories and bison with previous experience with gentle handling will be easier to handle than animals with a history of rough handling.

4.2 Facility Design

Well-designed and constructed handling facilities are essential to safely and humanely care for a captive bison herd. All bison on farms need to be handled periodically for a variety of reasons. These include treatment for common parasites, disease prevention, ear tagging for identification, treatment of sick or injured bison, weaning calves and removing surplus animals.

4.2.1 All facilities must be structurally safe for personnel and animals and the design must facilitate easy and safe handling of animals.

4.2.2 In general, bison want to go back in the direction from which they came. Facilities that incorporate this principle into the handling facility design by using intersections with gates work very well.

4.2.3 Animals and facilities should be inspected routinely and, if necessary, corrective action should be taken immediately.

4.2.4 Handling alleys and pens must be free of sharp edges and protrusions to prevent injury to personnel and animals. There should be no projecting objects on walls, fences or gates.

4.2.5 Spaces under and between fences, panels, or alleys should not be able to catch a leg or horn. Bison will charge for any opening to escape, even if the opening is markedly smaller than the animal.

4.2.6 Bison facilities should be designed so handlers can operate gates without having to be among the bison. Injuries occur while attempting to close gates behind bison when the animals run back through the gate before it is closed.

4.2.7 Bison facilities should be designed with escape routes for handlers (i.e. toe slots and grab rails) if they are going to be in the pen with the bison.

4.2.8 Facilities with square or "dead-end" alleyways may create areas where a submissive animal can become trapped and injured by a dominant bison. The facility should create a free-flow where the animal has a natural tendency to move down the alley to the desired location.

4.2.9 The strength and height of the fence generally has to increase as the pressure on the group increases, with the strongest fences in the actual handling facility. Fences within the corral system should be at least 2.2 m (7 feet) high to prevent attempts to jump. Bison may try to climb fences or walls when they are pressured.

4.2.10 Solid sides can reduce the number of escape attempts. Bison often perceive walls as a safety barrier between themselves and the handler if the walls do not allow bison to see handler movement.

4.2.11 A load-out chute should be included in the design.

4.2.12 Handling facilities should be designed so animals can be fed and watered if held for more than 24 hours.

4.2.13 The facility should have a crowding alley or tub designed to move the bison from the pens into the chutes. The gate must be solid and equipped with self-locking latches to ensure that the bison cannot push the gate open.

4.2.14 The facility could have a weaning pen to allow for the quiet segregation of calves prior to handling. A simple creep feeder with remotely closed gates, connected to a separate holding pen, works well (see Section 6.3).

4.2.15 Wood or steel can be used in the construction of a handling facility. Wood is quieter and flexes slightly while steel is stronger but noisier than wood. Strategically placed rubber inserts can reduce noise and stress in a steel facility.

4.2.16 Lighting can be a useful tool when moving bison. By controlling the location and intensity of light, the handler can reduce stress and induce bison to move from one area to another. Bison prefer to move from dark areas to well-lit areas, rather than from a lit area to a dark area. Sharp contrast in lighting should be avoided because shadows can be created which may cause the animals to balk.

4.2.17 Footing is a very important consideration in handling facilities. Compacted gravel is considered superior to concrete because concrete can become slippery. A bison that jumps or slips and falls on a concrete floor could sustain injuries.

4.3 Operations

4.3.1 Bison are highly susceptible to the stress of capture, restraint and handling. Bison should be handled quietly, with care and patience. Sudden movements and loud noises should be avoided.

4.3.2 One person should be designated to supervise the handling procedure. Clear communication among team members is critical.

4.3.3 Everyone involved in the bison handling operation must be familiar with the facility being used, the handling procedure, and with this section of the Code of Practice.

4.3.4 Handlers should be prepared for the unexpected and should be aware that different animals may respond differently to handling. Bison can react much faster than human handlers.

4.3.5 Handlers should never place themselves in a position where they are on the ground with a confined bison without having a planned escape route.

4.3.6 All persons working the facility should remain as quiet as possible during all phases of the operation. There is generally no requirement for loud or aggressive behaviour to move bison and repeated use of such tactics will usually aggravate the situation. A minimum necessary number of people should comprise the handling team. They must maintain focus and minimize conversation, and respect flight zones when animals are held.

4.3.7 Work with the minimum amount of pressure to initiate forward movement of bison and gradually increase as needed. Both noise and handler exposure can work to move bison.

4.3.8 Subtle sounds are the most effective at moving bison. Novel noises such as the rustling of a newspaper or plastic bag, snapping fingers, rattling pennies in a can, or a "shh shh" sound are examples of sounds that move bison well.

4.3.9 Too much pressure from yelling, arm waving, electric shock or striking bison needs to be avoided. The use of stock prods and goads should be restricted.

4.3.10 It is always advisable to move bison as slowly and calmly as possible. Passive methods of handling bison are superior to trying to drive the animals.

4.3.11 Familiarize animals to the farm and facilities by leaving gates to alleys, fresh pasture or handling facilities open for animals to move and explore on their own. It is advisable to condition the animals to the facility by feeding them in it for a few days prior to handling.

4.3.12 Feed should be used to entice bison into a new pasture or pen whenever possible. Dragging a familiar feeder out of the pen immediately after feed is placed in the feeder will result in animals following the handler outside the pen and into the next pen or alley.

4.3.13 Bison must be given sufficient time to find an open gate. Handlers should open the gate, let the animals settle and observe a handler walking in and out of the open gate several times.

4.3.14 Bison will remain calmer if left in the crowding pen or tub with other bison and moved individually to the squeeze chute when required. It is best to move bison to the squeeze chute one at a time.

4.3.15 When handling bison in facilities, handlers are generally well within the bison flight zone. Often the flight zone is larger than the holding pen the bison are in. It is often possible to work the edge of the flight zone from an outside pen.

4.3.16 Aggressive or dominant bison should be segregated as quickly as possible from those that are submissive or in danger of being injured. Similarly, horned and dehorned bison should be segregated.

4.4 Restraining Bison

4.4.1 An adequate restraining device such as a squeeze should be available for the treatment of bison.

4.4.2 The amount of time that a bison is restrained in a squeeze should be kept to the minimum.

4.4.3 When bison enter the squeeze, both the crash gate and neck squeeze should be closed. The neck squeeze is then opened, allowing the bison's head through. Bison entering a squeeze with an open neck squeeze may enter with such speed and force that the animal can be injured and/or the crash gate can be damaged.

Box 3. BISON SQUEEZE

A bison squeeze is similar to a cattle squeeze but incorporates a few modifications designed for this species.

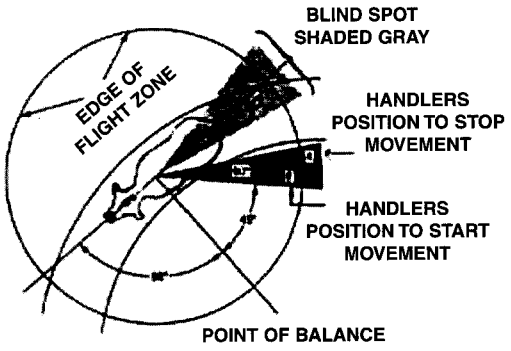
1. It is generally larger and stronger.
2. It has a solid top to prevent bison from climbing out.
3. A crash gate is positioned at the front of the squeeze to stop the bison while the neck restraint is applied. The crash gate is then opened for access to the bison's head.
4. It has a straight vertical neck restraint rather than a contoured cattle neck restraint. A curved or "V" shaped cattle neck restraint can occlude the carotid arteries and cause a bison to die if it goes down in the squeeze.
5. It should be designed so that the bison cannot get its legs or horns caught in openings.

Other features that should be incorporated into a bison squeeze include: neck access doors for injections, bottom access door for semen collection and foot treatment, rear access doors for palpation of cows, adjustable width sides to accommodate different sized animals, and a side exit.

Box 4. BEHAVIOURAL SIGNS OF BISON

It is important that handlers learn to recognize behavioural cues from bison that they are becoming increasingly fearful, threatened or stressed. Some very subtle behavioural cues from bison include licking, blinking, huddling, a raised tail, milling (circular movement), and balking. As fear levels increase these behaviours will increase and new behaviours emerge such as: laboured breathing, frothing at the mouth, vocalizing, bulging eyes, running, pushing, goring, sitting and lying down, as well as jumping or climbing out of the facility. The tail is a good barometer of aggression; as the tail rises, so does the stress level and the potential for aggressive behaviour.

FLIGHT ZONE



The **flight zone** is the critical distance at which an animal will make an escape response upon the approach of another animal, human handler or object. Understanding the flight zone of bison will reduce stress on the animals and help prevent accidents to handlers. Bison can be moved most effectively if the handlers work on the edge of the flight zone. The animals will move away when the flight zone is penetrated because the handler is perceived as a threat and stop when the handler withdraws. To make an animal move forward, the handler should stand in the shaded area marked A and B in Figure 1 and stay out of the blind spot directly behind the animal. To make an animal move ahead the handler should stand behind the **point of balance** at the shoulder, and to make the animal move backwards the handler should stand in front of the point of balance. When animals are in handling facilities, the point of balance can be used in conjunction with sweep and swing gates.

[adapted from Grandin 1983]

When approached, bison within a herd tend to gather together and turn their eyes and ears towards the handler. This process has been referred to as mustering. When the handler is near the edge of the flight zones of the individual animals, a portion of the animals will turn and begin to move away. As the handler further penetrates the flight zone, some of the animals will begin to move off and the follower response will stimulate the balance of the bison herd to follow. Handlers should avoid deep penetration of the flight zone because this can cause panic and attempts to escape. In extreme cases, panic behaviour typified by excessive and disorientated running may take place, increasing the risk of animals sustaining injuries by running into fences, corrals etc. Panic responses are more likely in recent herd additions. Bison that are held individually, in small groups away from the herd, or who are exposed to unfamiliar handlers, objects or noises tend to be more flighty. In addition, the process of social facilitation (behaviour influenced by the behaviour of others) may cause normally calm individuals to show similar panic behaviours. In cases where most of the herd is extremely disturbed, handling of the animals should be abandoned for several hours. Older mature animals often help show the way for younger inexperienced animals. In a similar manner, the flight distance for a group is reduced when extremely flighty individuals are removed.

Section 5 ◊ Feed and Water

Bison usually are raised on native or seeded pastures but can be finished on supplemental feeds including grain and other concentrates.

5.1 Supplemental feed must be offered where environmental or seasonal effects or stocking density do not allow for daily feed requirements to be met from range or pasture.

5.2 Bison must have access to an adequate and clean source of water. The average daily requirement for an animal weighing 500 kg (1100 lbs.) is about 45L (10 gal) per animal. Water sources can be wells, natural streams and ponds, or snow in extensive grazing systems. Care should be taken to provide water after fall frosts unless snow is available.

5.3 Feeders should be designed and distributed to allow all animals (with special attention to subordinate individuals) adequate access to feed.

5.4. Changes to concentrate rations must be made gradually to prevent digestive problems or potential death. Feed interruptions should be avoided because it may lead to subsequent over-consumption.

5.5 The use of feed and water medications is discouraged unless recommended by a veterinarian.

5.6 Feeds must be stored in an appropriate manner to prevent growth of molds and contamination from rodents, birds and insects. Feed quality, particularly vitamin activity, will deteriorate during storage. Manufacturers' expiration dates should be respected.

Section 6 ◊ Reproduction Management

6.1 Breeding

Bison cows usually are bred naturally because of the stress involved using other methods. Bison cows normally breed when they are two, with heifers producing first calves at the age of three. However, there are cases of heifers calving at two and in some herds up to 20% conception rates may be expected.

6.1.1 To prevent calving difficulties (dystocia) and other health problems, the timing of first breeding should take into consideration the overall physical development of the heifer. It may be prudent to keep yearling heifers in a separate pasture during the breeding season.

6.1.2 Cows and heifers should be managed so they are in suitable condition at the time of breeding and calving. Generally, conception rates are improved by good nutrition but overfeeding (concentrates) cows may contribute to calving difficulties.

6.1.3 The optimal age of breeding bulls is 2-5 years.

6.1.4 In multiple sire systems, bulls should be accustomed to one another before joining cows.

6.1.5 New or young bulls should not be introduced during the calving season because they may interfere with maternal bonding or injure calves.

6.2 Calving

6.2.1 Under Canada's climatic conditions, bison calve outside on range or pasture. This is the preferred and recommended practice to minimize the stress of cows during and after calving.

6.2.2 Bison cows should calve in clean spacious pastures. Unobtrusive surveillance should be made daily to identify difficult births or abandoned calves. Twins must be carefully watched.

6.2.3 Although an uncommon occurrence, cows having difficulty during calving should be assisted by competent personnel using accepted veterinary techniques.

6.2.4 Approaching a calving cow or newborn calf can be extremely dangerous. Avoid exposure to risks such as possible attack by the cow or by herd mates.

6.2.5 A cow that has been assisted or disturbed may abandon her newborn calf. A contingency plan for artificial rearing of abandoned calves must be in place.

6.2.6 Colostrum is essential to the health and survival of newborn bison. Early nursing of the dams ensures transfer of passive immunity and this should occur within the first twelve hours. Abandoned calves could be supplemented with dairy or colostrum substitutes within the first four hours.

6.2.7 Whole milk or milk replacers intended for beef and dairy calves or lambs have been successfully used to rear bison calves. In addition to regular feeding with milk or milk replacers, calves should have access to palatable feed, including some roughage and clean water.

6.2.8 Goats are suitable surrogate mothers, but these should be free of diseases such as Malignant Catarrhal Fever, Johnes' Disease, and others to which bison may be susceptible.

6.2.9 Calves should be inspected at each feeding for signs of constipation, diarrhea, and coughing, as well as noting general attitude and appetite.

6.2.10 Tagging of newborn calves is dangerous because of the protective instincts of bison cows.

6.3 Weaning

In the present management system, most calves remain with their dams until at least 5 months of age. After this time calves can be weaned by removing them from their dams and penning offspring separately or leaving them with the dams to allow natural weaning to take place.

6.3.1 Calves should be weaned 2-3 weeks prior to being entered in a sale, transported to new premises, or mixed with another group of bison.

6.3.2 If calves are removed from their dams it should be done in a method that minimizes stress to both the cows and calves. Calves should be kept in a secure pen with plenty of fresh water and feed available.

6.3.3 If natural weaning is employed, provisions must be made to ensure that the calves have access to a sufficient quantity and quality of feed to meet their requirements. Creep feeding of high quality forage and grain may be required.

Section 7 ◊ Herd Health Management

The Canadian Bison Association strongly opposes the use of growth hormones, steroids and sub-therapeutic antibiotic feeds in the production of bison meat. Bison meat is intended to be a natural, additive-free meat and producers are strongly urged to maintain and encourage this wherever possible.

7.1 The manager of a bison operation should develop, in consultation with a veterinarian, sound herd health and sanitation programs appropriate to the facilities and management systems.

7.2 Distressed bison must be dealt with humanely, effectively and promptly to prevent avoidable suffering. Abnormal health conditions must receive proper treatment. This requires adequate handling facilities.

7.3 Bison requiring medical treatment should be identified, treated and treatment records should be kept.

7.4 Sick, injured or disabled bison in severe distress must not be subjected to the additional distress of loading and transportation. These animals must be euthanised or slaughtered on the ranch (Section 11).

7.5 Dead animals must be removed and disposed in a manner prescribed by laws.

7.6 Suspicion of a reportable disease as defined by the *Health of Animals Regulations* must be immediately brought to the attention of a Veterinary Inspector of the Canadian Food Inspection Agency.

7.7 Overly aggressive, horned animals should be segregated or properly dehorned to prevent injury to other animals.

7.8 Insect pest populations should be regularly monitored and appropriate control measures applied.

7.9 Contact with species that cannot currently be reliably tested for Tuberculosis should be prevented.

7.10 Care should be exercised when mixing bison with other species that may spread disease. In particular, bison should be segregated from sheep and other species that may transmit Malignant Catarrhal Fever.

Section 8 ◊ Medical and Surgical Intervention

8.1 General

8.1.1 Medication must be administered as directed by a veterinarian who has sufficient knowledge of the conditions of use and the animals. Treated animals must be properly identified. Use of medications must adhere strictly to the recommended dosage and withdrawal periods prior to the marketing of the animals.

8.1.2 All producers should maintain health records of treatment and medications used. Treatment records should be maintained for one year after the animal has left the herd.

8.1.3 Competent and knowledgeable personnel must administer medication.

8.1.4 Only licensed veterinarians must conduct surgical procedures. Provincial veterinary acts may specify certain minor surgery that may be performed by non-veterinarians.

8.2 Castration and Dehorning

8.2.1 Castration is seldom conducted and is not recommended or required.

8.2.2 Removing horns (dehorning) may reduce the chances of injury due to aggressive behaviour. However, these benefits must be weighed against the risk associated with restraint (i.e., excessive stress or injury while in a squeeze) and surgery (i.e., blood loss, post-surgical infection).

8.2.3 In deciding whether to dehorn bison, managers should carefully consider their style of operation and the facilities available on their farm. Where the herd has ample space and feed available, dehorning may not be necessary since these conditions may reduce the chances of aggressive behaviour. In herds where there is close interaction among animals around feed supplies or in handling facilities, it may be necessary to remove horns to decrease the chance of injury due to goring.

8.2.4 In adult bison, removing the tips of the horns only (tipping) is preferred to removing the entire horn. Dehorning and tipping should be done using a method that minimizes stress to the animal. It should be done at the earliest age practical using a technique recommended by a veterinarian. Bison should be restrained only as long as necessary to effectively carry out the procedure. Prolonged restraint may cause undue stress that can lead to injury or death.

8.2.5 Dehorning should be limited to seasons when flies are absent. Flies increase the likelihood of post-dehorning infection.

8.2.6 Full dehorning of adult bison is recognized as producing both short and long term pain. Because the knowledge of pain and its control is evolving, the producer and veterinarian should maintain an awareness of current and practical techniques in pain management.

8.3 Semen Collection

8.3.1 Only trained personnel should collect semen. Bison bulls should be handled quietly and proper restraining equipment used.

8.3.2 Manual massage is recommended but electroejaculation may be required. If so, only a small electric probe and low amperage should be used because of the potential for injuring the bull.

Section 9 ◊ Transportation

The Recommended Code of Practice for the Care and Handling of Farm Animals: Transportation contains detailed recommendations and standards and should be consulted. The following highlights issues of particular relevance to bison.

9.1 General

9.1.1 Everyone directly or indirectly involved in the transportation of bison by any mode, air, land or water, must comply with the federal *Health of Animals Regulations*, Part XII concerning the humane transportation of animals (see also Section 2.1 and Appendix D).

9.1.2 Producers should be aware of federal import regulations and requirements prior to importing bison. They should check with their provincial agriculture office regarding provincial regulations.

9.1.3 Weather forecasts should be considered in planning long trips to avoid adverse weather conditions en route.

9.1.4 A system for early identification of injured animals prior to loading and an appropriate plan for handling them must be in place and known to all employees.

9.1.5 Recommendations for the shipment of bison by air are available in the *Live Animals Regulations* of the International Air Transport Association (IATA). Copies can be obtained from: Publications Assistant, IATA, 800 Place Victoria, P.O. Box 113, Montreal, Quebec, H4Z 1M1.

9.1.6 A national certification program for alternative livestock transporters is recommended to achieve a consensus on best practices and to ensure high standards of performance.

9.2 Vehicles and Containers

9.2.1 Vehicles used to transport bison should be in excellent condition and must be in full compliance with provincial highway traffic regulations. Prior to loading a vehicle, an interior inspection should be performed and bedding added or other corrective measures taken to assure safe transportation.

9.2.2 Vehicles used to transport bison should permit safe, easy loading and unloading and provide for the safety of the bison and personnel during transport.

9.2.3 Vehicles and containers must have sides that are secure, strong and high enough to prevent bison from jumping from, falling off or being pushed from the vehicles. To prevent injury, vehicle design and construction must prevent protrusion of any part of an animal from the vehicles. As an example, designs with several rails at the top just wide enough for a horn to get wedged must be avoided.

9.2.4 Vehicles must have doors which close firmly and securely, with a tamper-proof locking system. Doors and internal gates should be wide enough to permit bison to pass through easily, without bruising or other injuries. Stock trailers that open the full width of the trailer are much safer than single-animal sliding doors.

9.2.5 Vehicles should have smooth fittings and must be free of protruding bolt heads and any other sharp protrusions.

9.2.6 Vehicle floors must provide secure footing, such as sand or footholds.

9.2.7 Suitable bedding such as straw, wood shavings, peat moss or mats must be added to vehicles to assist in absorbing urine, and to protect the bison from hard flooring and from vibrations during vehicle operation. Bedding is also necessary to prevent direct contact with cold metal in the winter.

9.2.8 Vehicles must be constructed to provide bison with adequate ventilation at all times, while avoiding drafts. In the absence of adequate ventilation, bedding material can be detrimental to bison on long hauls, due to moisture and ammonia build-up within the vehicle. Ventilation and air temperature within the vehicle must be balanced to meet the animals' needs. Provision must be made for absorption or drainage of urine. Bedding materials must be free from substances known to be irritating or harmful to bison or to contaminate meat products.

9.2.9 Care must be taken to protect bison from exposure to exhaust.

9.2.10 Ventilation should be adjustable from the outside of the vehicle in response to temperature changes during a trip. The divider gates should also have latches that can be operated from outside the trailer.

9.2.11 Internal container temperature and air quality may not be adequate even when conditions outside the container are ideal. Temperature and ventilation inside the containers should be monitored throughout the trip.

9.2.12 Unless livestock can be easily seen from outside the containers, each container must have a sign or symbol to indicate that it contains live animals and to show its upright position.

9.2.13 Containers must be secured to vehicles to prevent movement during transit.

9.2.14 Containers that hold bison should be tilted as little as possible during all stages of transport. They should always be moved smoothly.

9.3 Loading and Unloading

9.3.1 Bison must not be loaded or unloaded in such a manner as to cause injury or avoidable suffering.

9.3.2 Bison should be kept as calm as possible. If they can start their trip with minimal stress and excitement, the rest of the journey will be more successful. If given time, bison will often leave a vehicle on their own. Handlers should be aware that bison can be excited by abrupt movements, noises or flashes of light that tend to occur during loading and unloading.

9.3.3 Contrasting shadows and bright spots may intimidate bison and interfere with their orderly movement. Uniform lighting of the areas through which the animals are to be loaded, such as sorting pens, single-file chutes and loading ramps, may help to prevent balking and reversing of direction. During loading at night, lighting the interior of the vehicle encourages the bison to move forward. On bright sunny days, it may help to cover the outside part of the loading dock to darken it.

9.3.4 Use of electric prods is discouraged. However, when their use is required, care must be taken to use them sparingly. Electric prods must never be used on the genital, anal or head areas.

9.3.5 Loading and unloading should be done using properly designed chutes, ramps and holding and sorting pens. Loading onto vehicles is more easily accomplished if the alleys and ramps have no sharp turns that could impede movement or could cause injury to the bison. The footing should be secure and the sides high enough to prevent the bison from falling or jumping off. Ramp slope should not exceed 25 degrees, with cleats or other means of providing good footing.

9.3.6 Ramps must be free from projections and sharp edges.

9.3.7 No gap should exist between the ramp, its sides and the vehicle. Internal ramps should be used at all times.

9.3.8 Preferably, the dock surface should be level with the vehicle floor. If the loading surface and the vehicle surface are not level, bison should not be required to negotiate a step in excess of 63 cm. (25 inches). When unloading from a truck, it is best to have a level area of at least 1.2 - 1.8 m (4 to 6 feet) at the top of the ramp. Bison do not like to come out of a door and start downhill immediately.

9.3.9 Bison should not be unloaded directly into long alleyways. Every effort should be made to prevent the animals from bolting when unloading.

9.4 Segregation

9.4.1 Bison over two (2) years of age that are from different sources must not be mixed during transport. During the breeding season, bison bulls will often not get along in the same compartment even if they are familiar mates.

9.4.2 Under the federal *Health of Animals Regulations*, the following animals must be segregated while on the same vehicle:

- animals of different species;
- animals that are incompatible by nature;
- animals of substantially different weight or age, except for a female animal and its suckling offspring;
- groups of mature bulls must be segregated from all other animals.

9.4.3 Mature horned bison must be segregated from dehorned bison during transport.

9.4.4 Bison of different health status should be segregated during transport.

9.4.5 When the vehicle is not full, bison should be safely partitioned into smaller areas to provide stability for the bison and the vehicle.

9.5 Space Allowances

9.5.1 Bison must not be overcrowded in a vehicle so as to cause injury or suffering. For extended trips, bison should be able to lie down comfortably at the same time.

9.5.2 In hot humid weather, bison require more ventilation to prevent dangerous levels of heat build-up. This situation can be partially alleviated by decreasing loading density. Handlers should also consider the effect of horns and winter coats and adjust loading density accordingly.

9.5.3 Each animal must be able to stand in its natural position without touching an overhead roof or deck. Bison older than one year of age should never be loaded in a vehicle with more than one deck.

9.6 Care in Transit

9.6.1 Drivers should check each load immediately before departure to ensure that the bison have been properly loaded.

9.6.2 Drivers should check each load again early in the trip and make adjustments as required. The driver should check for signs of general discomfort of the bison, such as overheating. Periodic checks should be made any time the load stops. Adjustments should be made as needed. Table 1 shows some behavioural signs of certain conditions requiring correction.

9.6.3 Drivers should start, drive and stop their vehicles as smoothly as possible. They should practice defensive driving by ensuring that adequate space is available in case an emergency requires an unexpected stop. They should negotiate turns in the smoothest possible manner. Sharp turns should be avoided.

9.6.4 Weather conditions should be monitored and ventilation adjusted accordingly to maintain animal comfort. The need for adequate ventilation must be continually in balance with the need for protection from draughts.

Table 1. Signs of Animal Discomfort During Transport

Problem	Warning Signs
Overcrowding	• load will not "settle", animals continue to scramble for footing and the load continues to be noisy for prolonged periods of time • animals involuntarily lie down and are unable to get up
Overheating	• animals standing with neck extended with open mouthed breathing • wet bison which were loaded dry are probably overheating; bison should remain dry during transport
Cold Exposure	• fluid frozen on the face and nostrils

Adapted from the *Recommended code of practice for the handling and care of farm animals: Transportation*, CARC, 2001

9.6.5 Extra caution should be taken to avoid stress or death caused by weather extremes, in particular very hot and humid weather. On trips exceeding 12 hours, available proven technology such as temperature probes should be used to allow monitoring of the animal environment in trailers. In extreme or rapidly changing weather, bison should be inspected frequently for signs of environmental exposure.

9.6.6 During hot and humid weather:

- adequate airflow must circulate throughout the vehicle or container to keep the bison comfortable;
- vehicles containing bison should not be parked in direct sunlight. When it is necessary to stop, the driver should take all necessary steps to ensure that the duration of the stop is minimized to prevent heat build-up inside the vehicle;
- loading density must be reduced;
- bison should be handled with extra care because physical activity increases heat stress. Every animal should be treated with great patience and should be allowed to rest to avoid overexertion;
- transportation should be rescheduled, such as during the cooler night or early morning. For trips exceeding 12 hours, the driver should keep the vehicle moving during the hottest period to circulate air through the vehicle, and provide any rest stop during the cool night hours. Periods of intense traffic congestion should also be avoided.

9.6.7 During cold weather:

- the load should be checked more frequently to ensure an adequate balance between protection from cold and provision of adequate ventilation. Alternate warming and cooling may lead to respiratory problems.
- extra measures should be taken to keep the bison dry and comfortable, for example by providing extra straw or other suitable bedding.
- bison must be protected from direct contact with the vehicle's cold metal surfaces by lining the floor and sides with wood, straw or other suitable insulating material.
- although resistant to cold, bison are vulnerable to excessive cold under certain circumstances.

9.6.8 In the case of traffic accidents, breakdowns or other delays, prompt action should be taken to ensure the well being of the bison. Emergency procedures are listed in Appendix B.

9.7 Feed, Water and Rest for Bison in Transit

9.7.1 Bison are very susceptible to transportation stress. Transporters should plan their long-distance trips considering first the route that minimizes transport time and stress to the animals, and second, the location of facilities at which bison may be adequately fed, watered, sheltered and cared for in a humane manner. If possible, trips should be limited to within a 24-hour range.

9.7.2 Bison destined for trips exceeding 24 hours must be fed and watered within 5 hours before departure. Particular attention should be paid to calves, and to lactating and pregnant cows (Section 9.8.6).

9.7.3 More research is required to determine maximum acceptable travel times and desirable feed, water and rest intervals for bison. Under the federal *Health of Animals Regulations*, bison must not be confined in a transport vehicle for more that 48 hours without being offered adequate feed, water and rest. This time may be extended only if they will reach their final destination without having been confined in a vehicle for longer than 52 hours.

9.7.4 Feed, water and rest can be provided at a rest station or on a suitably equipped vehicle (Transportation Code). In either case, the following factors should be considered:

- access must be available to feed, water and care for the animals as needed, including the availability of veterinary attention;
- pens must provide adequate space for all animals to lie down at the same time. Resting animals should be able to move freely in a well-bedded and protected environment and penned with at least twice the floor space as in transit recommendations;
- the environment must be free from disturbance by excessive noise or movement;
- an adequate quantity of good quality feed must be available to all animals, so that each animal has an opportunity to eat;
- pens must be equipped with suitable feeders;
- all animals must have free access to clean drinking water. Water must be protected from freezing and must be provided in adequate quantity to meet the bisons' needs;
- suitable clean, dry bedding such as straw, sand or wood shavings should be maintained in all pens and in all types of multi-purpose stock liners;
- adequate ventilation and appropriate temperatures must be maintained at all times;
- adequate lighting must be available for observation of each animal.

9.7.5 The *Health of Animals Regulations* require that the rest period be at least 5 hours in duration. However, it is strongly recommended that rest periods be at least 48 hours in duration if the bison are unloaded. It is preferable to avoid unloading the bison. This can be achieved by providing feed and water and allowing the animals to rest while the truck is stopped, in which case the rest period can be timed to coincide with the driver's rest stops.

9.7.6 Feed, water and rest should be provided more often for animals at risk, such as very young or old animals, and for animals that are transported under adverse weather conditions, such as travel through different climatic zones and weather extremes. Calves too young to be fed exclusively on hay and grain should be provided with suitable feed and water at least every 12 - 18 hours.

9.7.7 Nursing calves accompanying their dams should be allowed an opportunity to nurse undisturbed at suitable intervals. Nursing calves should be provided with appropriate additional feed and water at least every 8 hours.

9.8 Animals at Risk

9.8.1 An animal with reduced capacity to withstand the stress of transportation, due to injury, fatigue, infirmity, poor health, distress, very young or old age, impending birth, or any other cause, is an "animal at risk". Some animals at risk are unfit to be transported. Others can be transported providing special precautions are taken. The "Guidelines for Handling Animals At Risk" (Appendix C) provides recommendations to assist in the decision as to the proper handling of bison that fall within this category.

9.8.2 Prior to transport, bison should be in good physical condition and health. Animals that are sick, injured, disabled or fatigued and that cannot be moved without causing additional suffering are unfit for transport and must not be loaded for transport.

9.8.3 If an individual becomes unfit during transport, it must be segregated from other animals and taken to the nearest suitable place at which it can receive proper care and attention. Veterinary advice should be sought. A system of early identification of injured animals prior to unloading and an action plan must be in place and known to all involved parties (Appendix C).

9.8.4 In the case of a roadside emergency such as a vehicle accident, immediate action should be taken to minimize animal suffering (Appendix B). Veterinary advice should be sought.

9.8.5 Special care should be taken in transporting animals at risk, such as partitioning separately or loading in a separate compartment. Animals at risk must be loaded and unloaded in a way that avoids additional suffering. They should be loaded last and unloaded first.

9.8.6 Pregnant bison should not be transported if they are likely to give birth within 6 weeks after the journey (Section 9.7.2).

9.8.7 Calves less than 8 days of age should not be transported to auction markets (Section 9.7.2).

9.8.8 Bison that are unable to rise to a standing position (non-ambulatory animals or "downers") should not be loaded for transport.

9.8.9 Any animal which dies in transit must be removed at the first opportunity, in accordance with provincial and federal legislation.

Section 10 ◊ Auction Markets, Exhibitions, and Abattoirs

All provincial and federal acts and regulations governing all aspects of auction markets must always take precedence.

10.1 Facilities

10.1.1 Secure footing for all animals should be maintained preferably through the use of sand. Loading ramps, chutes and other holding facilities should be constructed of solid material and should be well maintained. Heavy-duty steel pipe, at least 5 cm (2 in.) thick lumber, and concrete are recommended building material.

10.1.2 Facilities should be routinely inspected to remove hazards. Holes in flooring, broken boards, bars, and protruding objects around the chute or corrals should be repaired or removed to prevent the risk of injury.

10.1.3 All handling or holding facilities should be regularly cleaned and supplied with fresh bedding.

10.1.4 Loading chutes are generally used to load bison directly into closed trailers, from ground level, preferably 1.8m (6 ft) wide to allow pairs or groups to load together. If required, loading ramps should be at least 76 cm (30 in.) wide to allow bison to move single file. Ramps should not be steeper than 25 degrees and preferably made of concrete with adequate grooving in the concrete. The walls of chutes and ramps should be partially closed in and have sides high enough, 2m (7 ft) to prevent animals from jumping.

10.1.5 On wooden ramps, square cleats 3.8 - 5.0 cm (1.5 - 2 in.) should be attached to the ramp every 20 cm (8 in.). Hardwood or square steel tubing should be used for cleats.

10.1.6 Floors of all pens should be paved, properly drained and scored or treated to prevent slipping. They must be graded gently to

provide good footing. The slope of the floor in the individual holding units should be between 2 and 4%. Drainage grates, where required, should be at the sides of the pens.

10.1.7 Drains should be installed outside the chute area. Bison will balk and refuse to walk over drain grates in the middle of the floor of chutes or alleys.

10.1.8 To encourage the safe and efficient movement of bison at night, adequate and proper lighting is required around alleys, loading ramps and the entrances to transport vehicles.

10.1.9 Bison generally move towards light, but lamps should not be shone directly into the animals' eyes. To load bison at night, either a spotlight mounted 3 - 6m (10 - 20 ft) off the ground or frosted lights placed inside the truck should be used.

10.1.10 One-way gates that prevent bison from reversing direction are highly desirable.

10.2 Injured, Sick and Disabled

10.2.1 All bison should be inspected on arrival at the auction and other facilities. Any signs of abuse or neglect should be reported to the Canadian Food Inspection Agency or SPCA who may refer the complaint to local authorities.

10.2.2 Market operators should refuse to accept animals that are clearly not in condition to be moved through their facilities without further injury or stress.

10.2.3 Market operators should encourage and facilitate producers to move injured, sick and disabled animals directly to slaughter plants.

10.2.4 Distressed animals that are accepted should be held separately in appropriate pens and promptly treated.

10.3 Holding and Handling

Bison should be unloaded, moved through the facilities and loaded with patience as quietly as possible to reduce stress and injury. These measures ultimately make the job safer and more efficient. All employees working with bison should be instructed in handling techniques unique to bison.

10.3.1 To reduce stress and to prevent injury to bison, pens should be large enough to allow for adequate space to avoid overcrowding.

10.3.2 A range of pen sizes should be available to minimize the need to mix various types of bison. In large pens, adjustable dividing gates should be used to reduce mixing of animals.

10.3.3 During loading and unloading of vehicles, loading docks must always be aligned with the vehicles. Small gaps can catch or trip animals resulting in physical injury or stress.

10.3.4 Every bison that is a potential danger to other bison should immediately be segregated.

10.3.5 Bison often feel secure in the transport vehicle, partially due to the subdued lighting, and will cringe if they see a dead end. Bison should be able to see a pathway of escape ahead and facilities should be designed with this in mind.

10.3.6 The use of prods should be avoided when moving bison through the facility. If use of prods is considered necessary, use of both electric and other prods should be minimized. Prods must not be used in the facial, genital or anal areas.

10.3.7 Attention should be paid to noises that unnecessarily excite the animals. Rubber stops installed on gates and squeezes will help to reduce noise.

10.3.8 Dogs should be kept away from handling areas.

10.3.9 Bison are particularly affected by contrasts between light and dark areas. Care should be taken to ensure artificial or natural light does not cast shadows across the paths of the bison.

10.3.10 Bison held for more than 24 hours should be provided with adequate feed and water in bedded facilities and have sufficient floor space for all animals to lie down at the same time and not contaminate their feed.

10.3.11 Orphans less than 8 days old should not be accepted for sale. Bison cow-calf pairs should not be accepted unless the calf is greater than 3 months (lost orange color).

10.3.12 Heavily pregnant cows (within 6 weeks of expected calving) should not be offered for sale at an auction facility.

10.3.13 Operators of registered establishments and all other slaughter facilities are fully responsible for humane preslaughter handling and the humane slaughter of bison on their premises.

10.3.14 It is the responsibility of inspectors under both the federal and provincial legislation to monitor the humane handling of bison.

10.3.15 Violations of humane handling and related regulations, such as overcrowding or other circumstances that result in unnecessary suffering, should be reported immediately to plant management, inspectors and other authorities.

Section 11 ◊ Humane Slaughter

Bison are slaughtered for commercial meat production. In some situations, bison may become injured and require humane killing to promptly relieve their suffering. When it is necessary to kill bison, the procedure must be achieved quickly and must minimize pain as much as possible. The following brief guideline is intended to assist persons who must perform this task.

11.1.1 Shooting with a high-powered rifle is the recommended humane method of killing bison provided that the shot penetrates the brain causing instant unconsciousness and death without regaining consciousness. In all instances a high-powered rifle must be used because of the thick hair coat and the heavy skull covering the brain.

11.1.2 Safety precautions to protect other animals and people are essential. Any person using a firearm must be licensed to do so in the particular jurisdiction.

11.1.3 The recommended procedure is to shoot the bison in the side of the head in the position shown in Figure 1. Place the shot just below and immediately to the rear of the horn. Frontal shots are not advised because of the possibility of ricocheting off the skull. The exception is when the animal's head is lowered while eating off the ground and the shot is placed as described in Section 11.1.4

11.1.4 For commercial slaughter, two alternative shot placements are used depending on the construction and arrangement of the knocking box.

- From the front, the shot should be placed in the center of the skull at a point 2-3 inches above the eyes perpendicular to the front of the skull to ensure proper penetration.

- From the rear, the shot should be placed in the center and just slightly behind the horns at an angle perpendicular to the skull, i.e., towards the animal's nose. The bullet then enters the approximate center of the brain, rendering the animal immediately unconscious.

Euthanasia: rifle shot placement ●

FIGURE 1

FIGURE 2

Bison should be shot with a high powered rifle with the shot placed to destroy the brain. This shot placement ensures a quick, painless and humane death for the animal. The side shot should be placed between the base of the horn and the ear, on a level line with the base of the horn when the head is carried in the normal walking position. The shot is best taken with the bison quartering away slightly rather than perpendicular as this ensures that the bullet travels forward into the brain case. If the shot must be taken from the front, then an imaginary line should be drawn from the centre of back horn to the centre of the opposing eye. The shot should be placed just above the intersection of these two lines. If possible wait until the animal lowers its head towards the ground to ensure that the shot does not deflect off the skull. Care must always be taken to ensure that no persons or other bison are within the injectory bullet.

Section 12 ◊ Research Needs

The following are identified as research needs for improving the welfare of farmed bison:

12.1 Animal Production, Welfare and Behaviour

- Further understanding of the natural behaviour of bison
- Design and operation of handling facilities
- Compatibility in social grouping, regrouping and the introduction of new individuals
- Managing horned vs. non horned bison and humane dehorning methods
- Use of shelter during inclement weather
- Holding conditions and times at auctions and exhibits
- Preslaughter holding times and conditions
- Alternative weaning strategies
- Optimal seasonal body condition and condition scoring
- Defining and meeting seasonal nutrient requirements
- Bloat and nutritional disorder management
- Humane methods of semen collection

12.2 Transportation

- Bison-specific design of transport vehicles
- Transport times, loading densities, transport management
- Optimal feed, water and rest during handling and transport

12.3 Reproduction and Genetics

- Impact of sex ratios in a herd, single vs. multiple sire groups

12.4 Health

- Understanding emerging diseases such as Malignant Catarrhal Fever and Johne's Disease
- Effective preventative treatments for Infectious Bovine Rhinotracheitis, Bovine Viral Diarrhea, Pink Eye and Shipping Fever.

Section 13 ◊ References and Resources

Books

1. Dary, D.A. 1989. The Buffalo Book: The Full Saga of the American Animal Sage Books. Chicago. 384 p. illus. 24 cm.
2. Geist, V.1996. Buffalo Nation: History and Legend of the North American Bison. Voyageur Press, Stillwater, Minn.
3. National Buffalo Association. 1990. Buffalo Producer's Guide to Management and Marketing. Ft. Pierre, SD. 543 p. ill. 24 cm.
4. National Bison Association. nd. The Bison Breeder's Handbook Fourth Edition.

Web Sites

1. Bison Centre of Excellence, Leduc, Alberta: http://www.bisoncentre.com
2. Centre for Bison Studies: Montana State University – Bozeman: http://www.montana.edu/wwwcbs
3. Specialized Livestock and Development Program - Western College of Veterinary Medicine, Saskatoon, Canada: http://www.usask.ca/wcvm/herdmed/specialstock
4. Dr. Temple Grandin's Web Page: http://www.grandin.com/behaviour/tips/buffalo.html
5. Saskatchewan Agriculture: http://www.agr.gov.sk.ca/livestock/bison
6. National Bison Association: http://www.bisoncentral.com
7. Canadian Bison Association: http://www.bisoncentre.com

Extension Articles

1. Armstrong, J. 1998. *Bison production: Economic and production information for Saskatchewan producers.* Saskatchewan Agriculture and Food, Regina, Saskatchewan. 72p.

2. Dey, D. 1988. *Commercial Bison Industry,* Ag-Ventures. Canada - Alberta Farm Business Management Initiative. Alberta Agriculture, Food and Rural Development.

3. Irby, L. and Knight, J. eds. 1998. *International Symposium on Bison Ecology and Management in North America.* Montana State University, Bozeman, Montana. 395p.

4. Nixdorf, R. 1998. *Bison feedlot: Economic and production information.* Saskatchewan Agriculture and Food, Regina, Saskatchewan. 66 p.

5. Prairie Agricultural Machinery Institiute. 1999. *The Rancher's Guide to Elk & Bison Handling Facilities.* First Edition. P.O. Box 1900, Humboldt SK SOK 2AO.

Associations

Bison Centre of Excellence
4301 50 St.
Leduc, Alberta
T9E 7H3
Ph: 780-986-4100
Fax: 780-980-7597
web site: www.bisoncentre.com
e-mail: bison@bisoncentre.com

Canadian Bison Association
#200-1660 Pasqua St.
Regina, Saskatchewan
S4P 3G7
Ph: 306-522-4766
Fax: 306-522-4768
web site: www.bisoncentral.com
e-mail: cba1@sk.sympatico.ca

National Bison Association
Suite 100, 4701 Marion St
Denver, Colorado
80216
Ph: 303-292-2833
Fax: 303-292-2564
web site: www.bisoncentral.com
e-mail: info@nbabison.org

APPENDICES

Appendix A ◊ Glossary

Capture myopathy A non-inflammatory degeneration of skeletal muscle caused by excessive contraction of the muscle fibres due to exertion. The condition may be exacerbated by certain drugs, fear or high environmental temperatures. An affected animal will appear weak and may not be able to stand or walk. This condition can affect bison several minutes or days after severe stress or excessive exercise and usually results in death.

Consignee A person, group or organization that takes possession of bison (livestock) at destination for an express purpose such as transportation, auction, slaughter or other specific service or function.

Consignor An owner or agent that provides livestock including bison to another person, group or organization for an (express) purpose such as transportation, auction, slaughter or other specific service or function.

Container A box or crate that is constructed for the shipment of livestock and that can be moved independently from one mode of transport to another.

Driver The person operating the vehicle used to transport livestock including bison.

Knocking box The enclosure used to restrain an animal while it is being rendered unconscious by a stunning (knocking) instrument such as a dead bolt pistol or a high powered rifle.

Livestock Includes bison.

Owner Such person, organization or group that has (possesses) legal property rights with respect to the livestock or bison in question.

Qualified Transporter A person who has demonstrated through knowledge and experience the ability and commitment to transport livestock humanely and in accordance with applicable Federal, Provincial (and export) regulations and this code of practice.

Shipper 1) the owner of the livestock, or 2) the person or organization who possessed the bison at the time of loading. Any person, group or organization that causes livestock (bison) to be transported.

Transporter A person or organization that conveys by vehicle livestock (bison) from one place to another.

Transportation The conveyance or movement of livestock by vehicle beginning with the onset of loading at the place of origin to the completion of unloading at destination.

Vehicle Any means of conveyance used for the transportation of all classes of livestock, including trucks, tractor-trailers, railway cars, ships and airplanes.

Appendix B ◊ Emergency Procedures During Transport

In the event of an emergency during the transport of bison from one location to another via a truck and trailer, the following set of guidelines will assist the driver in obtaining assistance and maintaining adequate care of the bison. There are numerous types of emergencies which may occur while bison are being hauled and each has its unique set of variables. The owners of the bison should consult with the driver to ensure that the following steps have been taken prior to loading the bison onto the trailer.

General Considerations

- The owners and driver should each have a copy of this code and be familiar with its contents.
- If the driver has not previously hauled bison, they should be made aware of the behaviour and characteristics of bison. For example, a driver must never enter a trailer loaded with bison, though that might be possible with cattle or hogs.
- The driver should have some form of communication with the owners. Cell phones or radios are necessary to call for assistance and to alert the owners of a problem.
- Prior to transport, the driver should have a list of several other bison producers along the route who would be willing to assist or temporarily hold the bison if a long wait period is expected.

Truck Breakdowns

In the event that the truck becomes immobile due to mechanical failure, a second truck must be made available as soon as practicable to continue with the transport of the bison. The driver should make sure that an alternate truck is available.

- While the trailer is parked along the roadside, the driver is responsible for the care of the bison. This includes prohibiting bystanders from climbing on or looking into the trailer. Foot traffic should be restricted to the front of the trailer to help the bison remain calm.
- When pulling over to deal with a truck breakdown, if at all possible the driver should select a level location so that the bison are not standing on an angle during the waiting period.

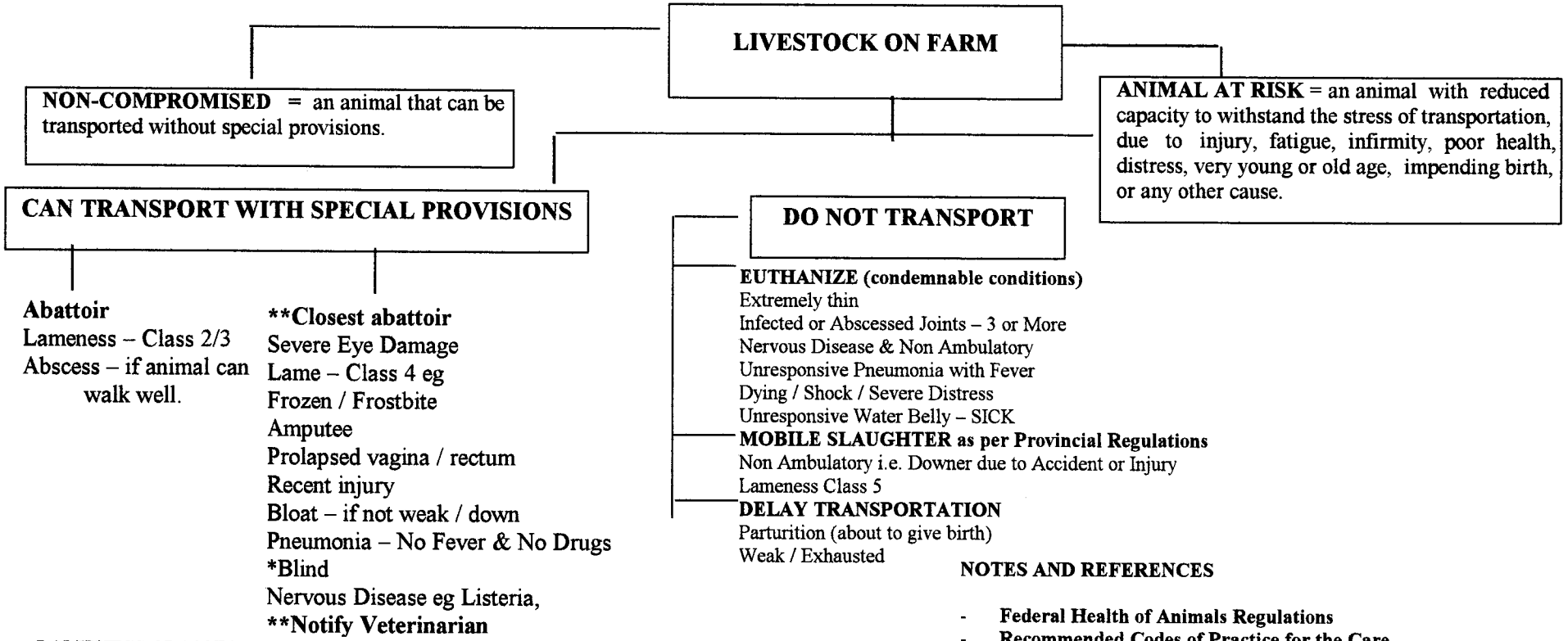
Accidents With Injured Bison

In the event of a serious accident where the driver is injured, a clearly labeled package of information must be available to assist emergency personnel in dealing with the bison. This package should contain:

- A copy of this code.
- Telephone number of the owners or their designate.
- A 'record-of-movement' and livestock manifest, where applicable, listing the contents of the trailer, preferably with the number of each age and sex.
- Names and telephone numbers of veterinarians willing to work with bison.

- Names and telephone numbers of bison producers along the route willing to be of assistance.
- Names and telephone numbers of the persons who are receiving the bison at the end of the trip.
- When a serious accident occurs and bison are injured, the driver must contact the owners as soon as possible.
- The receiving party at the end of the destination should be contacted to inform them of the situation.
- It is the driver's responsibility to ensure the safety of the bison during transport and this includes following an accident. No unauthorized personnel are to be allowed access to the bison.
- Prior to beginning transport, the driver should have a list of Fish and Wildlife office telephone numbers along the route. While the RCMP or other law enforcement agencies must be contacted in the event of a serious accident, these agencies typically are not experienced in dealing with injured wildlife, nor do they carry the appropriate firearms. Conservation Officers generally are experienced dealing with wildlife and are armed, trained and experienced to kill them humanely, if necessary.
- In the event that bison are severely injured, Section 11.0 of the Code concerned with the humane slaughter of bison must be employed to ensure that those animals are killed humanely.

Appendix C ◊ A Guide to Handling Livestock at Risk



LAMENESS CLASSES

Class 1 - Visibly lame but can keep up with group; no evidence of pain.
Class 2 - Unable to keep up; some difficulty climbing ramps. **Load in rear compartment.**
Class 3 - Require assistance to rise but can walk freely.
Segregate. **Load in rear compartment.**
Class 4 - Require assistance to rise; reluctant to walk, halted movement; no steep ramps.
Class 5 - Unable to rise or remain standing.
Should not be moved; except with veterinary certification, using suitable specialized equipment, and in accordance with provincial regulations.
Euthanasia or Mobile Slaughter.

NOTES AND REFERENCES

- **Federal Health of Animals Regulations**
- **Recommended Codes of Practice for the Care and Handling of Farm Animals**
- **Animals segregated in trucks require extra protection from cold and wind chill; ample bedding is required.**
- ***Blind animals should be put in a small compartment with one other quiet animal, or individually segregated**
- **Producers must adhere to drug withdrawal times prior to slaughter.**

Adapted from Margaret Fisher, DVM, CFIA

Appendix D ◊ Transporting Bison by Truck

Transport of bison and other livestock within, out of, or into Canada is subject to Regulations of the *Health of Animals Act* (C.R.C., c296, as amended). This appendix is a convenient summary of the Regulations as they apply to bison that you can keep in your vehicle at all times. It is not an official document and is not comprehensive.

YOU MUST NOT

- Transport a sick or injured animal where undue suffering will result, or when the animal is liable to give birth.
- Continue to transport an animal that is injured, becomes ill, or is otherwise unfit to travel.
- Load or unload animals in a way that would cause injury or undue suffering.
- Crowd animals to such an extent as to cause injury or undue suffering.
- Transport animals if injury or suffering is likely to be caused by inadequate construction of the vehicle, insecure fittings, undue exposure to the weather or inadequate ventilation.
- Use ramps, gangplanks or chutes that are inadequately constructed or maintained and would be likely to cause injury or undue suffering to the animals.
- Confine bison in a motor vehicle for longer than 48 hours unless they can reach their final destination in 52 hours or feed and water is provided on a suitably equipped vehicle.
- Load an animal for a trip of more than 24 hours without first providing food and water within 5 hours before loading.

YOU MUST

- Segregate animals of different species, of substantially different weights and ages, or if incompatible by nature.
- Have sufficient headroom for animals to stand in a natural position.
- Provide for drainage and absorption of urine.
- Either spread sand or have the vehicle fitted with safe footholds in addition to appropriate bedding.
- Ensure that the feed, water and rest period is at least 5 hours and is long enough to allow each animal to access feed and water.
- Keep the following records if engaged in interprovincial or international transportation; name and address of consignee; number and description of livestock; registration number of motor vehicle; time and place loaded; time and place of feed, water and rest; time unloaded at destination.

  Keep these records for 2 years, and make them available to an inspector on demand.

Appendix E ◊ Participants

Representatives of the following organizations provided input at various stages in the drafting of this code. However, the code does not necessarily have the unequivocal endorsement of any agency.

Representative	Organization
Alan Bergen	Canadian Veterinary Medical Association
Bill Bouffioux	Canadian Bison Association
John Church	Alberta Agriculture Food and Rural Development
Gavin Conacher	Canadian Bison Association
Gord Doonan	Canadian Food Inspection Agency
Malcolm Gray	Canadian Food Inspection Agency
Gilly Griffin	Canadian Council on Animal Care
Gerald Hauer	Bison Centre of Excellence
Robert Hudson (Chair)	University of Alberta
Wes Olson	Elk Island National Park
Susanne Pohl (Secretary)	Bison Centre of Excellence
Shane Renwick	Canadian Agri-Food Research Council Agriculture and Agri-Food Canada
Joy Ripley	Canadian Federation of Humane Societies
Doug Rombough	Canadian Federation of Humane Societies
Al Schaefer	Canadian Society of Animal Science

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