NATIONAL FARM ANIMAL CARE COUNCIL
CONSEIL NATIONAL POUR LES SOINS AUX ANIMAUX D'ÉLEVAGE

CODE OF PRACTICE

FOR THE CARE AND HANDLING OF

VEAL CATTLE

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Preface

The National Farm Animal Care Council (NFACC) Code development process was followed in the development of this Code of Practice. *The Code of Practice for the Care and Handling of Veal Cattle* replaces its predecessor developed in 1998 and published by the Canadian Agri-Food Research Council (CARC).

The Codes of Practice are nationally developed guidelines for the care and handling of farm animals. They serve as our national understanding of animal care requirements and recommended practices. Codes promote sound management and welfare practices for housing, care, transportation, and other animal husbandry practices.

Codes of Practice have been developed for virtually all farmed animal species in Canada. NFACC's website provides access to all currently available Codes (www.nfacc.ca).

The NFACC Code development process aims to:

- link Codes with science
- ensure transparency in the process
- include broad representation from stakeholders
- contribute to improvements in farm animal care
- identify research priorities and encourage work in these priority areas
- write clearly to ensure ease of reading, understanding and implementation
- provide a document that is useful for all stakeholders.

The Codes of Practice are the result of a rigorous Code development process, taking into account the best science available for each species, compiled through an independent peer-reviewed process, along with stakeholder input. The Code development process also takes into account the practical requirements for each species necessary to promote consistent application across Canada and ensure uptake by stakeholders resulting in beneficial animal outcomes. Given their broad use by numerous parties in Canada today, it is important for all to understand how they are intended to be interpreted.

Requirements - These refer to either a regulatory requirement or an industry imposed expectation outlining acceptable and unacceptable practices and are fundamental obligations relating to the care of animals. Requirements represent a consensus position that these measures, at minimum, are to be implemented by all persons responsible for farm animal care. When included as part of an assessment program, those who fail to implement Requirements may be compelled by industry associations to undertake corrective measures or risk a loss of market options. Requirements also may be enforceable under federal and provincial regulation.

Recommended Practices - Code Recommended Practices may complement a Code's Requirements, promote producer education, and encourage adoption of practices for continual improvement in animal welfare outcomes. Recommended Practices are those that are generally expected to enhance animal welfare outcomes, but failure to implement them does not imply that acceptable standards of animal care are not met.

Broad representation and expertise on each Code Development Committee ensures collaborative Code development. Stakeholder commitment is key to ensure quality animal care standards are established and implemented.

This Code represents a consensus amongst diverse stakeholder groups. Consensus results in a decision that everyone agrees advances animal welfare but does not necessarily imply unanimous endorsement of every aspect of the Code. Codes play a central role in Canada's farm animal welfare system as part of a process of continual improvement. As a result, they need to be reviewed and updated regularly. Codes should be reviewed at least every five years following publication and updated at least every ten years.

A key feature of NFACC's Code development process is the Scientific Committee. It is widely accepted that animal welfare codes, guidelines, standards, or legislation should take advantage of the best available research. A Scientific Committee review of priority animal welfare issues for the species being addressed provided valuable information to the Code Development Committee in developing this Code of Practice.

The Scientific Committee report is peer reviewed and publicly available, enhancing the transparency and credibility of the Code.

The Code of Practice for the Care and Handling of Veal Cattle: Review of Scientific Research on Priority Issues developed by the veal cattle Code of Practice Scientific Committee is available on NFACC's website (www.nfacc.ca).

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Introduction

This Code of Practice represents a significant update to the previous Code (published in 1998). In updating the Code, the Code Development Committee has relied on research and practical experience of those responsible for the care of veal cattle. The revised Code aims to provide feasible and scientifically informed approaches to meeting the health and welfare needs of cattle that will contribute to a sustainable and internationally competitive Canadian veal industry.

An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress (1). Animal welfare can also be improved when an animal experiences positive states. The care and management provided by the person(s) responsible for the daily care of farm animals has a significant influence on their welfare. Veal and dairy-beef production are highly specialized, and those involved should consider the following key aspects of responsible animal care:

- training of on-farm personnel
- calf sourcing and selection
- shelter and comfort
- the company of herd mates
- feed and water to maintain health and vigour
- humane handling
- no unnecessary surgical alterations, and pain control for necessary alterations
- disease prevention, detection, and control
- veterinary care, diagnosis, and treatment
- preparedness for emergencies such as fire, natural disaster, equipment failure, and the disruption of feed supplies
- preparations for animal transport
- euthanasia.

Producers use a variety of husbandry and management systems to meet the needs of their cattle. Requirements in this Code are often outcome- or animal-based, as these are most directly linked to animal welfare and can be applied in a wide range of production systems. Since Requirements often state the necessary outcomes, the producer has flexibility to determine how the outcomes can be achieved using individual management and husbandry practices. Recommended Practices encourage continuous improvement in animal care. However, failure to implement Recommended Practices does not imply that acceptable standards of animal care are not being met.

Wherever possible, scientific research was used to inform the specific performance measures included in this Code. It is hoped that these will be useful to individual producers as they set goals and benchmark improvements in animal welfare as well as to those developing an on-farm assessment program.

This Code pertains to dairy feeder calves (being raised for the dairy-beef market) during the starting period and cattle being raised for milk- and grain-fed veal, including on farms that specialize in pre-conditioned calves. Dairy feeder calves fall under the veal cattle Code of Practice until they are moved from young animal housing and management systems (that more closely resemble veal production rather than cow-calf operations covered in the beef cattle Code) into housing and management systems intended for growing and finishing.[1] Consult the dairy cattle Code of Practice for information on the care of dairy calves, including bull calves, while on dairy farms.

[1] The timing at which this movement occurs varies across farms but would commonly take place in the period following weaning and does not necessarily involve movement to a different farm.

The veal cattle Code includes important pre-transport considerations but does not address animal care during transport. Consult the transportation Code of Practice for information on animal care during transport. All Codes are available on NFACC's website (www.nfacc.ca).

In this Code, "cattle" refers to cattle of all ages. Where special provisions for animals less than 6 months apply, the word "calves" has been used.

Glossary

Abomasal ulcer: damage to the lining and wall of the abomasum (i.e. fourth stomach) that extends deep into the abomasal muscle.

Ad libitum feeding: allowing animals to eat as much as they want when they want (free choice).

Aerosol: a mixture of fine solid particles or liquid droplets suspended in the air.

All-in/all-out: In veal production, this describes a system whereby all animals are moved out of a housing unit or facility before new animals are placed.

Analgesia: reduction or elimination of pain without loss of sensation or consciousness.

Analgesic: a drug that relieves pain.

Anesthesia: temporary induction of loss of sensation or awareness. See for example "local anesthetic."

Animal welfare: an animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear and distress (1). Animal welfare can also be improved when an animal experiences positive states. Animal welfare refers to the state of an animal; the treatment that an animal receives is covered by other terms such as "animal care."

Biofilm: a thin layer of microorganisms and other substances that accumulates on facilities and equipment and that may impair the effectiveness of cleaning and disinfection if not first removed.

Bloat: abnormal distension of the rumen as a result of accumulated gases that cannot escape.

Bursitis: swelling and inflammation of 1 or more of the small fluid-filled sacs that act as a cushion between a bone and other moving parts. Bursitis is typically seen as swellings near the carpal (knee) and tarsal (hock) limb joints.

Calves: male or female bovine animals under 6 months of age.

Cattle: bovine animals of all ages.

Cleaning: the process of making equipment or facilities clean by removing wastes such as biofilm, manure, bedding, or other organic debris. (Contrast with "Disinfection.")

Colostrum: the first milk secreted by the cow after parturition (giving birth), characterized by its high content of proteins and antibodies known as immunoglobulins (Ig).

Colostrum replacer: a preparation that contains a sufficient mass of immunoglobulins (Ig) along with the nutrients the neonatal calf requires to suitably replace the first feeding of colostrum (2). (Contrast with "Colostrum supplement.")

Colostrum supplement: a preparation with an immunoglobulin (Ig) concentration that is too low to completely replace colostrum. Supplements should be formulated to be fed in conjunction with colostrum to increase Ig concentration and provide nutrients that are inherently variable in colostrum (2). (Contrast with "Colostrum replacer.")

Competent: demonstrated skill and/or knowledge in a particular topic, practice, or procedure that has been developed through training, experience, and/or mentorship.

Compromised animal: in the context of transport, an animal with reduced capacity to withstand transportation but that is not unfit. Refer to *Appendix G – Transport Decision Tree.*

Corrective action: action to eliminate the cause(s) of nonconformity or other undesirable situations and to prevent recurrence (3). Generally, corrective actions relate to aspects of animal care or welfare that a producer can control; the action taken needs to be directed at effectively addressing a given issue.

Dairy feeder calves: young, often male, calves that leave the dairy farm to enter the red meat industry.

Dehorning: removal of the horns of an animal after the horn buds have attached to the skull. Horn bud attachment occurs between 2–3 months of age. (Contrast with "Disbudding.")

Disbudding: removal or destruction of the horn-producing cells of the horn buds before they have attached to the skull. Horn bud attachment occurs between 2–3 months of age. (Contrast with "Dehorning.")

Disinfection: the application, after thorough cleaning, of procedures or products intended to destroy disease-carrying microorganisms. (Contrast with "Cleaning.")

Distress: an animal is in distress if it is likely to be suffering, i.e. is consciously experiencing a negative emotional state and is indicating this by obvious behavioural signs. Distress can occur during and following pain, severe or prolonged stress, and ill health. Note: this definition may differ from how "distress" is used in some provincial animal welfare legislation.

Esophageal groove: a specialized part of the ruminant stomach composed of folds of muscular tissue that close forming a "tube" that directs milk or milk replacer past the rumen and directly into the abomasum (i.e. fourth stomach).

Euthanasia: ending of the life of an individual animal for humane reasons in a way that minimizes or eliminates pain and distress (4).

Fit animal: in the context of transport, an animal that is able to withstand the stress of transportation without experiencing suffering and that is expected to arrive at its final destination in good condition.

Flight zone: in animal handling, flight zone is the space surrounding an animal that, when penetrated, causes the animal to move to re-establish a comfortable distance. Low-stress handling includes applying and releasing pressure on the edge of the flight zone ideally never penetrating the zone so aggressively that the animal overreacts and "takes flight."

Grain: seed from cereal crops or corn.

Grain-fed veal cattle: grain-fed veal is started with calves from dairy farms that are fed initially on a commercial milk replacer or whole milk diet before transitioning to a grain ration and finished to the weight required for marketing. (Contrast with "Milk-fed veal cattle.")

Hutch: any type of outdoor enclosure that includes some type of overhead cover used to rear 1–2 calves (some hutches are designed to house 4–5 calves). Hutches may be purchased or made.

Incidence: the number of new cases of a disease or condition over a specific period of time. (Contrast with "Prevalence.")

Lameness: any alteration in an animal's gait that appears to be caused by pain or discomfort. In cattle, lameness can manifest as a reluctance or inability to bear weight on a limb, shortened stride, arched back, and/or head bobbing.

Laminitis: inflammation in the digits/claws that may result in severe pain, abnormal foot growth, and lameness. Laminitis occurs in acute, chronic, or sub-clinical forms, and may be a result of ruminal acidosis.

Lateral resting position: a resting position in which an animal lies on either side of the body with legs extended. This position uses more floor space than a sternal resting posture. (Contrast with "Sternal resting posture.")

Local anesthetic: a drug that induces a loss of feeling or sensation, especially the loss of pain sensation in the area to which it is applied.

Milk-fed veal cattle: milk-fed veal is started with calves from dairy farms that are raised primarily on a milk-based diet with some grain and/or fibre included in the ration and finished to the weight required for marketing. (Contrast with "Grain-fed veal cattle.")

Mitigate: make less severe or harmful (i.e. alleviate).

Moribund: an animal whose condition is in a state of terminal decline, in a state of dying.

Neonatal calves: newborn calves up to 28 days of age.

Neuroma: a mass of regenerating nerve tissue (nerve bundle) that may form when nerve tissue is damaged. Neuromas can result in chronic pain.

Non-ambulatory: unable to rise or stand without assistance or move without being dragged or carried (5), regardless of size or age. Also known as "downers." Note: it is illegal to drag an animal.

Non-steroidal anti-inflammatory drug (NSAID): a drug that provides analgesic (pain-killing), fever-reducing, and anti-inflammatory effects but is not a steroid or a narcotic.

Outdoor enclosures: hutches and 3-sided barns.

Pathogen: a bacterium, virus, or other microorganism or agent that can cause disease.

Point of balance: in animal handling, point of balance is the point on an animal's body (usually the shoulder) where an animal perceives a person to be standing in front of the animal (causing the animal to back up) or behind the animal (causing the animal to move forward).

Pre-conditioned calves: calves (generally 80–136 kg [177–300 lb]) that are no longer receiving milk or milk replacer, are consuming grain, and may have been vaccinated. Also known as "pre-cons."

Prevalence: the number of cases of a disease or condition (new and ongoing) at one point in time. (Contrast with "Incidence.")

Prophylactic: a measure or medication to prevent a disease from occurring.

Rumen: the largest of the ruminant stomach chambers and the site of fermentation of fibrous feeds.

Ruminal acidosis: a metabolic condition that occurs when the acidity of the rumen is abnormal (i.e. pH lower than 5.5). The effects can range from disturbance of rumen function (resulting in decreased productivity) to metabolic and health disorders arising from absorption of acids and toxins from the rumen. Acidosis can occur after rapid or over-consumption of highly digestible feeds such as grains.

Ruminal drinking: when milk or milk replacer enters the rumen rather than the abomasum. Ruminal drinking occurs when the esophageal groove fails to close completely due to various factors.

Rumination: the contractions of the reticulorumen (i.e. the first 2 stomach chambers) to regurgitate previously consumed solid feed, chewing of the feed for a second or additional time followed by swallowing to return the chewed feed to the reticulorumen.

Satiety: a feeling of fullness or that hunger has been satisfied.

Sedative: a drug that depresses central nervous system activity reducing mental activity and body reactions.

Standard operating procedures: written step-by-step instructions describing how a particular task is to be done and/or completed.

Stereotypies: abnormal behaviours that serve no apparent function and are performed in a repetitive, invariant way (6). Examples include tongue rolling, cross sucking, and manipulation of pen substrates with the tongue.

Sternal resting posture: resting upright on the chest with legs tucked under the body. (Contrast with "Lateral resting posture.")

Technical advice: advice provided by a professional working within their designated expertise (e.g. nutrition, animal care).

Tethering: a method of keeping animals whereby a length of a rope or chain (which is fixed to an object) is attached to the neck.

Unconsciousness: in the context of euthanasia, it is a state of unawareness (loss of consciousness) in which there is sufficient temporary or permanent disruption to brain function to make an animal unaware of (or insensible to) sensory and/or emotional experiences such as pain.

Unfit animal: in the context of transport, an animal deemed to be unable to withstand transportation without experiencing suffering. Refer to *Appendix G – Transport Decision Tree*.

Weaned calf: a calf that is no longer receiving milk or milk replacer.

1 Roles and Responsibilities

Farm owners and managers have a primary responsibility for ensuring cattle health and welfare are a priority on the farm. Before personnel are assigned their duties, they need to be knowledgeable of the basic needs of cattle in all stages of production. While managers have a primary responsibility for ensuring personnel are trained, all those involved in animal care should be encouraged to identify areas where they would benefit from additional training.

Daily monitoring of cattle is an important component of animal care that facilitates prompt identification of changes in their health and welfare. Daily assessments of the general health and well-being of individual cattle can include monitoring of:

- cattle behaviour, especially at feeding
- feed and water intake, including access to feed and water
- signs of illness
- injuries
- signs of thermal discomfort.

REQUIREMENTS

Managers must ensure that personnel are trained and supervised.

Personnel working with cattle must have access to a copy of this Code of Practice and be familiar with, and comply with, the Requirements as stated in this Code.

Neonatal calves must be assessed at least twice daily, and all other cattle must be assessed at least once daily, for general health and well-being.

RECOMMENDED PRACTICES

a. develop and implement a written Cattle Welfare Policy outlining the farm's commitment to responsible and humane animal care (see sample provided in Appendix A)
b. identify supervisors or managers that personnel can approach with questions or concerns about animal care.

2 Calf Selection and Care of Newly Arrived Calves

2.1 Sourcing Calves

The welfare of calves is a shared responsibility among producers, auction personnel, transporters, and calf dealers, and it is significantly influenced by the care they receive early in life. Early nutrition and management on the dairy farm, along with transport, affect calf health and welfare. Intermediate stops (e.g. auctions, assembly yards) exacerbate many of the stressors associated with transport given the additional handling, loading and unloading, social stresses of comingling, and further exposure to infection (7).

Purchasing calves direct (i.e. from dairy farms or farms that specialize in pre-conditioned calves) rather than auctions is strongly encouraged. Direct purchasing is less stressful to calves and it allows the buyer to establish criteria for calf selection (and the seller can be held accountable when the criteria are not met). The producer also knows the farm of origin, including the herd's health status (a benefit to the entire production chain).

Every effort should be made to ensure that calves are sourced from reputable sources. If buying from an auction or calf dealer, urge the operator to adopt best practices, communicate any concerns you have, and, if corrective actions are not taken, identify other sources to buy from.

The federal requirements for transport (e.g. age, journey duration) are covered under the *Health of Animals Regulations, Part XII*.[2] Some provinces have additional regulations related to animal transport.

RECOMMENDED PRACTICES

a. purchase calves directly from dairy farms that demonstrate compliance to the *Code of Practice for the Care and Handling of Dairy Cattle* (through proAction®, for example) rather than from auctions
b. source calves from locations that result in the shortest possible journey durations
c. use health records of previous calves from the same source as the basis for future purchasing decisions
d. when choosing an auction or calf dealer, ask for references of their customers to verify calf care and handling.

2.2 Assessing Calf Health at Purchasing

Multiple criteria should be used when selecting calves (see *Appendix B – Selecting Healthy Calves*). Calves must have a dry, healed navel and should be able to easily rise unassisted and appear alert and sturdy on their legs. Purchasing calves when they are less than 14 days of age is not recommended.

The ideal weight of calves varies by breed. Calves that are low weight for the breed are at greater risk of illness and mortality (8).

[2] The Health of Animals Regulations are accessible through the link below (accessed July 18, 2017) or by doing an Internet search for "Health of animals regulations" https://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._296/index.html

REQUIREMENTS

A written standard operating procedure detailing strategies to minimize the likelihood of purchasing unhealthy calves must be developed, made available to personnel involved in purchasing, and implemented.

***The written standard operating procedure must include not purchasing calves showing signs of an infected navel, illness, injury, or weakness when assessed at the dairy farm or auction. Signs of illness are provided in* Section 6.3 – Sick or Injured Cattle.**

Calf selection and purchasing decisions must be made by competent personnel.

RECOMMENDED PRACTICES

a. use multiple criteria to assess the health of each calf prior to purchase (see Appendix B)
b. purchase calves of similar weights and that are at least 14 days old
c. if purchasing calves that appear small/low weight for the breed, ensure the specialized care and feeding practices these calves typically need can be provided
d. when purchasing calves directly from dairy farms, have a calf purchase agreement detailing colostrum and milk feeding practices, herd and calf health, weight range, and other conditions for calf guarantee.

2.2.1 Colostrum

Colostrum contains antibodies known as immunoglobulins (Ig) that protect calves from infections. Intake of colostrum or good quality colostrum replacer is essential to calf survival during the neonatal period and can have lasting positive effects on health, digestion, and nutrient absorption (9,10).

Calves' ability to absorb the immunoglobulins from colostrum is substantially reduced 6–8 hours after birth (11). Calves that do not receive enough colostrum as soon as possible in the first day of life face a higher risk of illness and mortality (12). Early colostrum feeding is, therefore, among the most important calf care obligations of the dairy farmer, and it is a Requirement in the dairy cattle Code of Practice.

Once on the veal or dairy-beef farm, feeding colostrum or a colostrum supplement for the first 2 weeks after calves arrive can be beneficial in terms of improved daily weight gain and reduced diarrhea (13). Additional information about colostrum management is provided in *Appendix L – Resources for Further Information*.

RECOMMENDED PRACTICES

a. implement, in consultation with the herd veterinarian, protocols for verifying calves' Ig concentration on arrival and additional care for calves found to have a low Ig concentration
b. mark calves found to have a low Ig concentration for increased monitoring
c. reconsider calf sourcing strategies if Ig concentrations of calves tend to be insufficient

When buying calves directly from dairy farms, in addition to the above Recommended Practices:

d. work with the dairy producer to verify that calves receive colostrum and daily milk intake in accordance with the *Code of Practice for the Care and Handling of Dairy Cattle*.

2.3 Managing Calves upon Arrival

The care of calves on the day of arrival is especially important for their comfort and future health and growth. Every effort should be made to ensure calves are thermally comfortable soon after they arrive. There are several options for caring for wet or cold stressed calves (e.g. heated barns, offering feed as soon as appropriate, providing ample dry bedding, drying off if wet, provision of clean and dry calf coats). Refer also to *Section 3.5.2 – Temperature and Relative Humidity*.

Cleanliness of equipment and facilities is particularly important for neonatal calves given their vulnerability to disease. Refer to *Section 6.2.1 – Cleaning and Disinfection*.

REQUIREMENTS

A written standard operating procedure detailing protocols for the care of newly arrived calves must be developed, readily available, and implemented.

Upon arrival, calves must be provided access to water and individually assessed for general health and well-being.

Prompt additional care must be provided to calves showing signs of heat or cold stress, illness, or injury on arrival. Signs of illness are provided in Section 6.3; signs of heat and cold stress are provided in Section 3.5.2.

Steps must be promptly taken to rehydrate calves showing signs of dehydration on arrival. Signs of dehydration are provided in Appendix C.

***Refer also to the Requirements in* Section 7.2 – On Farm Loading and Unloading.**

RECOMMENDED PRACTICES

a. develop, in consultation with the herd veterinarian, a prophylactic plan for neonatal calves (e.g. electrolyte, mineral, and vitamin mixes) (refer also to *Section 6.1 – Herd Health Planning*)
b. schedule a field service technician to provide general advice on the management of the calves, or schedule a visit by a veterinarian to advise on any tests/samples or additional treatment that may be needed
c. ensure a sufficient number of trained staff are on-site to promptly unload and pen calves and provide care
d. pen calves of similar size and age together
e. minimize handling and non-essential procedures on the day of arrival.

3 Housing

3.1 General Facility Design and Maintenance

The facilities where cattle are kept contribute significantly to their health and welfare. Housing systems need to provide a comfortable environment for cattle through appropriate space allowance, ventilation, and temperature. Routine maintenance of facilities can help prevent cattle from becoming injured and contribute to cattle health and welfare.

REQUIREMENTS

Housing systems and their components must be designed, constructed, and maintained in a manner that reduces the potential for injury and allows visual inspection of all cattle.

RECOMMENDED PRACTICES

a. develop and follow a program for facility maintenance
b. keep records of facility maintenance in a maintenance log
c. consult an experienced agricultural engineer (or other technical advisor) and the herd veterinarian when building a new facility or renovating an existing one.

3.2 Young Animal Housing

A key focus in the starting phase is maintaining calves' health given their vulnerability to disease in this period. Disease risk is influenced by many factors (e.g. diet, hygiene, ventilation), and there is little evidence of a consistent relationship between group housing and disease risk (6,14). Housing calves individually can reduce the transmission of infectious diseases between calves by physical contact but does not necessarily reduce transmission of disease as a result of airborne exposure (e.g. respiratory disease) (6). Housing calves individually facilitates monitoring and therefore early identification and treatment of sick calves (15).

Rearing calves in pairs from arrival allows for effective monitoring and treatment of individual calves while also satisfying calves' motivation for social contact. When calves are paired early, they eat more solid feed and have greater weight gains than those housed individually (6).

Well-managed hutches provide a good housing option for young calves, especially when hutches permit social contact by virtue of their design/size or the way in which the hutches are arranged.

Individual stalls must be appropriate to the size of the calf to ensure calves can adopt sternal and lateral resting postures. The ability of cattle to adopt sternal and lateral resting postures is important for their comfort. Lateral lying or lying with the head resting on the ground is important for sleep (6).

REQUIREMENTS

Transition to Group Housing Methods - All Facilities

Effective December 31, 2020, in all holdings:

- ***Calves must be housed in groups as young as possible and not later than 8 weeks of age. Time in individual housing can only be extended past 8 weeks of age in exceptional circumstances for the health and welfare of individual calves on the advice of the herd veterinarian according to the herd health plan. Refer to* Section 6.1 – Herd Health Planning.**

Transition to Group Housing Methods - New or Renovated Facilities

Effective July 1, 2018, in all holdings which are newly built, substantially renovated, brought into use, or where existing stalls are modified:

- ***Calves must be housed in groups as young as possible and not later than 8 weeks of age. Time in individual housing can only be extended past 8 weeks of age in exceptional circumstances for the health and welfare of individual calves on the advice of the herd veterinarian according to the herd health plan. Refer to* Section 6.1 – Herd Health Planning.**
- ***If individual housing is used in the first 8 weeks of age, it must allow calves to turn completely around without assistance, groom, adopt sternal and lateral resting postures, easily stand up and lie down, and have visual and physical contact with other cattle. This can be achieved through stall design, stall size and/or the timing of when calves are grouped.***

Tethering - Indoor Facilities

Effective July 1, 2018, in facilities that are newly built, substantially renovated, brought into use, or where existing stalls are modified, those facilities must not be designed to permit tethering, and calves in those facilities must not be tethered.

Effective December 31, 2020, tethering of calves is prohibited.

Existing Individual Stalls that Do Not Allow Lateral Resting

Existing stalls where calves are housed untethered may be used after July 1, 2018, provided:

- ***they are in good condition and allow calves to groom, adopt a sternal resting posture, easily stand up and lie down, and have visual contact with other cattle, and***
- ***effective December 31, 2020, calves are grouped as young as possible and not later than 8 weeks of age (as outlined under "Transition to Group Housing Methods - All Facilities").***

Existing stalls that meet the above Requirements (for "Existing Individual Stalls") and where less than 50% of each of the 2 side panels is solid (thus permitting physical and visual contact between calves) may be used for the lifetime of the stall.

Effective July 1, 2033, existing stalls where more than 50% of the side panels is solid are prohibited.

REQUIREMENTS (continued)

Hutches and Outdoor Enclosures

Calves in hutches and outdoor enclosures must be able to easily stand up and lie down, turn completely around without assistance, groom, adopt sternal and lateral resting postures, and have physical or visual contact with other cattle.

Calves in hutches and outdoor enclosures must be able to stand fully upright without touching the top of the enclosure.

***Effective July 1, 2018, calves in hutches and outdoor enclosures must be grouped as young as possible and not later than 8 weeks of age. Time in individual housing can only be extended past 8 weeks of age in exceptional circumstances for the health and welfare of individual calves on the advice of the herd veterinarian according to the herd health plan. Consult* Section 6.1 – Herd Health Planning.**

Effective December 31, 2020, calves in hutches and outdoor enclosures must not be tethered and calves in hutches must be able to access an area outside the hutch.

RECOMMENDED PRACTICES

a. consider housing calves in pairs from arrival
b. choose hutches large enough to house calves in a small group (e.g. 2–5 calves) from arrival or arrange hutches to permit visual and physical contact between calves from arrival.

3.3 Cattle in Groups

Group housing generally provides cattle with more space (and therefore greater freedom of movement) and satisfies their strong motivation for social contact (6). Veal cattle can be well managed in small groups (2–10 animals) and large groups (more than 10 animals).

Group size and method of grouping influence disease risk (6,16). Small groups are associated with lower risk of respiratory disease and calf mortality (6). Detecting, treating, and monitoring sick cattle is generally easier with small groups, especially in the starting period (14). Stable groups are associated with lower incidence of disease and higher daily gains compared to dynamic groups (where cattle are continuously introduced and removed) (16).

Grouping cattle of similar size, age, and drinking speed helps reduce competition for feed. Additional information on managing competition for feed is provided in *Section 4.1 – Feeding Management*.

In grain-fed systems, calves are typically not moved into groups until after weaning so that feed intake of individual calves can be monitored during weaning. This strategy also avoids exposing calves to adverse stresses of weaning and grouping concurrently.

REQUIREMENTS

Cattle in groups must be able to easily stand up and lie down, turn around, groom, adopt sternal and lateral resting postures, and rest on the enclosure floor at the same time.

RECOMMENDED PRACTICES

a. keep unweaned calves in groups of fewer than 10 animals (6)
b. avoid moving grain-fed veal calves into groups during weaning
c. strive to maintain cattle in stable groups with individual animals sorted to promote cattle health and minimize competition
d. where possible, manage groups in an "all-in/all-out" method to reduce disease transmission and permit effective cleaning and disinfection.

3.4 Lighting

Appropriate lighting is important for proper monitoring and handling of cattle. Cattle prefer moving from darker to lighter areas and generally move through facilities more smoothly when shadows are minimal.

Cattle have a preference for light over darkness (17,18) and need light for social contact (observing other cattle) and for orientation in stalls or pens (19). Although calves are able to discriminate objects in close range at light intensity of about 2 lux (equivalent to twilight) (20), they are more active and play with pen-mates more at high light intensity (e.g. 100 lux, equivalent to overcast daylight) and tend to rest more at low light intensity (e.g. 2 lux) (21).

REQUIREMENTS

Cattle must receive a light period (for at least 8 hours) and a dark period every day.

In barns without natural light, supplemental artificial lighting must be provided daily for at least 8 hours.

Light intensity, whether natural or artificial, must permit cattle to navigate their surroundings, feed, rest, and be monitored.

Lighting (whether fixed or portable) must be available to enable detailed inspection of cattle at any time.

RECOMMENDED PRACTICES

a. match the intensity and location of the lighting to the purpose for which the area is used
b. ensure alleyways in which cattle are moved through are uniformly lit
c. provide a light intensity of at least 100 lux during the light period.

3.5 Ventilation, Temperature, and Relative Humidity

3.5.1 Ventilation

Ventilation brings in fresh air and removes metabolic end products produced by cattle, including heat, water, carbon dioxide, noxious gases from manure and urine (e.g. ammonia), and airborne microorganisms and dust. Stocking density (expressed as the air space per calf) is a major factor affecting the risk of respiratory disease. Maximizing the air space per calf is beneficial. A minimum air space of 10 m^3/100 kg (353 ft^3/220 lb) live weight has been recommended (19).

The ventilation rate (i.e. the number of air changes per hour) should be sufficient to avoid the build-up of relative humidity in cold conditions and heat and relative humidity in warm conditions and minimize the occurrence of respiratory disease. The incidence of respiratory disease tends to be higher in calves reared in mechanically ventilated barns than in calves housed with natural ventilation or in outdoor enclosures (22). The advantage of hutches and other outdoor enclosures in providing good air quality depends on facility design and bedding management.

While a definitive threshold for ammonia concentration has not been established for cattle, it is recognized as an irritant to animals' eyes and respiratory tract, and can pose a health threat to cattle. An ammonia concentration of 25 ppm corresponds to safety standards established for humans for continuous 8-hour exposure but is not necessarily pleasant for humans or animals (23,24). When the smell of ammonia is aversive to a human observer, it is likely at a concentration of at least 17 ppm (25), and steps should be taken to establish a comfortable environment for cattle and personnel. There are several tools for measuring ammonia concentration, including test strips, detection tubes, and electronic devices.

REQUIREMENTS

Ventilation systems must be maintained in good working order.

Air quality in facilities housing cattle must be maintained to provide cattle with fresh air, reduce the risk of heat stress, and prevent the buildup of noxious gases, dust, and moisture.

***Refer also to the Requirements in* Section 6.3.1 – Respiratory Illness.**

RECOMMENDED PRACTICES

a. maintain good indoor air quality in ventilated barns using the following air exchange rates (26,27):
   - in cold weather, at least 0.28 m^3/min/calf (10 ft^3/min/calf) for calves less than 56.7 kg (125 lbs)
   - in cold weather, at least 0.34 m^3/min/calf (12 ft^3/min/calf) for calves greater than 56.7 kg (125 lbs)
   - in warm weather, 5 m^3/min/calf (177 ft^3/min/calf)
b. calculate the air space per calf for each room and adjust stocking density or ventilation rate based on the occurrence of heat stress and respiratory disease
c. lower the stocking density in anticipation of seasonal hot weather to reduce the demand placed on the ventilation system
d. maintain some air flow during cold weather in mechanically ventilated barns (i.e. ventilation systems should not shut off at a low temperature threshold)
e. ensure hutches offer ample natural ventilation through doors, windows, and top vents
f. remove manure and soiled bedding from facilities frequently
g. if ammonia is readily detected by smell, test actual concentrations at cattle level ensuring they are maintained below 17 ppm.

3.5.2 Temperature and Relative Humidity

Maintaining appropriate temperature and relative humidity is important for limiting pathogen survival and maintaining animal health. High relative humidity tends to increase survival of aerosol respiratory pathogens. Measures that can be taken to reduce relative humidity include raising the air temperature, reducing stocking density, increasing the ventilation rate, improving drainage (e.g. urine, water), and limiting activities that increase relative humidity (e.g. milk replacer preparation within the same air space as cattle).

Low Ambient Temperatures

Cattle exposed to temperatures below their lower critical temperature (i.e. the temperature at which individual cattle start to respond to cold) are not thermally comfortable and expend energy trying to stay warm. The lower critical temperature will be higher if an animal is wet, is exposed to air movement (wind or drafts), is lying on concrete or damp bedding, or has had reduced feed intake.

Table 3.1 – Temperatures at which cattle start to respond to cold (i.e. lower critical temperature) at different ages depending on air movement and bedding

	Exposed to 0.2 m/s air movement	Exposed to 2 m/s air movement	Provided with deep, dry straw bedding
Young calf on arrival	12°C (53.6°F)	20°C (68°F)	6°C (42°F) or lower
Calf at 5 weeks of age	2°C (35.6°F)	11°C (51.8°F)	2°C (35.6°F) or lower
Calf at 12 weeks of age	-11°C (12.2°F)	2°C (35.6°F)	-11°C (12.2°F) or lower

(Adapted from 28)

Cattle that are dry, in good health, and fed to adequate energy intake are better able to cope with cold weather (29). Young calves on arrival are especially vulnerable to cold stress in part due to reduced feed intake during transportation. If the temperature during the week after arrival is below 12°C (53.6°F), calves should be monitored more often to confirm they are consuming sufficient feed to prevent cold stress (28,30).

Signs of cold stress in cattle can include:

- shivering (cattle may stop shivering if severely cold stressed)
- huddling or crowding
- low core body temperature (normal body temperature for cattle is 38–39.3°C [100.4–102.7°F]; take action before body temperature falls to 37.5°C [99.5°F]).

Intervention is required when signs of cold stress are observed and before signs of hypothermia. Signs of hypothermia include low core body temperature, cold mouth, inability to get up, and no sucking reflex (in unweaned calves).

Provision of a dry, insulated coat to young calves is effective in improving their insulation and resistance to cold (31). Although young calves with dry bedding may tolerate cold ambient temperatures, their extremities are vulnerable to frostbite unless the bedding is provided to a depth that permits nesting.

High Ambient Temperatures

Temperatures above 23°C (73.4°F) may cause heat stress in cattle when combined with high relative humidity, low air movement, or direct sun (32). Signs of heat stress in cattle include:

- sweating
- increased respiration rate
- reduced feed intake
- increased water intake
- open mouth breathing
- increased body temperature.

Sick cattle, heavier cattle (closer to finishing), and cattle recently handled are less able to cope with high ambient temperatures (32).

REQUIREMENTS

Temperature control systems (e.g. fans, heaters, thermostats) must be maintained in good working order.

***Protocols to mitigate heat and cold stress must be developed and implemented as part of the herd health plan. Refer to* Section 6.1 – Herd Health Planning.**

Steps must be taken to mitigate heat and cold stress in cattle.

RECOMMENDED PRACTICES

a. avoid exposing cattle to drafts
b. strive to maintain barn temperatures below 21°C (69.8°F) and relative humidity between 40–60% (25)
c. allow recently washed pens or stalls to dry before placing calves
d. design and locate outdoor enclosures to take advantage of prevailing winds in the summer and allow sunlight penetration in the winter

Examples of steps to mitigate cold stress:

e. increase the ambient temperature in heated barns
f. provide insulated and/or heated flooring
g. protect cattle from wind and moisture (e.g. wind break, addition of a screen to a 3-sided barn)
h. provide straw bedding (which offers more insulation than other bedding types) and ensure the depth permits cattle to nest (6)
i. adjust the feeding program (refer to *Section 4.1.1 – Cold Weather Feeding*)
j. strive to prevent condensation
k. provide calves with clean and dry calf coats in addition to bedding

Examples of steps to mitigate heat stress:

l. provide shade through natural or artificial means (e.g. shade cloths, opaque hutches)
m. modify hutches to have a reflective covering in the summer
n. provide ample cool, clean water
o. avoid handling or other stressors especially during the hottest times of the day
p. increase air flow (e.g. position hutches to facilitate inter-hutch air flow, open barn or hutch vents fully, add more fans to indoor housing)
q. install a sprinkler in front of the air inlet (note: only suitable if the ventilation system can maintain relative humidity between 40–60%)
r. for milk-fed veal cattle (except young calves), reduce the quantity of milk fed in the evening and/or feed an electrolyte meal at night (allows for a reduction in body temperature in the evening and may be a suitable intervention after a few days of high ambient temperatures).

3.6 Flooring and Bedding

The surfaces that animals stand, walk, and lie on have important effects on their well-being because they influence animal comfort, movement, thermoregulation, and health (6). Soft compressible flooring surfaces or solid flooring surfaces with special design features can offer animals good traction for locomotion and transitioning between lying and standing (6). Flooring can, either by design or the addition of bedding, provide support for animals' leg joints while lying (6).

The risk of bursitis and carpal joint swelling is lower on soft flooring (rubber slots, slats with rubber cover, or perforated rubber mats) than on hard flooring (concrete slats, perforated concrete) (6). Refer also to *Section 6.3.3 – Foot and Leg Health*.

Cattle, including young calves, consistently avoid wet bedding (6). Keeping bedded areas dry improves animal comfort, cleanliness, and thermoregulation, and reduces ammonia emissions, fly infestations, and pathogens (6).

Each type of bedding offers advantages and disadvantages (6). Safe bedding types are those made of natural materials such as straw, sawdust, sand, and wood shavings. Some processed materials (from recycled sources) may contain chemical contaminants that are unsafe if cattle ingest the material.

REQUIREMENTS

Flooring must be designed and maintained to minimize slipping and injury.

***Corrective action must be taken if the number of animals with bursitis exceeds 15% in 3 consecutive cycles when assessed at shipping or once during the 2 weeks before shipping. Examples of corrective actions are provided in* Section 6.3.3 – Foot and Leg Health.**

A dry, bedded area must be continuously available to calves in hutches, calves up to 16 weeks of age in an existing unheated building, and all cattle reared on solid concrete flooring.

Newly built unheated barns must be designed to provide all cattle access to a bedded area.

Bedding must be of a safe material and managed to provide comfort, insulation, dryness, and traction.

For cattle in groups, bedded areas must be large enough to allow all cattle to lie down at the same time in sternal and lateral resting postures.

RECOMMENDED PRACTICES

a. inspect cattle in each stage of production for injuries associated with flooring or other aspects of facility design (e.g. hairless patches, lameness, swelling of the knee and hock) (6)
b. choose flooring types that are non-slip but not overly abrasive (33,34)
c. avoid bare concrete slatted flooring and provide cattle with softer flooring types that afford good drainage (e.g. rubber coated flooring, perforated rubber mats, access to bedded areas) (6)
d. aim for less than 10% prevalence of bursitis in finished veal (assessed at shipping or once during the 2 weeks before shipping) (based on data in 34)
e. ensure solid flooring is appropriately sloped to permit effective drainage (the slope of flooring in each pen or stall should not exceed 4 cm/m [1.6 in/y])
f. locate outdoor enclosures on gently sloping, well drained surfaces
g. move hutches to a new area of the yard twice a year to help keep calves dry
h. position waterers and buckets/troughs to limit wetting of the flooring or bedding
i. in the summer, provide bedding that promotes thermal comfort and aids in controlling fly populations (e.g. wood shavings, sawdust, sand) (6)
j. in the winter, provide straw bedding (which offers more insulation than other bedding types) and ensure the depth permits cattle to nest (6)
k. clean out bedding before calves are placed (i.e. between groups).

3.7 Facilities for Sick or Injured Cattle

Sick or injured cattle sometimes benefit from being segregated in an area where they can be readily observed; recuperate without having to compete with pen mates for feed, water, and lying areas; and receive additional care and treatment. Where appropriate, moving sick animals to dedicated areas can also reduce transmission of disease. Isolation is stressful to cattle; they should ideally be segregated such that they can see other cattle. Refer also to *Section 6.3 – Sick or Injured Cattle.*

REQUIREMENTS

Farms must have the capability to segregate sick or injured cattle.

Farms must have facilities to provide additional individual care.

RECOMMENDED PRACTICES

a. design facilities for sick or injured cattle that provide enhanced comfort conducive to recovery (e.g. bedding, rubber mat, supplemental heat, additional space)
b. locate facilities for sick or injured cattle in an area that provides a draft-free environment and visual contact with other cattle and that facilitates frequent monitoring by personnel.

3.8 Emergency Planning

Emergencies may arise and can compromise cattle welfare (e.g. power failure, barn fire, flooding, disruption of supplies). Pre-planning will assist producers to respond in a timely and effective manner, better providing for the welfare of cattle during the event of an emergency. Resources to support emergency planning are provided in *Appendix D – Sample Emergency Contact List* and *Appendix L – Resources for Further Information*.

REQUIREMENTS

Emergency procedures, relevant to the farm's location and housing system(s), must be developed and communicated to personnel.

***A fire safety self-assessment must be completed annually. Refer to the sample listed in* Appendix L – Resources for Further Information.**

For cattle that are reliant on electricity for ventilation or the provision of feed or water, alternative means of temperature regulation, ventilation, feeding, and watering must be available and implemented in the event of a power failure, mechanical breakdown, or other emergency.

Alarms and fail-safe devices, including an on-farm alternate power supply, must be tested at least annually and corrected if a defect is identified.

RECOMMENDED PRACTICES

a. when designing or renovating facilities, consider emergency management protocols and seek advice on housing design as it relates to emergencies (e.g. rapid evacuation of livestock, installation of fire alarms that can be heard and responded to at any time, emergency lighting)
b. consult a local fire department for specific advice on fire prevention particularly before renovating an existing facility or building a new facility
c. have a licensed electrician conduct an on-farm inspection annually
d. consult local fire services on the correct number of fire extinguishers for all facilities
e. ensure fire extinguishers are maintained according to manufacturer's instructions and that personnel know where they are located and are trained in their proper use
f. check automated or mechanical equipment essential for the health and well-being of cattle daily to ensure it is functional
g. in mechanically ventilated barns, have a back-up ventilation system or generator to ensure air renewal in the event of a failure of the system, along with an alarm system that will operate even if its principal electricity supply fails
h. check back-up systems, including alarms, on a regular basis at an interval appropriate to the age and type of equipment and risks associated with failure of the system. Correct defects promptly.

4 Feed and Water

4.1 Feeding Management

Quality of ingredients, feed form, feeding frequency, method of delivery, quantity of feed offered, and hygiene are all important elements of feeding management. Feed should be evaluated before it is fed for indicators of poor quality (e.g. off odour, mold in solid feeds, sedimentation in milk-based feeds). Proper feed storage helps prevent contamination, which can negatively impact calf health and performance.

Examples of general feeding strategies to improve health and welfare outcomes include:

- provide ample fresh, clean water
- provide feed ad libitum
- avoid long periods of fasting between feedings
- increase the frequency of milk meals
- offer fibrous feeds that increase chewing activity and/or the time it takes to consume the ration
- provide feed according to a consistent daily schedule
- implement strategies that encourage natural sucking behaviour
- implement strict protocols for sanitizing feeding and watering equipment.

Competition for feed can be an issue in group-housed cattle when feed is not provided ad libitum. Behavioural signs of inadequate feed access include displacements during feeding and, in cattle with access to solid feed, individual animals not chewing their feed at the bunk (35). Strategies to improve feed access include:

- reduce group size
- increase the quantity of feed offered
- increase feeding frequency
- provide feed ad libitum
- increase the per animal linear bunk or trough space or the number of teats available.

REQUIREMENTS

***The ration must be in compliance with the* Feeds Regulations.[3]**

Cattle must receive a ration that maintains health and vigour and promotes satiety.

Neonatal calves must be assessed at least twice daily, and all other cattle must be assessed at least once daily, for signs of inadequate feed intake.

Feed must be provided in ways that prevent competition resulting in injury or limited access to feed by some animals in the group.

RECOMMENDED PRACTICES

a. ensure feed is kept dry and stored in a dry area
b. take steps to protect stored feed from rodents, insects, and moisture
c. manage storage and provision of feeds in ways that maintain feed quality and minimize spoilage
d. if feeding is provided at a consistent time, ensure that schedule is maintained
e. ensure changes to the diet are accomplished gradually
f. consult with the herd veterinarian on relationships between diet and health and regularly update the herd health plan to minimize dietary health and welfare issues (refer also to Section 6.1).

[3] The *Feeds Regulations* are accessible through the following link (accessed: July 18, 2017) or by doing an Internet search for "Feeds regulations" www.laws-lois.justice.gc.ca/eng/regulations/sor-83-593/index.html.

4.1.1 Cold Weather Feeding

Cold weather increases the amount of energy required for growth, maintenance, and thermoregulation (29). Cattle, and particularly neonatal calves, are less able to cope with cold temperatures if they are not fed sufficient energy to sustain growth (29).

Some calves can become vulnerable to cold stress at temperatures below approximately 10°C (50°F), requiring extra energy for maintenance and growth (36). Energy requirements in cold weather vary according to wind, bedding dryness, shelter design, animals' health status, and other factors.

Resources on cold weather feeding are provided in *Appendix L – Resources for Further Information*. Refer also to *Section 3.5.2 – Temperature and Relative Humidity*.

REQUIREMENTS

Additional feed must be provided to meet increased energy requirements of cattle at risk of cold stress.

RECOMMENDED PRACTICES

a. develop a plan for cold weather feeding in consultation with a nutritionist or veterinarian (refer also to *Section 6.1 – Herd Health Planning*)
b. gradually increase energy intake in anticipation of cold weather to ensure that growth and weight gain are maintained through winter.

4.2 Milk Feeding

Calf age, manufacturing process, and ingredient quality are important factors when selecting milk replacers (37). Feeding according to the labelling instructions or a feed program developed in consultation with qualified advisors helps ensure calves' nutritional needs are met and promotes animal health.

Providing calves with a quantity of milk or milk replacer that is similar to what they would naturally consume promotes satiety (i.e. satisfaction, lack of hunger) and improves average daily gains (6). During the period immediately following calf arrival, there may be a need to gradually transition calves to higher milk intakes. Research has shown that calves benefit from higher milk intakes (an average of 8–12 L/day of whole milk or the equivalent in milk replacer), especially during the first weeks of life when their ability to digest solid feed is limited (6). There is no evidence that feeding large amounts of whole milk causes diarrhea in calves (6).

Where feasible, offering milk or milk replacer through a teat can be beneficial and satisfies calves' motivation to suck (6). Feeding through a teat enhances hormonal responses involved in digestion and satiety and stimulates the esophageal groove reflex (thereby reducing the risk of ruminal drinking and its associated health issues) (6).

Increasing the frequency of milk meals (to more than 2 meals in a day) improves nutrient utilization and health (6). More frequent milk meals per day as well as teat feeding can reduce the risk of abomasal damage (6). The occurrence of non-nutritive sucking (e.g. sucking at pen substrates, cross-sucking) is also lower with increased milk meals and in calves provided opportunities to suck (e.g. nipple feeding or providing a dry or floating teat) (6). Refer also to *Section 4.3.1 – Fibre*.

REQUIREMENTS

Cattle must receive a milk ration (until weaning, if applicable) that maintains health and vigour and promotes satiety.

Personnel must assist newly arrived calves not accustomed to milk feeding by bucket, trough, or nipple.

Milk replacer must be fed according to the label instructions or feed program developed in consultation with a nutritionist or veterinarian.

Cattle must be fed milk or milk replacer at least twice a day (except during weaning, if applicable).

RECOMMENDED PRACTICES

a. develop a written feed program for each stage of production in consultation with a nutritionist or veterinarian
b. ensure milk or milk replacer is fed according to a consistent schedule, temperature, and concentration (38)
c. in consultation with a nutritionist or veterinarian, feed higher quantities of milk or milk replacer particularly in the first 2 weeks (an average of 8–12 L/day of whole milk or the equivalent in milk replacer)
d. whenever possible, assess the occurrence of abomasal ulcers. When these are found to occur, adjust the feed program in consultation with a nutritionist or veterinarian (refer also to *Section 6.1 – Herd Health Planning*)
e. provide milk or milk replacer through a teat or provide a dry teat after milk feeding, particularly during the first 2 weeks
f. ensure the number of nipples provided at the trough exceeds the number of cattle to ensure all calves are on a teat quickly after milk delivery (e.g. 10 nipples for a group of 7 calves)
g. group calves of similar drinking speed together to ensure feed access to all cattle in a group
h. feed milk or milk replacer 3 or more times a day (6).

4.2.1 Iron Deficiency Anemia

Milk-fed veal cattle are at risk of developing iron deficiency anemia. The risk is greater in cattle that receive only milk replacer than in cattle that receive solid feed with or without milk replacer (6). Current practice in the milk-fed veal industry is to include solid feed in the ration, in addition to milk replacer.

Management strategies include monitoring of hemoglobin, provision of solid feed, and supplementation (e.g. addition of iron sulphate to milk replacer or administration of iron dextran).

Cattle on a milk-only diet (without supplementation) show signs of iron deficiency anemia when the iron concentration in the milk replacer is less than or equal to 20 mg iron/kg DM (6). Signs of iron deficiency anemia include decreased growth, loss of appetite, fatigue, laboured breathing, and increased incidence of disease (from impaired immunity) (6). Pale mucous membranes are a sign of severe anemia (6).

Groups of milk-fed cattle with an average blood hemoglobin concentration below 7.7 g/dl (4.8 mmol/l) show signs of iron deficiency anemia (6). In any group of cattle, some will have a blood hemoglobin concentration lower than the group average, and this is an important consideration if setting thresholds for intervention based on a group average (6).

REQUIREMENTS

Cattle must have access to feed of quality and quantity to fulfill their nutritional needs.

In milk-fed veal systems, a written protocol designed to prevent anemia must be developed, approved by a veterinarian, and implemented. The protocol must include blood hemoglobin monitoring (i.e. frequency and timing) and thresholds for iron supplementation.

Through diet and/or supplementation, average blood hemoglobin concentration in a group must be maintained or corrected to at least 8.5 g/dl (5.3 mmol/l), with the exception of the last 4 weeks of rearing.

If, in the last 4 weeks of rearing, average blood hemoglobin concentration in a group is found to be below 7.7 g/dl (4.8 mmol/l), corrective action must be taken.

Individual veal cattle found to have a blood hemoglobin concentration below 7.2 g/dl (4.5 mmol/l) must receive iron supplementation.

Corrective action must be taken for individual veal cattle showing signs of anemia.

RECOMMENDED PRACTICES

For milk-fed veal cattle:

a. provide milk replacer with at least 40–50 mg iron/kg DM in the starting period
b. provide solid feed in addition to milk replacer throughout the rearing period
c. aim for blood hemoglobin concentrations of at least 9.7 g/dl (6.0 mmol/l) in calves up to 10 weeks of age
d. monitor blood hemoglobin concentrations throughout the rearing period
e. if 25% of sampled cattle are found to be below 7.2 g/dl (4.5 mmol/l), sample the entire group or, depending on the veterinary advice outlined in the written protocol, provide supplementation to the entire group
f. use records of blood hemoglobin concentrations of individual cattle to inform future strategies to prevent anemia.

4.2.2 Weaning

Calves in grain-fed production systems are weaned to support increased consumption of solid feed. Solid feed intake, an important criterion for when to wean, increases as calves get older. Calves that are gradually weaned and/or weaned when they are consuming appropriate amounts of solid feed tend not to experience weight loss and have higher energy intakes and better weight gains during weaning and in the immediate post-weaning period (compared to calves that are abruptly weaned or weaned at a fixed age) (6). Later weaning also takes advantage of the typically better developed digestive system in older calves (6).

Calves that are not coping with the transition to solid feed lose weight and show other signs of hunger such as more frequent vocalizations, increased cross-sucking (6), and lack of rumen fill (i.e. both sides of the abdomen appear sunken).

REQUIREMENTS

Weaning must not be initiated until calves are at least 4 weeks of age.

Weaning must be gradual over at least 5 days and must not be completed until calves are at least 6 weeks of age to minimize the risk of weight loss.

Calves must be monitored throughout the weaning process and promptly assisted if showing signs of not coping with the transition to solid feed.

RECOMMENDED PRACTICES

a. evaluate individual calves' suitability for weaning based on their health status, physical development, and intake of solid feed
b. wean calves gradually over a period of 10 days or more (6)
c. manage weaning so that it is complete (i.e. no milk in a day) no earlier than at least 8 weeks of age (6)
d. monitor individual calves' solid feed intake and/or weight during weaning (some calves may need additional milk through the weaning process) and adjust milk feeding to reduce weaning stress.

4.3 Solid Feeds

Rumination has important behavioural and health benefits (6). Calves require a physically and functionally developed rumen to digest solid feed (6). When calves are fed only milk, the rumen does not develop its normal structure and function (6). Grain and fibrous feeds each play a role in different aspects of rumen development and function (6). Current practice in the milk-fed veal industry is to include solid feed in the ration, in addition to milk replacer.

Milk-fed veal cattle that cannot perform chewing and rumination are at risk of developing oral stereotypies (e.g. tongue rolling, manipulation of pen substrates) (6). Intake of solid feed will not be high during periods of high intake of milk replacer, but solid feed intake increases with age and rumen development.

REQUIREMENTS

Effective December 31, 2020, cattle must have access to solid feed from no later than 8 weeks of age.

RECOMMENDED PRACTICES

a. develop a written feed program for each stage of production in consultation with a nutritionist or veterinarian
b. when appropriate (based on consultation with a nutritionist or veterinarian), offer solid feeds to calves from 2 weeks of age
c. offer solid feeds that increase chewing activity and/or the time it takes to consume the ration, including for milk-fed veal cattle (see Appendix E).

4.3.1 Fibre

Cattle have a ruminant digestive system that evolved to use fibrous feeds (6). In some circumstances, offering fibrous feeds to young calves can improve feed efficiency, provide an improved rumen environment, and reduce the occurrence of abnormal oral behaviour without impairing growth (6). The risk of developing oral stereotypies (e.g. tongue rolling, manipulation of pen fittings) and the quantities of fibre required to satisfy ad libitum intake increase with age (6). The effect of the provision of fibrous feed in the diet of cattle depends on the amount and physical properties of the fibrous feed (mainly, the size of particles and physical structure of the fibre) (6). See Appendix E for examples. Fibre provided as long forage is more effective than non-forage feeds in stimulating chewing and rumination (6).

The addition of fibre to a grain diet can reduce the risk of ruminal acidosis and bloat (6). Fibre decreases the rate of fermentation and increases rumen motility, chewing duration, and saliva production, which acts as a buffer to acidity in the rumen (6). Cattle with ruminal acidosis may go off feed or show large day-to-day variation in feed intake, and/or their manure may appear grey.

In calves fed large volumes of milk replacer, coarse fibrous feed in the abomasum is thought to aggravate pre-existing damage to the lining of the abomasum and is a risk factor for abomasal ulcers (6). The risk of abomasal damage appears to be lower with hay compared to straw (6). See *Section 4.2 – Milk Feeding* for other risk factors for abomasal damage.

REQUIREMENTS

If a significant number of cattle in a cycle are performing oral stereotypies or showing signs of ruminal acidosis, the feeding program must be adjusted in terms of provision of fibre and/or method of milk delivery.

RECOMMENDED PRACTICES

a. when appropriate (based on consultation with a nutritionist or veterinarian), offer fibrous feeds to calves from 2 weeks of age
b. provide fibre as long forage or chopped to not less than 1 cm (0.39 in) particle length (6)
c. feed fibre off the ground to prevent contamination
d. whenever possible, assess the occurrence of abomasal ulcers. When these are found to occur, adjust the feed program in consultation with a nutritionist or veterinarian (Refer also to *Section 6.1 – Herd Health Planning*).

4.3.2 Grain Ration

Grain-fed cattle that have continuous access to grain tend to eat more slowly (rather than binge) and chew more (35). They therefore swallow less grain whole and this results in improved digestion (35).

Feeding uniform whole corn improves performance and reduces the risk of bloat and acidosis compared to ground corn (35). Ensuring that cattle do not consume fine feed particles that accumulate in the feed bunk also reduces the risk of bloat and acidosis (35).

RECOMMENDED PRACTICES

a. wherever possible, feed cattle to ad libitum intake or in several small meals
b. remove fine particles that accumulate in the bunk after consumption of whole grains
c. ensure feed is continuously available in grain-fed systems.

4.4 Water

Water is the most important nutrient, and it is required in the greatest quantity of any nutrient (39). Water also plays an important role in the digestive process—cattle with an insufficient supply of water will limit their solid feed intake. Daily water needs depend on many factors including age, diet, environmental temperature, and health status.

Methods to ensure water availability during freezing temperatures include electrical heaters, non-freezing water bowls, nipple waterers, and frequent water feedings.

Water testing (chemical and bacterial analysis) is an important tool for ensuring that water is safe and palatable.

REQUIREMENTS

Cattle must have daily access to clean water in quantities to maintain normal hydration and health, taking into consideration factors such as environmental temperature and diet.

Neither ice nor snow are suitable as a sole source of water.

Water quality must be tested at least annually to ensure its suitability for cattle, and corrective action must be taken if an issue is identified.

RECOMMENDED PRACTICES

a. test water quality whenever problems such as poor performance, reluctance to drink, or reduced feed consumption are observed and during high risk periods (i.e. spring, fall)
b. promptly increase linear water trough space or add a drinking point if competition for water is observed in group-housed cattle, particularly those on a grain-based diet (35) and during high ambient temperatures.

4.5 Feeding and Watering Equipment

Feeding and watering equipment must be well maintained, free from sharp edges that might injure animals, and should be constructed from materials that can be cleaned and disinfected.

Water quality is affected by how often watering systems are cleaned and flushed. Resources on cleaning and disinfecting feeding and watering equipment are provided in *Appendix L – Resources for Further Information*. Refer also to *Section 6.2.1 – Cleaning and Disinfection*.

REQUIREMENTS

Feeding and watering equipment must be in good repair, functional, and maintained free of manure and mold.

***Refer also to the Requirements in* Section 6.2.1 – Cleaning and Disinfection.**

RECOMMENDED PRACTICES

a. construct and locate watering systems so that they are protected from fouling and freezing
b. keep water troughs, bowls, and nipples clean and check them daily to ensure they are dispensing water properly.

5 Husbandry Practices

5.1 Stockmanship Skills Related to Animal Welfare

Good stockmanship improves animal health, welfare, and productivity. Research in several farm animal species shows that attitudes and beliefs about animals and the importance of routine care influences the way people interact with animals and the diligence with which they carry out their tasks (40).

REQUIREMENTS

On-farm husbandry practices must only be done by competent personnel or under supervision of competent personnel.

RECOMMENDED PRACTICES

a. hire personnel with positive attitudes and who exhibit empathy towards cattle
b. participate in continuing education activities related to animal care and welfare (e.g. workshops in low-stress cattle handling)
c. keep records of training or certifications completed.

5.2 Handling and Moving Cattle

Cattle are herd animals that are easier to move together in small groups. Experienced handlers who understand cattle behaviour (e.g. herd instinct, flight zone) and how cattle react to noise, sudden movements, light contrast, and shadows will be able to move cattle more smoothly. This will minimize stress and promote cattle welfare. Good handlers are relaxed, calm, and allow time to carry out their work handling or moving cattle.

Research confirms that the way animals are handled has a major effect on their productivity and welfare (40). Veal cattle that are consistently handled using gentle handling techniques are easier to move, fall less often, and show fewer fear responses (41). It is especially important to be patient when moving young calves as they can be uncoordinated and lack experience being handled.

REQUIREMENTS

Animal handlers must be knowledgeable in cattle behaviour and use only quiet handling techniques acquired through training, experience, or mentorship.

Abusive handling is unacceptable. This includes but is not limited to kicking, beating, dragging cattle, or slamming gates on cattle.

Electric prods must never be used on calves that are less than 3 months of age.

In animals older than 3 months, electric prods must not be used except when animal or human safety is at risk and as a last resort when all humane alternatives have failed and only when cattle have a clear path to move.

In animals older than 3 months, electric prods must never be used on sensitive areas (belly, genitals, facial or anal areas) or repeatedly on the same animal.

RECOMMENDED PRACTICES

a. understand and apply the behavioural principles of low-stress handling such as flight zone, point of balance (see *Appendix L – Resources for Further Information*), and use of food rewards
b. plan before moving cattle and walk the route looking for things that will distract them or cause them to balk
c. move cattle quietly and calmly, in small groups and at a slow walk
d. provide sufficient area and a clear, well-lit path for cattle to move in the desired direction
e. use low-stress handling aids to help direct cattle (e.g. gates, boards)
f. evaluate cattle handling and make improvements to facility design, flooring, and handler techniques using the following recommended benchmarks (adapted from 42):
    - fewer than 5% of cattle balk
    - fewer than 1% of cattle slip
    - fewer than 1% of cattle fall (i.e. body touches floor).

5.3 Restraint

Cattle may be restrained manually or with the use of handling aids (e.g. halter, squeeze chute). The method of restraint chosen should be the least stressful for the animal and most effective method available for the procedure and size of the animal. Human and animal safety are also important factors.

REQUIREMENTS

Farms must have the capability (handling aids and/or personnel) to safely restrain cattle.

Cattle must only be restrained for as long as necessary to carry out the procedure.

Restraint equipment must be kept in good repair.

Corrective action must be taken if the equipment or method of restraint causes injury to cattle.

RECOMMENDED PRACTICES

a. choose restraint equipment designed to minimize noise. High-pitched sounds are especially stressful to cattle (43)
b. ensure restraint devices are used correctly and are designed to avoid uncomfortable pressure points on the animal's body (43)
c. have sufficient personnel to perform the procedure in a timely manner and any necessary tools ready before the animal is restrained.

5.4 Tail Docking

Tail docking is not common in veal or dairy-beef production and is not an acceptable means of preventing tail injury and potential subsequent infection. Tail docking can be painful at any age and brings the risk of chronic pain due to neuromas and post-operative infection (11). Tail docked cattle may also experience greater discomfort from flies as they are not able to use the tail to control flies (11).

REQUIREMENTS

Cattle must not be tail docked unless deemed medically necessary by a veterinarian for an individual animal. If deemed necessary, tail docking must only be performed by a veterinarian using anesthesia and analgesia.

RECOMMENDED PRACTICES

a. if tail injuries occur, promptly address the underlying causal factors (e.g. review design and construction of slatted flooring, reduce stocking density) (44)
b. design new or renovated facilities to prevent tail injury.

5.5 Branding

Branding is not practised in veal production, and it is not common in the starting period in dairy-beef production. Branding causes pain and distress in cattle (11,29).

REQUIREMENTS

Cattle covered under this Code of Practice must not be branded. If additional identification is required for export, a method other than branding must be used.

5.6 Disbudding, Dehorning, and Castration

Disbudding, dehorning, and castration are not practised in veal production. In dairy-beef production, the procedures are performed to prevent unwanted reproduction and improve meat quality (castration) and reduce the risk of injury to personnel and other animals (disbudding and dehorning).

All methods of disbudding, dehorning, and castration are painful at any age (11,29). Local anesthetic reduces the pain during these procedures but does not provide post-operative pain relief (11,29). The use of an analgesic is necessary to control longer lasting pain (11,29).

Animals are easier to handle, heal more quickly, and show lower declines in growth rate when disbudding, dehorning, and castration are performed at younger ages (11,29). Removal of the horn after the horn bud has attached to the skull (generally at 2–3 months of age) is more invasive than when done prior to horn bud attachment (29).

Disbudding, dehorning, and castration require careful training to ensure they are done correctly and to avoid injury or infection (11).

REQUIREMENTS

Dehorning, disbudding, and castration must only be performed after training with a veterinarian and by competent personnel using proper technique and well-maintained, sanitary equipment.

Disbudding, dehorning, and castration must be done at as early an age as possible. At any age, pain control must be provided in consultation with a veterinarian, including local anesthesia and systemic analgesia.

Bleeding control must be used when dehorning.

Cattle must be monitored after disbudding, dehorning, and castration to ensure there are no signs of infection or abnormal bleeding.

Appropriate restraint (chemical or physical) must be used when disbudding, dehorning, or castrating cattle.

RECOMMENDED PRACTICES

a. consider, in consultation with the herd veterinarian, the inclusion of a sedative as part of the protocol for disbudding, dehorning, and castration. Sedatives reduce the amount of physical restraint (which can be stressful to cattle) needed.

6 Health Management

There is a critical relationship between animal health and welfare. Health issues can cause pain and discomfort, which negatively impact an animal's well-being. Good animal welfare, therefore, requires good animal health, and prevention of disease is always preferred to treatment.

6.1 Herd Health Planning

A herd health plan contributes to cattle welfare by providing strategies for disease and injury prevention, rapid detection, and effective treatment.

Include the following in the herd health plan:

- protocols for calf selection and introduction to the farm
- protocols for the prevention, detection, and treatment of diseases and injuries at all stages of production (e.g. vaccinations, hygiene, changes to diet and housing)
- protocols for cleaning feeding equipment
- protocols to mitigate heat and cold stress
- protocols designed to prevent anemia
- specific targets/goals for herd health and welfare outcomes (e.g. mortality, occurrence of pneumonia)
- appropriate sources and uses of medications
- strategies for pest and insect control
- criteria to guide euthanasia decisions
- staff training
- contact information for veterinarians and other advisors
- mortalities, health problems, and treatment records
- biosecurity measures.

Veterinarians and other advisors play a key role in helping producers attain herd health objectives. A valid, ongoing veterinary-client-patient relationship (VCPR)[4] helps ensure that the veterinarian will be familiar with the herd and farm management practices to assist proactively and in the event that a problem occurs. A VCPR also facilitates collaborative decision-making between the producer and veterinarian, and it is necessary in order to obtain some classes of medications.

REQUIREMENTS

Producers must have a valid, ongoing veterinary-client-patient relationship with a licensed veterinarian and at least one on-farm visit per year by the veterinarian to assess overall herd health and welfare.

A written herd health plan must be developed and implemented with veterinary and technical advice, readily available, and updated at least annually.

Personnel must be trained in aspects of the herd health plan relevant to their assigned duties.

[4] The veterinarian-client-patient relationship is the basis for interaction among veterinarians, their clients, and their clients' animals. Generally, a veterinarian-client-patient relationship has been established when the veterinarian has examined the animals or visited the farm; the veterinarian has assumed responsibility for making clinical judgments related to the health of the animals; and the client has indicated a willingness to follow the veterinarian's instructions. Although the specific regulations vary among provinces, in order for veterinarians to prescribe some classes of medications, a veterinarian-client-patient relationship must first be established.

RECOMMENDED PRACTICES

a. review the herd health plan whenever there is a disease outbreak or significant change in health, housing, or management
b. participate in continuing education activities related to animal health and welfare or practical experience monitored by trained personnel.

6.1.1 Health and Treatment Records

Health and treatment records are important for disease prevention and detection, food safety, and consistency and continuity of treatment. Without records, producers tend to underestimate the incidence of disease on their farms (45). Research has also shown that producers who keep accurate and detailed health records achieve a lower incidence of disease (46).

Health records can also be used to assess the health and welfare of individual animals and overall herd health status. For example, annual mortality is an important indicator of the general health of veal cattle (45). A reduction in annual mortality reflects an improvement in cattle health (47,48).

Sample health and treatment records are available in the Verified Veal Program (see *Appendix L - Resources for Further Information*).

REQUIREMENTS

Treatments (preventative and therapeutic), health problems, and disease outbreaks must be recorded.

Mortalities (including reason for death or euthanasia, if known) must be recorded.

The above records must be kept for at least 2 years (or longer, if needed for existing regulations).

RECOMMENDED PRACTICES

a. ensure treatment records include a record of the animal(s) treated, date, reason for treatment, dosage, withdrawal time, and outcomes of the treatment (e.g. recovery, cull, mortality, adverse reaction)
b. review records with the veterinarian and use them to inform updates to the herd health plan and overall management (e.g. ventilation, facility design)
c. in addition to on-farm health records, consider records of other health and welfare outcomes (e.g. slaughterhouse condemnations, production statistics such as average daily gain)
d. if average annual mortality exceeds 6%, consult the herd veterinarian, investigate the causes, and implement corrective strategies.

6.1.2 Medications

Appropriate uses and sources of medications should be discussed with the herd veterinarian as part of the health plan (see *Section 6.1 – Herd Health Planning*). Correct storage of medications is important to ensure their efficacy and safety. For more information, refer to the Verified Veal Program (listed in *Appendix L – Resources for Further Information*).

Some animal health products can be ineffective or even unsafe. This includes some natural and herbal remedies and medications that are unlabeled, untested, or unregulated. Research does not support the efficacy claims of homeopathic remedies (49).

REQUIREMENTS

Pharmaceuticals and vaccines must be used according to the label or veterinary prescription.

RECOMMENDED PRACTICES

a. adopt practices that promote prudent use of antibiotics in order to minimize the risk of antimicrobial resistance and preserve the efficacy of antibiotics used to treat cattle
b. consider, where appropriate, alternatives to antibiotics when revising the health plan (e.g. management or housing changes, vaccinations, effective and approved alternative products)
c. check any stored animal health products before use to ensure they have not expired
d. store animal health products according to label instructions or veterinary prescription
e. minimize the risk of contamination related to injections (e.g. select a clean, dry area for the site of injection and clean the area with 70% alcohol, avoid multiple uses of the same needle)
f. establish drug administration protocols (e.g. read label and withdrawal time, site and angle of injection, water distributor calibration and cleaning, medicated mixed feed protocols, disposal of drugs and administration material).

6.2 Disease Prevention

Good herd health management incorporates practices that are designed to optimize the health and welfare of cattle through nutrition, housing, and management. Many issues can effectively be addressed through preventive strategies such as vaccinations, biosecurity, and cleaning and disinfection.

REQUIREMENTS

Vaccination options must be discussed with the herd health veterinarian as part of the herd health plan.

RECOMMENDED PRACTICES

a. strive to continuously improve herd health by taking the following steps in response to any illness, particularly a disease outbreak (50):
   - obtain a veterinary diagnosis
   - investigate the risk factors (e.g. hygiene, nutrition, management, environment) and analyze the health and treatment records
   - develop a manageable, effective action plan to prevent new cases
   - communicate the action plan to relevant personnel
   - evaluate the effectiveness of the action plan and refine if needed.

6.2.1 Cleaning and Disinfection

Implementing strict protocols for cleaning and disinfecting facilities and feed equipment has a significant impact on calf health especially in the first 2 weeks after arrival. Research on veal farms suggests that the cleanliness of housing can account for 19% of the variability between units in daily weight gain and 22% of the variability between units in feed efficiency (51).

Effective procedures include removal of biofilm and wastes, followed by washing and sanitizing (often with detergents to help remove organic debris), and, finally, disinfection to destroy disease-carrying organisms. Allowing cleaned pens and stalls to be unoccupied between uses (for a period of 5 days, for example) can also help reduce the spread of infection.

A dirty vaccination syringe or one that still has disinfectant in it can contaminate or inactivate a vaccine.

For more information, refer to the Verified Veal Program (listed in *Appendix L – Resources for Further Information*).

REQUIREMENTS

Cleaning and disinfection procedures for all facilities housing cattle must be developed and implemented.

Cleaning procedures for feeding and watering equipment must be developed and implemented.

Prior to calf arrival, milk-mixing and milk feeding equipment must be cleaned and disinfected.

Treatment tools including esophageal feeders must be cleaned and disinfected after each use.

Reusable syringes must be cleaned and dried after each use.

Manure and other wastes must be managed in a manner that promotes cattle health and welfare.

RECOMMENDED PRACTICES

a. use disinfectants in accordance with the manufacturer's directions to ensure efficacy
b. where possible, manage groups in an "all-in/all-out" method to reduce disease transmission and permit effective cleaning and disinfection
c. clean and disinfect facilities and equipment regularly
d. move hutches to a new area of the yard at least twice a year and after a disease outbreak to reduce the risk of disease transmission
e. clean milk distribution and mixing equipment daily or according to the manufacturer's recommendations
f. clean bowls and troughs at least weekly
g. periodically measure bacterial counts in bowls and troughs.

6.2.2 Pest Control

Rats, mice, and other pests can transmit diseases to cattle. In addition to being a disease vector, flies can also be a nuisance to cattle. Flies can become a problem in bedded areas when bedding is mixed with urine, manure, spilled milk, spilled grain, or water (6).

For more information, refer to the Verified Veal Program (listed in *Appendix L – Resources for Further Information*).

REQUIREMENTS

Ongoing strategies to monitor and control pests and insects must be implemented.

RECOMMENDED PRACTICES

a. eliminate or reduce the number of places rodents can use for shelter
b. prevent clutter in and around buildings
c. store feed in rodent-proof facilities and containers
d. take steps to make facilities rodent proof
e. locate and eliminate insect breeding areas (e.g. manure, wet or soiled bedding, standing water)
f. minimize feed and water spillage by ensuring feeders and waterers are appropriately sized and positioned at a suitable height for cattle age
g. clean out bedding more frequently in the summer (on a 2-week interval for hutches, for example) (52).

6.3 Sick or Injured Cattle

Early signs of illness can be subtle and require skill, experience, and effort to recognize. The severity of conditions and risk of transmission can be reduced through early detection and treatment. Taking time to observe each animal as part of daily routines (and therefore being able to intervene early) can save significant time caring for an animal with an advanced condition.

Calves are more susceptible to illness any time there is a change in their environment or management (e.g. weather conditions, introduction of new animals, abrupt changes in feed or feed schedules). When there is any doubt about whether an animal is healthy or sick, the animal should be marked for further assessment and more frequent monitoring.

Some examples of signs of illness:

- droopy ears and/or sunken eyes
- discharge from the nose or eyes
- swollen, inflamed, or infected navel
- laboured, rapid, or shallow breathing
- shivering
- coughing
- bloat
- diarrhea
- behavioural changes (e.g. animal stands apart from the group, is slow to rise or is weak and/or depressed)
- reduced appetite (e.g. animal does not immediately get up to eat, does not finish a meal, and/or daily feed intake is reduced)
- reduced water intake
- fever (≥39.5°C [≥103°F]) or hypothermia (≤37.5°C [≤99.5°F]).

Sick or injured animals often experience pain and discomfort (see *Appendix F – Signs of Pain*). Inclusion of pain control, fever relief, and inflammation control (e.g. non-steroidal anti-inflammatory drugs [NSAIDs]) in a treatment plan, in consultation with the herd veterinarian, can improve welfare and may facilitate recovery.

Owners, veterinarians, and laboratories are required to immediately report an animal that is infected or suspected of being infected with a reportable disease to the appropriate federal or provincial authority.

REQUIREMENTS

The following Requirements also apply to the specific conditions in Sections 6.3.1 to 6.3.3.

Personnel must be knowledgeable of normal cattle behaviour and signs of illness, injury, and disease.

Neonatal calves must be assessed at least twice daily, and all other cattle must be assessed at least once daily, for signs of illness, injury, and disease.

Sick, injured, or diseased cattle must be monitored more frequently and receive prompt treatment and care, or be euthanized without delay. The treatment must be appropriate for the condition.

For cattle that are not responding to treatment(s) according to the herd health plan, personnel must, without delay, obtain and follow veterinary advice or euthanize the animal.

RECOMMENDED PRACTICES

a. establish a system to identify cattle that should be monitored more frequently due to injury, illness, or other reason
b. segregate sick, injured, or diseased cattle when it is advantageous for treatment, recovery, animal comfort, or limiting disease transmission. Isolation is stressful to cattle; they should ideally be segregated such that they can see other cattle (refer to *Section 3.7 – Facilities for Sick or Injured Cattle*).

6.3.1 Respiratory Illness

Early detection is a key factor in the successful treatment of respiratory illness. Signs of respiratory illness include elevated respiration rate, fever, nasal discharge, coughing, depression (often mild), and loss of appetite (53). Because these signs can be subtle, attentive observation of individual calves is essential and data provided at slaughter may provide valuable information on actual occurrence (53).

Respiratory disease can be closely linked to air quality, housing, management, and the environment. For more information, see *Section 3.5.1 – Ventilation*.

Strategies that may reduce the risk of respiratory illness (53,54):

- maintain good indoor air quality at all times through effective ventilation and frequent removal of manure
- replace wet and/or soiled bedding frequently
- vaccinate
- avoid overcrowding
- minimize comingling of different groups, especially animals of different ages.

REQUIREMENTS

Stocking density, ventilation, and bedding must be managed in a manner that provides air quality that is not harmful to cattle, and all reasonable steps must be taken to reduce the risk of respiratory disease.

RECOMMENDED PRACTICES

a. work with the herd veterinarian to identify the causes of pneumonia and include in the herd health plan strategies to reduce the incidence
b. when possible, obtain data from the slaughterplant on the occurrence of lung lesions and strive to continually reduce the occurrence
c. consider prevention of respiratory disease when designing new facilities.

6.3.2 Diarrhea

Diarrhea is a major cause of mortality in young calves (55). Fluid therapy (i.e. replacement of lost water and electrolytes) greatly improves their chance of survival (55). If bottle feeding is unsuccessful, fluid therapy can be provided subcutaneously or intravenously following veterinary advice and training.

As long as scouring calves continue to drink milk, it is important to continue offering it (55). Continued milk feeding prevents weight loss and provides the energy and nutrients that support recovery and growth (55). Tube feeding milk to calves that have gone off milk brings serious health risks and is not recommended.

Some research suggests there are benefits to including an NSAID as part of an overall therapy plan for scouring calves (56,57). However, especially in dehydrated calves, NSAIDs bring a risk of toxicity (58); therefore, this therapy (which also requires a prescription) has to be considered in consultation with the herd veterinarian.

REQUIREMENTS

Cattle showing signs of dehydration must receive fluids. The appropriate intervention depends on the severity of dehydration, as outlined in Appendix C.

RECOMMENDED PRACTICES

a. work with the herd veterinarian to identify the causes of diarrhea and include in the herd health plan treatment protocols and strategies to reduce the incidence (e.g. biosecurity procedures, nutrition, water quality, management)
b. upon the earliest signs of diarrhea, provide fluids according to the herd health plan.

6.3.3 Foot and Leg Health

Foot and leg health problems are painful and restrict the normal behaviour of cattle (33). There are multiple causes of foot and leg health problems in cattle, including injury, infection, and nutrition. Slippery flooring, concrete flooring, and lack of bedding have been linked to foot and leg injuries in cattle.

A common cause of infectious arthritis is *Mycoplasma bovis* which is also associated with bovine respiratory disease (29). Preventive measures for bovine respiratory disease (see Section 6.3.1) may help to reduce lameness caused by arthritis (29).

The prevalence of bursitis can be high in some veal cattle herds (34). Risk factors include concrete and wooden slatted flooring (the prevalence is highest in cattle on concrete flooring), age of cattle (animals closer to slaughter appear to be more at risk) and insufficient space allowance (34). Providing cattle with enough space to adopt different resting postures (i.e. sternal and lateral) may reduce the risk of bursitis (34) and improves animal comfort.

Strategies to reduce the prevalence of bursitis include (34):

- avoid concrete and slatted wooden flooring
- provide bedding, bedded areas, or rubber mats
- increase space allowance.

Laminitis can also affect cattle. Depending on the severity, affected animals may exhibit signs of mild discomfort or severe pain. Some studies suggest a link between excessive consumption of grain, ruminal acidosis, and laminitis.

REQUIREMENTS

Corrective action must be taken if the number of animals with bursitis exceeds 15% in 3 consecutive cycles when assessed at shipping or once during the 2 weeks before shipping.

RECOMMENDED PRACTICES

a. choose flooring types that are non-slip but not overly abrasive (33,34)
b. avoid bare concrete slatted flooring and provide cattle with softer flooring types that afford good drainage (e.g. rubber coated flooring, perforated rubber mats, access to bedded areas) (6)
c. inspect cattle in each stage of production for injuries associated with flooring or other aspects of facility design (e.g. hairless patches, lameness, swelling of the knee and hock) (6)
d. monitor and record the prevalence of lameness in each stage of production and aim to continually reduce its occurrence
e. aim for less than 10% prevalence of bursitis in finished veal (assessed at shipping or once during the 2 weeks before shipping) (based on data in 34).

7 Transportation

The federal requirements for animal transport are covered under the Health of Animals Regulations, Part XII (59). They are enforced by the Canadian Food Inspection Agency (CFIA) with the assistance of other federal, provincial, and territorial authorities. Some provinces have additional regulations related to animal transport.

Those responsible for loading, transporting, or unloading animals must be familiar with, and follow, Canada's animal transport requirements. If you do not comply with the regulations, you could be fined or prosecuted. If your actions or neglect are considered animal abuse, you could also be charged and convicted under the Criminal Code of Canada and/or provincial legislation.

Transportation begins with the decision to transport an animal. The producer is responsible for ensuring animals are fit for the intended journey, selecting the type of transport, and selecting a carrier that follows Canada's animal transport requirements.

The scope of the veal cattle Code of Practice is on farm and includes pre-transport Requirements and Recommended Practices. Refer to the transportation Code of Practice for information on animal care during transport.

7.1 Pre-Transport Decision-Making and Fitness for Transport

It is the responsibility of the party that is shipping, loading, or transporting animals (or causing animals to be shipped, loaded, or transported) to ensure that all animals are fit for the intended journey. When assessing fitness for transport, those responsible need to be aware of how long the animals may be in transit, including intermediate stops such as auction markets or assembly yards. If in doubt, assume the longest travel that might occur. Those arranging transport also need to know whether the transporter needs to provide feed, water, rest, or additional services during transport.

Animals that are to be shipped must be deemed fit for transport. While producers have a primary responsibility to ensure that animals are fit for the expected journey, the carrier and driver have the right and legal responsibility to refuse to load an animal that they deem unfit. For animals that cannot be transported in their current condition, transport must be delayed until the animal is fit for the trip and appropriate care and/or treatment provided, or the animal may be euthanized.

Special care appropriate for the condition must be taken if transporting compromised animals (versus unfit animals, which must not be transported). Some examples of special provisions:

- transport locally and directly to the nearest suitable place to receive care or be humanely slaughtered or euthanized
- load the compromised animal last and unload first or in a conveyance with hydraulic decks or on the main deck of trailers (i.e. must not negotiate ramp[s] within the conveyance)
- segregate the compromised animal from all other animals, or pen with one familiar animal
- provide additional bedding.

Specific Considerations for Neonatal Calves

Neonatal calves are not able to cope well with transport, especially long journeys or journeys involving intermediate stops. They can be weak, have difficulty walking, are susceptible to extremes of cold and heat, and are vulnerable to disease. Young calves also have modest energy reserves, and the time of their last feeding must be considered when arranging transport[5].

5 Sections 141 and 143 in Part XII (Transport of Animals) of the Health of Animals Regulations specify conditions that must be met when transporting livestock of eight days of age or less, and young ruminants (59).

REQUIREMENTS

Before loading, each animal's fitness for transport must be individually assessed and evaluated within the context of each journey (e.g. weather conditions, anticipated total journey duration, and intermediate stops such as auction markets).

Unfit animals must not be transported except for diagnosis or treatment and only if special provisions[6], including the recommendation of a veterinarian, are met. Refer to Appendix G – Transport Decision Tree.

Compromised animals, if transported, may only be transported with special provisions directly (not through an auction or assembly yard) to the nearest suitable place where they can receive care or be promptly slaughtered or euthanized. Refer to Appendix G – Transport Decision Tree.

Refer also to the Requirements in Section 2.2 – Assessing Calf Health at Purchasing.

RECOMMENDED PRACTICES

a. identify conditions early so that animals can be treated or shipped as appropriate before the condition worsens and the animal becomes unfit for transport
b. consult a veterinarian if uncertain about an animal's fitness for transport and/or appropriate special provisions
c. clearly identify and provide documentation for animals that are fit for transport but show signs of a previous disease or injury or a current health condition at the time of loading (e.g. a veterinary note explaining the condition and declaration of treatment[s] given).

7.1.1 Preparing Animals for Transport

Preparation for transport starts long before the journey begins. Factors such as feed, water, and health management have a collective impact on fitness for transport, and should be considered as a whole.

REQUIREMENTS

Personnel must be familiar with and follow federal and provincial transport regulations.

On-farm preparations for transport must take into account the requirements for feed, water, and rest as described in federal and provincial regulations.

RECOMMENDED PRACTICES

a. provide continuous access to water until the time of loading.

7.1.2 Arranging Transport

Producers are responsible for selecting a carrier that follows animal transport requirements and that is trained and knowledgeable in animal care.

Trip planning and scheduling should include consideration of possible delays along the route or at the destination, which can affect cattle welfare particularly in adverse environmental conditions.

REQUIREMENTS

Make arrangements in consultation with the transporter and other relevant parties that aim to avoid delays.

Documentation must be completed in advance of shipping to avoid delays at inspection stations or other checkpoints.

6 Section 139 (2) in Part XII (Transport of Animals) of the Health of Animals Regulations specifies four conditions that must be met when transporting animals for veterinary care (59). Refer to Appendix G – Transport Decision Tree.

RECOMMENDED PRACTICES

a. follow these guidelines when selecting a carrier:
   - ask for references of other shippers and receivers that have used that carrier
   - ensure the carrier has appropriate experience relative to journey duration (e.g. short vs. long distance hauls) and the species and class of cattle being transported
   - use drivers that are professionally trained or certified in the care and handling of cattle

b. ensure the following information is discussed and agreed upon with the transporter:
   - number of animals to be shipped and their estimated weight
   - class of cattle
   - time and point of loading
   - destination
   - biosecurity arrangements
   - special requirements of the animals being transported (e.g. compromised animals)
   - protection from extreme weather conditions especially for animals most at risk (e.g. young calves).

7.2 On Farm Loading and Unloading

Loading and unloading can be the most stressful aspects of transport. Any efforts to reduce animal stress during these times can improve welfare. Good handling and properly designed handling systems facilitate animal movement and reduce stress and injury. The risk of slips and falls should be reduced because they are stressful to cattle and lead to injury and bruising (60,61). Refer also to *Section 5.2 – Handling and Moving Cattle.*

REQUIREMENTS

Loading/unloading facilities must permit the safe handling of cattle.

Personnel involved in loading and unloading must be trained and knowledgeable and comply with the provincial and federal regulations for the movement and transport of animals.

Personnel involved in loading and unloading must be knowledgeable in cattle behaviour and use only quiet handling techniques acquired through training, experience, or mentorship.

Electric prods must never be used on calves that are less than 3 months of age.

In animals older than 3 months, electric prods must not be used except when animal or human safety is at risk and as a last resort when all humane alternatives have failed and only when cattle have a clear path to move.

In animals older than 3 months, electric prods must never be used on sensitive areas (belly, genitals, facial or anal areas) or repeatedly on the same animal.

The truck/trailer must be strewn with material that is sufficient to absorb moisture (59).

There must be no unprotected gap between the end of the ramp and truck/trailer (59).

Ramps must have sides that are high enough to prevent cattle from falling off ramps (59).

Ramps that are designed to reduce slips and falls must be used (59).

RECOMMENDED PRACTICES

a. confirm that the truck/trailer is clean and bedded with straw, wood shavings (or other bedding material appropriate for the weather and class of cattle) sufficient to provide a comfortable resting surface
b. ensure loading facilities are compatible with the type of trailer used by the transporter
c. ensure farm roads and loading areas are accessible in all kinds of weather
d. during extreme weather conditions, avoid or delay shipping
e. during hot weather, avoid loading during the hottest part of the day
f. provide overhead cover in loading/unloading areas to protect cattle from wet conditions
g. ensure loading and unloading areas are well lit, designed to minimize noise and provide flooring that is non-slip, uniform in appearance, and free from puddles and ice (60)
h. use solid sided loading/unloading ramps that are high enough to protect cattle from wind and prevent cattle from falling between the sides
i. use ramps with the following design features to reduce slips, falls, and balking:
    - stair-step design with a maximum rise of 10 cm (3.9 in) and tread length between 30–60 cm (11.8–23.6 in); grooves in the treads, 2.5 cm (0.98 in) deep, enhance traction (62)
    - ramps with cleats spaced so that the hoof fits easily between them. For cattle, 20 cm (7.9 in) of space between cleats is recommended (62)
    - appropriately sloped ramps (for cattle, the maximum recommended angle is 20° for ramps [60]; for unloading neonatal calves, an angle below 12° is recommended [63])
j. design loading and unloading areas with straight or gently curved raceways to avoid cattle having to make sharp turns around corners.

8 Euthanasia

Euthanasia is defined as the ending of the life of an individual animal for humane reasons in a way that minimizes or eliminates pain and distress (4). Euthanasia is necessary when medical care to alleviate pain and suffering is not feasible, the animal is not responding favourably to treatment, or there is no reasonable prospect for recovery. Euthanasia may also be necessary to ensure human safety, or for regulatory requirements associated with disease control.

Cattle, having evolved as prey animals, may hide signs of pain or suffering, and this may affect assessment of their condition when making a decision about euthanasia. It is the responsibility of the producer to ensure euthanasia is carried out by competent personnel without delay and using an acceptable method. Veterinarians play an important role developing on-farm euthanasia protocols and providing training. They may also be called upon to perform euthanasia or assist in determining the best course of action.

8.1 Euthanasia Timelines and Protocols

It is important to euthanize without delay cattle that:

- fail to respond to treatment(s) and recovery protocols, or
- show signs of chronic, severe, or debilitating pain or distress, or
- are unable to stand or walk, or
- show marked weight loss/loss of body condition, or
- are unfit for transport (or are likely to be condemned) and it has been decided that treatment will not be provided.

Having a written euthanasia protocol can improve confidence when making decisions about euthanasia and help ensure the procedure is carried out in a timely manner and consistently according to on-farm protocols. Personnel who have received training on all aspects of euthanasia have greater confidence to make timely decisions on when to euthanize an animal and the skills to perform the procedure competently.

Suggested elements of a euthanasia protocol include:

- personnel who are responsible for euthanasia
- training provided to ensure those responsible are competent
- access to acceptable equipment to carry out the procedure (e.g. devices, materials for restraint)
- a schedule for maintenance of equipment
- criteria to guide euthanasia decisions (See *Appendix H – Sample Euthanasia Decision Tree*).

REQUIREMENTS

Cattle must be euthanized without delay if they are suffering from pain or illness and:

- ***do not have a reasonable prospect of improvement, or***
- ***fail to respond to treatment(s) within an appropriate timeframe, or***
- ***treatment will not be provided.***

A written euthanasia protocol detailing criteria for when to euthanize an animal and appropriate euthanasia method(s) for each phase of production must be developed with veterinary input, readily available, and implemented.

Personnel who perform euthanasia must be trained in the protocol.

8.2 Methods of Euthanasia

Euthanasia must be quick, cause minimal stress and pain, and result in immediate loss of consciousness followed by death without the animal regaining consciousness. Humane handling (Section 5.2) and restraint (Section 5.3) are also important components of euthanasia (64).

When choosing a euthanasia method (from *Appendix I – Methods of Euthanasia*), consider (65,66):

- ability to restrain the animal for proper application of the procedure
- emotional comfort for the person performing the procedure and any bystanders
- skill of the personnel performing the procedure
- biosecurity and potential spread of disease
- carcass disposal
- potential need for brain tissue for diagnostic purposes
- human safety and the safety of nearby animals.

Every effort should be made to ensure human and animal safety, particularly when performing euthanasia by gunshot or captive bolt device. The use of any firearm brings the risk of ricochet; an accidental application of a captive bolt device can cause significant injury to humans.

Proper storage and maintenance of equipment is essential to ensure the equipment functions effectively, particularly with captive bolt guns.

REQUIREMENTS

An acceptable method of euthanasia must be used. Refer to* Appendix I – Methods of Euthanasia. *Methods not listed in Appendix I (Table I.1) are considered unacceptable. Blunt force trauma to the head by means of anything other than the appropriate use of a captive bolt gun is unacceptable.

The method of euthanasia must be quick, cause minimal stress and pain, and result in immediate loss of consciousness followed by death without the animal regaining consciousness.

A secondary step to ensure death must be used when required according to the method of euthanasia. Refer to Appendices I and K.

Every farm must have the equipment necessary for euthanasia or have ready access to such equipment.

Personnel who perform euthanasia must have the required skills, knowledge, and abilities and be competent to perform the procedure.

Equipment necessary for euthanasia, such as firearms or captive bolt devices, must be used, stored, and maintained according to the manufacturer's instructions to ensure proper function.

Unnecessary handling and moving of cattle prior to euthanasia must not occur. Animals must not be dragged, prodded, or forced to move prior to euthanasia.

When restraint is necessary, the safest, least stressful method available to facilitate effective euthanasia must be used, and euthanasia must be performed without delay following restraint.

RECOMMENDED PRACTICES

a. consider, in consultation with the herd veterinarian, sedation as a means of humane restraint as part of the euthanasia protocol. Some sedatives can be dispensed by a veterinarian for on-farm use at low cost.

8.3 Confirmation of Unconsciousness and Death

Death does not occur immediately; it is the result of respiratory and cardiac failure, which can take several minutes (65). It is essential that cattle being euthanized are rendered unconscious immediately and remain unconscious until death occurs.

Multiple indicators should be used when evaluating consciousness. Signs of consciousness include:

- rhythmic breathing
- eye movement
- animal blinks when the surface of the eye is touched (corneal reflex)
- presence of jaw tone (resistance is felt as the animal's jaw is opened wide; the jaw is not relaxed)
- vocalization
- animal attempts to rise or lift its head.

All of the above indicators must be absent before an animal can be considered unconscious. Animals euthanized by gunshot or captive bolt device should immediately collapse upon the application of the euthanasia method as a further indicator of unconsciousness. Convulsions (i.e. uncoordinated kicking of the legs, body rigidity) following the application of any euthanasia method are not a sign of consciousness.

REQUIREMENTS

Cattle must be inspected for signs of consciousness immediately after the application of the euthanasia method.

If any sign of consciousness is observed, the euthanasia procedure must be repeated immediately. Be prepared to perform a repeat procedure (or an alternate) if the first attempt does not render the animal immediately unconscious or if there are signs that the animal is returning to consciousness.

Before moving or leaving the animal, the following 2 indicators must be used to confirm death:

- ***absence of a heartbeat for at least 5 minutes and***
- ***lack of breathing for at least 5 minutes.***

Carcass disposal must be in accordance with federal, provincial/territorial, and municipal regulations.

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Sample Cattle Welfare Policy

[Your Farm/Company]
Employee Animal Care Code of Conduct

Our commitment to our animals

[Our company/farm] is committed to responsible farm animal care and handling. That means animals in our care deserve to be healthy, safe and well cared for.

Our commitment to our customers

Working with animals is important work that we take seriously. We are proud of the work that we do, and we strictly enforce responsible farm animal care and handling among employees and service providers at our facility.

Every person who handles or comes into contact with an animal is required to support our core objective of responsible farm animal care and handling. The demonstration of that support is through the review and signing of this Code of Conduct agreement on a **[quarterly/annual]** basis.

Our commitment to our employees

Your job is valuable and important to our animals, and our business. When you report an incident involving possible mistreatment, illness or injury involving one of our animals, we will take it seriously. We will document your concern. We will follow up to resolve the animal's situation, and/or provide additional training among employees.

Our employees' commitment to us

Every one of our employees is required to handle and treat animals with respect and in accordance with [farm/company] policies and rules as well as the federal, provincial and municipal regulations under which we operate.

Any employee who is responsible for, observes or receives any information that alleges an animal on our property or in our care is being mistreated, mishandled or treated or handled in a way that is contrary to our animal care policy/guidelines must report that information to **[NAME OF POINT PERSON]** immediately so that the situation can be corrected. **[PROVIDE CONTACT INFO]**.

Failure to adhere to this agreement is cause for dismissal. **[Farm/company]** reserves the right to refer animal-abusers to law enforcement for prosecution.

I _____ understand and acknowledge that willful neglect, mishandling or abuse of animals by any [name of company] employee or witnessing it and not reporting it is subject to discipline including immediate termination of employment, and that offenders may also be subject to prosecution under applicable laws.

_____ _____
Signature of Employee *Date*

_____
Name (Please Print)

_____ _____
Signature of Employer *Date*

_____ _____
Name *Title*

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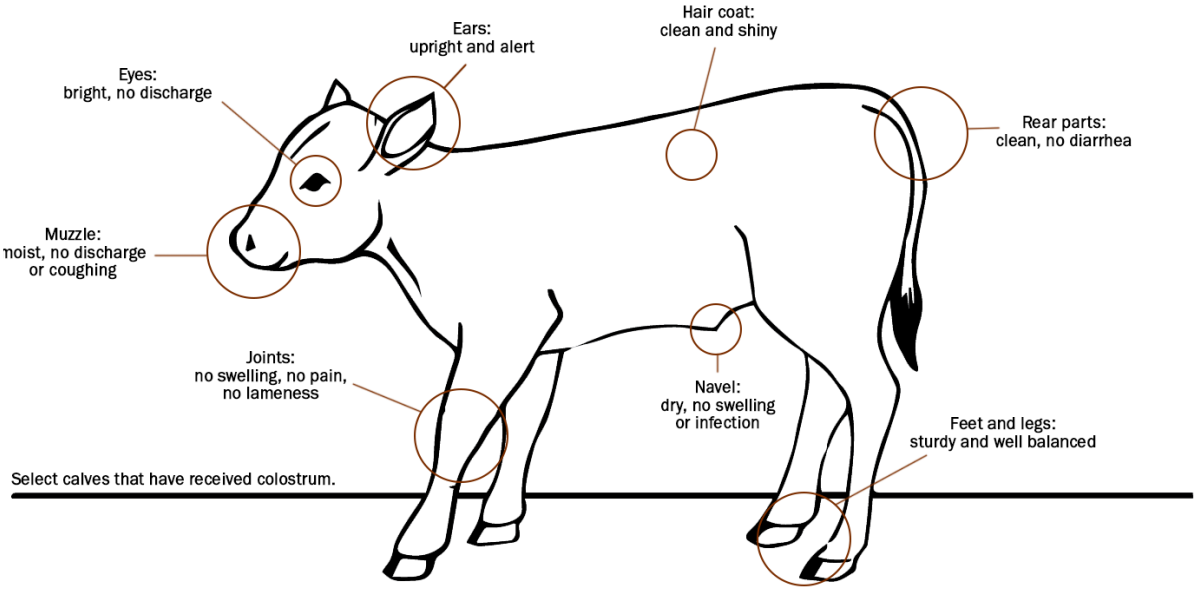
Selecting Healthy Calves



Adapted from "*Marketing Healthy Calves*" and used with the kind permission of Les Producteurs de bovins du Québec.

Assessing Dehydration in Calves

% Dehydration	Attitude	Appearance	Intervention
<5%	Stands without assistance, strong suckle reflex	No clinical signs	None
6–7%	Standing with arched back with good suckle reflex	Slight sinking of eyes, mild increase in skin elasticity, moist mucous membranes	Oral electrolyte fluids
8–9%	Mild depression, sternal recumbency, poor suckle response	Moderately sunken eyes, significant increase in skin elasticity, tacky mucus membranes	Requires IV fluid therapy[1]
10–12%	Profound depression with absent suckle response and lying in lateral recumbency	Eyes deeply sunken, permanent skin tent, dry mucus membranes	Requires immediate IV fluid therapy[1]

[1] Fluid therapy should only be administered intravenously or subcutaneously by a veterinarian or a producer following veterinary advice and training.

Sample Emergency Contact List

EMERGENCY CONTACT LIST

Use 911 for any emergencies

Your farm address: _____

Farm staff emergency contacts:

Contact 1

Office phone: _____
Home phone: _____
Cell phone: _____

Contact 2

Office phone: _____
Home phone: _____
Cell phone: _____

Veterinarian _____
After hours veterinary contact: _____
Local police contact (for non-911 emergencies): _____
Provincial Ministry of Agriculture: _____
Canadian Food Inspection Agency: _____
Internet service provider: _____
Insurance company: _____
Hospital: _____
Hospital address: _____
Nearby slaughter plant: _____

Examples of Fibre Sources and their Relative Abilities to Stimulate Chewing

The table below lists examples of solid feed and their physically effective fibre[1] properties to stimulate chewing.

Fibre source	Physical form	NDF%[2,3,6]	pef[2]	peNDF[2]	Chewing duration (minutes/kg DM)[4,5,7]
Forage					
Hay	Long	54	1.00	54	62
	Chopped	54	0.95	51	44
	Pellets	-	-	-	37
Straw	Long	73	1.00	73	160
	Chopped	84	1.00	84	56
	Pellets	-	-	-	18
	Ground	75	-	-	18
Corn/Maize silage	Chopped	68	0.90	61	66
	Ground	60	0.80	35	-
Corn/Maize cob silage	Ground	87	0.40	35	-
Non-forage					
Dried beet pulp		46	0.40	18	58
Barley	Rolled	18	0.70	13	11
	Pellets	-	0.40	-	-
	Ground	-	0.40	-	15
	Whole	10	-	-	30
Corn/Maize	Rolled	10	0.60	-	-
	Ground	10	0.40	4	5
Concentrates	Pellets	-	0.30	-	12
Soybean hulls		67	0.49	27	8
Whole cottonseed		50	0.90	45	-

NDF (Neutral Detergent Fibre)
pef (physical effectiveness factor to stimulate chewing, range 0 to 1)

[1]"Physically effective NDF (peNDF) can be defined as the fraction of the feed that stimulates chewing activity and would be expressed as a product of NDF concentration and a physical effectiveness factor determined by total chewing response." Grant R.J. (1997) Interactions among forages and nonforage fiber sources. *Journal of Dairy Science* 80:1438–1446.
[2]Adapted from Mertens D.R. (1997) Creating a system for meeting the fiber requirements of dairy cows. *Journal of Dairy Science* 80:1463-1481. & Mertens D.R. (2002) Measuring fiber and its effectiveness in ruminant diets. In: *Proceedings of the Plains Nutritional Council* (pp 40–66) Texas A&M Publication AREC 02–20.
[3]Adapted from National Research Council (2000) *Nutrient Requirements of Beef Cattle*. Seventh revised edition, 2000 update. Washington, D.C.: National Academy Press.
[4]Adapted from Sudweeks E.M., Ely L.O., Mertens D.R. & Sisk L.R. (1981) Assessing minimum amounts and form of roughages in ruminant diets: Roughage value index system. *Journal of Animal Science* 53:1406–1411.
[5]Adapted from Moon Y.H., Lee S.C. & Lee S.S. (2002) Chewing activities of selected roughages and concentrates by dairy steers. *Asian-Australasian Journal of Animal Sciences* 15:968–973.
[6]Preston R.L. (2016) Feed Composition Table. beefmagazine.com
[7]Beauchemin K.A., McAllister T.A., Dong Y, Farr B.I. & Cheng K. J. (1994) Effects of mastication on digestion of whole cereal grains by cattle. *Journal of Animal Science* 72:236–246.

Signs of Pain

Sign	Explanation
Guarding	The animal alters its posture to avoid moving or causing contact to a body part or to avoid the handling of that body area.
Abnormal appearance	Obvious lack of grooming, changed posture with head held low.
Altered behaviour	Behaviour may be depressed with reduced interest in their surroundings; animals may remain immobile, or be reluctant to stand or move even when disturbed. They may also exhibit restlessness (e.g. lying down and getting up, shifting weight, circling, or pacing) or disturbed sleeping patterns. May grunt and grind their teeth. Severe pain often results in rapid, shallow respiration. Abdominal discomfort can be indicated by behaviour ranging from mild kicking at the abdomen to rolling and thrashing. Animals in pain may also show altered social interactions with others in their group.
Vocalization	An animal may vocalize when approached or handled or when a specific body area is touched or palpated. It may also vocalize when moving to avoid being handled. Bellowing can occur if the pain is severe.
Mutilation	Animals may lick, scratch, or rub a painful area.
Sweating	Excessive sweating is often associated with some types of pain (e.g. laminitis, colic).
Inappetence	Animals in pain frequently stop eating and drinking, or markedly reduce their intake, resulting in rapid weight loss.

Adapted from National Research Council Committee on Recognition and Alleviation of Pain in Laboratory Animals (2009) *Recognition and Alleviation of Pain in Laboratory Animals*. Washington, DC: National Academies Press.

Transport Decision Tree

FIT ANIMALS

An animal deemed to be able to withstand the stress of transportation without experiencing suffering and that is expected to arrive at its final destination in good condition.

If unsure of animal's condition, contact a veterinarian.

COMPROMISED ANIMALS[1]

TRANSPORT WITH SPECIAL PROVISIONS DIRECT TO FINAL DESTINATION

(not to an auction or assembly yard)

Examples of compromised conditions:

- Slight lameness[2]
- Contracted flexor tendons (calf walks as if on its "tippy toes")
- Limb deformity (not painful)
- Unhealed or acute penis injury (without significant bleeding)
- Acute frostbite
- Blindness in both eyes
- Bloated, with no signs of discomfort or weakness and not down (treatment on farm is recommended vs. transport)
- Open wound (a severe open wound would render the animal unfit for transport)
- Not fully healed after a procedure (e.g. castration, dehorning)
- Minor rectal prolapse (without necrosis or infection)
- Single, minor abscess (no fever, weakness or impeded movement)
- Pneumonia (without fever) (treatment on farm is recommended vs. transport)

Required special provisions

- Transport directly to the nearest suitable place, other than an assembly centre, where it can receive care or be humanely slaughtered or euthanized
- The animal is individually loaded and unloaded without having to negotiate any ramps in the conveyance
- Isolate from all other animals
- Measures are taken that are necessary to prevent the animal's suffering, injury, or death during loading, confinement, transport, and unloading

Optional provisions

- Load last and unload first
- Pen with one familiar animal
- Additional bedding

UNFIT ANIMALS

DO NOT TRANSPORT

Other than for diagnosis or treatment on the recommendation of a veterinarian[3]

Examples of unfit conditions[4]:

- Lameness other than sight[5]
- Non-ambulatory[6]
- Unhealed or infected navel
- Fractured jaw, limb, pelvis or any fracture that hampers mobility or causes it to exhibit sighs of pain or suffering
- Rupture of the pre-pubic tendon
- Weak or lethargic
- Bloat (signs of discomfort or weakness, difficulty breathing or non-ambulatory)Exhibits signs of a generalized nervous system disorder (e.g. rabies – must be reported to CFIA)
- Severe wound (deep or gaping, profuse bleeding or exposed bone)
- Extremely thin
- Listeriosis (listeria)
- Is in shock or dying
- Exhibits signs of exhaustion
- Exhibits signs of dehydration
- Exhibits signs of a generalized nervous system disorder
- Exhibits signs of fever (≥39.5°C [≥103°F])
- Hernia that impedes movement; touches the ground when the animal stands; causes the animal to exhibit signs of pain or suffering; or has an open wound, ulceration or obvious infection
- Arthritis involving multiple joints
- Multiple abscesses or single, large abscess with potential systemic effects (fever, weak) or impedes movement
- Urethral blockage
- Pneumonia (unresponsive and/or fever, difficulty breathing, weakness, dehydration or respiratory distress)

Signs of pain are described in Appendix F.

1 Section 136 (1) in Part XII (Transport of Animals) of the Health of Animals Regulations defines "compromised" and includes a list of conditions beyond those listed in this appendix that would render an animal compromised or unfit for transport (59).

2 The animal has imperfect locomotion, a slight limp; the lame leg may not be immediately identifiable and the animal is able to bear weight on all feet. ***Rationale: Even a slight lameness can deteriorate quickly in transit especially when the animal negotiates ramps during loading and unloading. This animal is at risk of becoming severely lame or non-ambulatory during transport.***

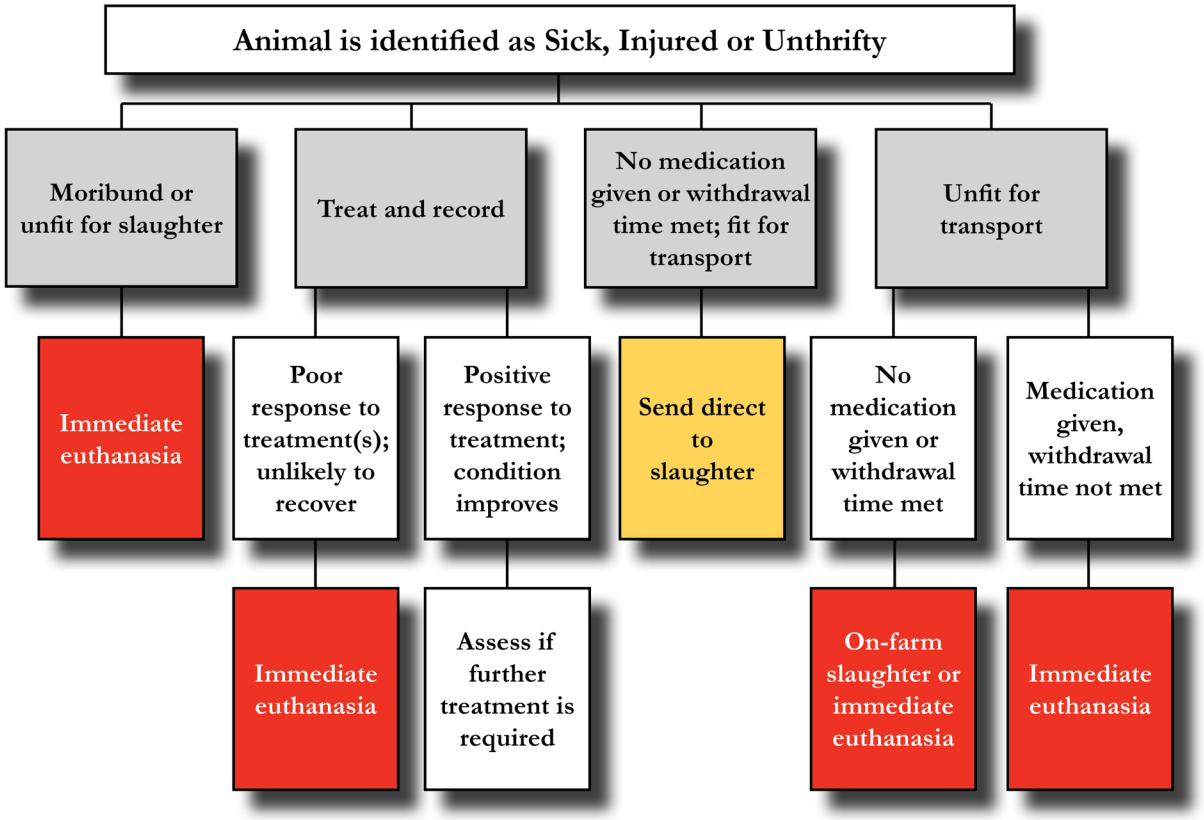
3 Section 139 (2) in Part XII (Transport of Animals) of the Health of Animals Regulations mandates that an unfit animal can only be transported directly to a place (other than a slaughter establishment or assembly centre) for veterinary care if (59): it is individually loaded and unloaded without having to negotiate any ramps inside the conveyance; it is isolated during confinement and transport; measures are taken to prevent the animal's unnecessary suffering, injury or death during loading, confinement, transport and unloading; and, a veterinarian recommends that the animal be transported to receive veterinary care.

4 Section 136 (1) in Part XII (Transport of Animals) of the Health of Animals Regulations defines "unfit" and includes a list of conditions beyond those listed in this appendix that would render an animal compromised or unfit for transport (59).

5 The animal is reluctant to walk, and exhibits halted movement or demonstrates one of the following: obvious arched back and head bob; obvious limp with uneven weight bearing; not bearing any weight on one leg which is immediately identifiable; or the animal must be strongly encouraged to move.

6 Unable to rise or stand without assistance or move without being dragged or carried, regardless of age or size. Note: it is illegal to drag an animal.

Sample Euthanasia Decision Tree



Examples of questions to guide decision-making on whether to treat or euthanize an animal:

- Will the animal endure a painful and lengthy recovery?
- Will the animal be likely to return to normal function post recovery?
- Can the required care be provided during the convalescence period?
- Is the animal likely to suffer chronic pain or immobility following recovery?
- Will weather extremes create inhumane conditions for the animal during and/or after recovery?

Methods of Euthanasia

Table I.1: Acceptable euthanasia methods for cattle (adapted from [1,2,3])

Method	Suitable for	Equipment and Procedure
Gunshot	Calves less than 181 kg (400 lb)	Examples of appropriate firearms: • Rifles: a .22 long rifle fired from a short distance is acceptable (i.e. 0.60–0.90 m [2–3 feet]) • A .22 magnum or larger calibre is recommended • Shotguns: a .410 shotgun with a 7.6 cm (3 in) magnum load with bird shot or slug fired a short distance or a 12 or 20 gauge shotgun with slugs or bird shot no. 2, 4 or 6.
	Cattle more than 181 kg (400 lb)	• Requires a minimum of 1356 J (1000 ft-lb) of muzzle energy. Examples of appropriate firearms: • Rifles: a .22 magnum or larger calibre centre fire rifle (.223, .270, 303, 30-30) is required • Shotguns: a 12 or 20 gauge shotgun with slugs or bird shot no. 2, 4 or 6. Note: A standard .22 calibre long rifle only produces 119–138 joules (116–135 ft-lb) of muzzle energy and is not sufficient for this class of cattle.
Penetrating captive bolt and secondary step to cause death	All weight and age classes	• Penetrating captive bolt guns with velocities ranging from 55–58m/s are most effective • Restrain if necessary • A secondary step is required as the penetrating bolt device is designed only to stun the animal (see Appendix K).
Non-penetrating captive bolt and bleeding out	Young calves only	• Restrain if necessary • Bleeding out step required after animal is confirmed to be unconscious (see Appendix K).
Drugs approved for euthanasia	All weight and age classes	• Must be administered by a veterinarian. Safe disposal of the carcass is required when barbiturates are used.
Secondary steps can ONLY be performed on an animal that is confirmed to be unconscious. Secondary steps must be chosen in consultation with the herd veterinarian, outlined in the euthanasia protocol, and only performed following veterinary advice and training. Acceptable secondary steps include: • bleeding out (see Appendix K) • pithing (see Appendix K) • cardiac puncture • rapid intravenous injection of a concentrated solution of potassium chloride or magnesium sulfate.		

Methods not listed in Table I.1 are considered unacceptable methods of euthanasia. Blunt force trauma to the head by means of anything other the appropriate use of a captive bolt gun is unacceptable.[1,4,5] With the exception of a captive bolt gun, blunt force trauma does not consistently cause immediate loss of consciousness in cattle, including young calves.[1,4,5]

[1] American Veterinary Medical Association (2013) *AVMA Guidelines for the Euthanasia of Animals: 2013 Edition*. Available at: www.avma.org/KB/Policies/Documents/euthanasia.pdf Accessed: April 20, 2015.

[2] Shearer J.K. & Ramirez A. (last updated January 28, 2013) Procedures for Humane *Euthanasia – Euthanasia of Sick, Injured and/or Debilitated Livestock*. Available at: www.vetmed.iastate.edu/sites/default/files/vdpam/Extension/Dairy/Programs/Humane%20Euthanasia/Download%20Files/EuthanasiaBrochure20130128.pdf Accessed April 20, 2015.

[3] Woods J., Shearer J.K. & Hill J. (2010) Recommended On-Farm Euthanasia Practices. In *Improving Animal Welfare: A Practical Approach*. Ed. Temple Grandin. Cambridge, UK: CAB International. pp. 186–213.

[4] Humane Slaughter Association (2007) Humane Dispatch and Disposal of Infant Calves: Technical Note No. 2. Available at: www.hsa.org.uk/downloads/technical-notes/TN2-calves-human-dispatch-disposal-HSA.pdf Accessed May 17, 2015.

[5] American Association of Bovine Practitioners (2013) *Practical Euthanasia of Cattle*. Available at: www.aabp.org/resources/AABP_Guidelines/Practical_Euthanasia_of_Cattle-September_2013.pdf Accessed May 17, 2015.

Anatomical Landmarks for Euthanasia

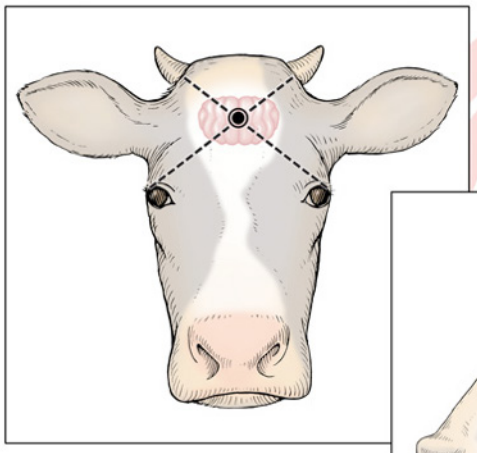


Figure J.1

Not between the eyes but above the eyes as illustrated.

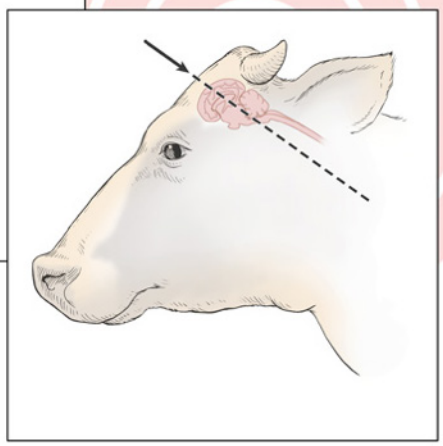


Figure J.2

Images reprinted with permission: J.K. Shearer and A. Ramirez, College of Veterinary Medicine, Iowa State University (2013) www.vetmed.iastate.edu/HumaneEuthanasia.

Figure J.1. Proper positioning of the firearm or penetrating captive bolt is essential to ensure a quick death. In mature cattle, the correct target is in the middle of the forehead at the intersection of 2 imaginary lines drawn from the outside corner of each eye to the opposite horn or equivalent site in polled or dehorned animals.

Figure J.2. The firearm or captive bolt should be angled so the projectile follows the angle of the neck or spine. Ensure the aim is perpendicular to the skull but tilted slightly to direct the shot to the lower brain.

Anatomical Landmarks for Euthanasia (continued)

Figure J.3

Figure J.3. For young calves, the correct target is in the middle of the forehead at the intersection of 2 imaginary lines drawn from the outside corner of each eye to the opposite horn or equivalent site in polled or dehorned animals. Because the forebrain of calves is underdeveloped (compared to older cattle) it is beneficial to direct the projectile towards the base of the skull.

When using a firearm: For all weight and age classes, the firearm must never be held in direct contact with the head. Shotguns loaded with appropriate bird shot or slugs are appropriate from a distance of 1–2 metres or yards.[1]

When using a captive bolt gun: For all weight and age classes, the device must be held in contact with the head using proper landmarks (figures J.1, J.2 and J.3). Restraint may be necessary to ensure proper application of the captive bolt gun. A rope halter is typically sufficient to restrain the head. Alternatively, sedation may be used (in consultation with the herd veterinarian) as a means of humane restraint.

[1] American Association of Bovine Practitioners (2013) *Practical Euthanasia of Cattle*. Available at: www.aabp.org/resources/AABP_Guidelines/Practical_Euthanasia_of_Cattle-September_2013.pdf.

Secondary Steps to Cause Death

Bleeding out (exsanguination)

Bleeding out can only be performed on an unconscious animal using a very sharp knife with a rigid blade at least 15 cm (6 in) in length.[1] For cattle, including calves, it is better to use a chest stick rather than a neck cut where possible.[2]

Figure K.1

Figure K.1. Bleeding out of an unconscious animal (previously stunned with captive bolt device or gunshot): Insert a sharp, single-sided blade, at least 15 cm (6 in) long into the neck below the neck bones and behind the jaw. Draw the blade forward to sever the major blood vessels (jugular vein and carotid artery) of the neck and the windpipe (trachea). Blood should begin to flow freely, and death occurs within minutes.

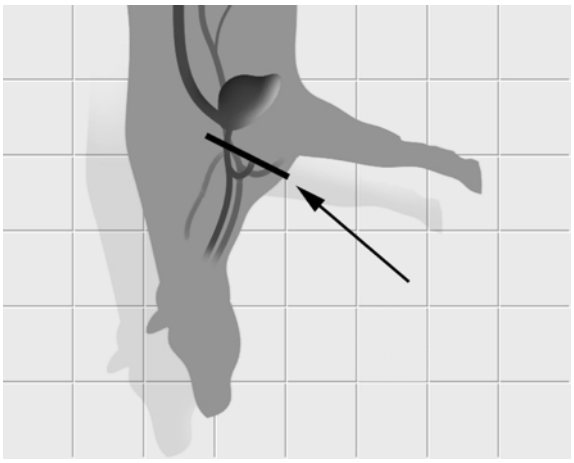


Figure K.2

Figure K.2 illustration used with permission of The Humane Slaughter Association. © The Humane Slaughter Association (www.hsa.org.uk)

Figure K.2. Chest stick of an unconscious animal (previously stunned with captive bolt device or gunshot): Sticking should be carried out by an incision made with a sharp knife in the jugular furrow at the base of the neck, the knife being directed towards the entrance to the chest to sever the major blood vessels close to the heart.[3]

Secondary Steps to Cause Death (continued)

Pithing

Pithing is the process of mechanically destroying the brain of an unconscious animal to prevent return to consciousness. Pithing is performed by inserting a rod or cane (approximately 1 m [3 ft] long x 5–10 mm [0.2–0.4 in] in diameter) through the hole in the skull created by the penetrating captive bolt device (Figure K.3).[3] Pithing rods are commercially available (e.g. www.pithingrods.com). The carcass is no longer safe for consumption due to possible contamination.[1] Producers are also advised to confirm that pithing will not affect dead stock removal.

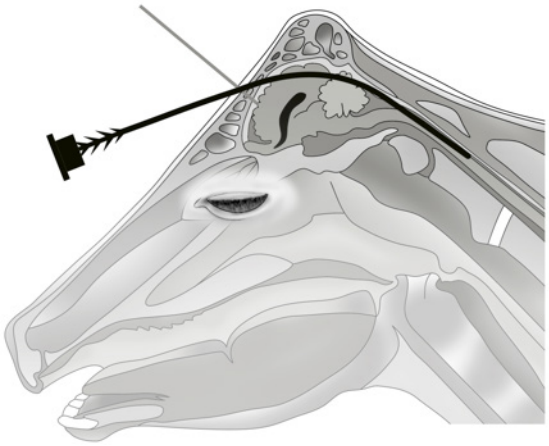


Figure K.3

Figure K.3. Pithing of a previously stunned animal. The line perpendicular to the animal's forehead shows the location for application of the captive bolt device. The curved pithing rod (shown only partially inserted) is inserted into the hole in the skull created by stunning with a penetrating captive bolt device. The rod is then manipulated, moving back and forth in approximately 5 cm (2 in) increments destroying the brain tissue and travelling through the brain to the top of the spinal cord, ensuring death.

Biosecurity Considerations:

Disposal of blood is an important consideration when bleeding out is used as a secondary step for humane euthanasia:

- Use sawdust, wood shavings, straw, or other absorbent material to contain the blood and dispose of the material as required by provincial regulations for deadstock disposal
- If infectious disease is suspected, non-porous surfaces (e.g. floors, walls, equipment) should be cleaned and disinfected after bleeding out
- If infectious disease is suspected and the surface is soil, gravel, sand, or similar material, remove the top 20 cm (7.9 in) of material where the blood spill occurred and dispose of it as required by provincial regulations for deadstock disposal. Allow the area to dry before allowing contact with other animals.

[1] American Veterinary Medical Association (2013) *AVMA Guidelines for the Euthanasia of Animals: 2013 Edition*. Available at: www.avma.org/KB/Policies/Documents/euthanasia.pdf.
[2] Anil M. H., McKinstry J. L., Gregory N. G., Wotton S. B. & Symonds H. (1995) Welfare of calves: 2. Increase in vertebral artery blood flow following exsanguination by neck sticking and evaluation of chest sticking as an alternative slaughter method. *Meat Science* 41: 113–123.
[3] Appelt M. & Sperry J. (2007) Stunning and killing cattle humanely and reliably in emergency situations – A comparison between a stunning-only and a stunning and pithing protocol. *Canadian Veterinary Journal* 48:529–534.

Resources for Further Information

General

- Charlton S.J. (2009) *Calf Rearing Guide*. Copies can be ordered through Context Bookshop: www.contextbookshop.com/books/calf-rearing-guide-practical-easy-to-use
- Calfcare.ca. www.calfcare.ca
- Canadian Veal Association (2017) *Verified Veal the Canadian On-Farm Food Safety Program for Veal*. Copies are available through Veal Farmers of Ontario (www.ontarioveal.on.ca) and Les Producteurs de bovins du Québec (www.bovin.qc.ca)

Calf Selection and Care of Newly Arrived Calves

- Quigley J. (2001) *Freezing and Thawing Colostrum*. Calf note #13. CalfNotes.com. www.calfnotes.com/pdffiles/CN013.pdf
- Quigley J. (2009) *Prolonged Colostrum Feeding and Calf Health*. Calf note #138. CalfNotes.com. www.calfnotes.com/pdffiles/CN138.pdf

Housing

Ventilation

- Calfcare.ca. *Ventilation*. www.calfcare.ca/housing/ventilation/
- House H. *Positive Pressure Air Tube Ventilation for Calf Housing*. Ontario Ministry of Food and Rural Affairs, Agdex #420/721. www.calfcare.ca/content/wp-content/uploads/2015/03/PPAT-Ventilation-for-Calf-Housing.pdf
- Nordlund K. *Practical considerations for ventilating calf barns in winter*. American Association of Bovine Practitioners, 40th Annual Conference, September 18, 2007. Vancouver, BC, Canada. www.vetmed.wisc.edu/dms/fapm/fapmtools/9ventilation/Practical_ventilating_calf_barns.pdf

Emergency Planning

- Department for Environment, Food and Rural Affairs (2004) *Farm Fires – Protecting Farm Animal Welfare*. www.gov.uk/government/uploads/system/uploads/attachment_data/file/69362/pb9326-farm-fires.pdf
- Ontario Ministry of Agriculture, Food and Rural Affairs. *Barn Fires – A Concern for Ontario Farmers. Questions and Answers to Barn Fires and Fires in Farm Structures*. www.omafra.gov.on.ca/english/engineer/facts/barn_fire.htm
- Ontario Ministry of Agriculture, Food and Rural Affairs (2011) *Reducing the Risk of Fire on Your Farm*. Publication 837. www.omafra.gov.on.ca/english/engineer/barnfire/toc.pdf
- Ontario Ministry of Agriculture, Food and Rural Affairs (last modified Jan. 6, 2017) *Barn Fire Prevention*. www.omafra.gov.on.ca/english/engineer/barnfire/fireprevention.htm
- Perth East Fire Department. *Farm Fire Safety Self-Assessment Form*. www.pertheast.ca/en/municipal-services/resources/SelfAssessmentFormPEFD_pub_0001.pdf
- The Alberta Environmental Farm Plan Company (2008) *Rural Emergency Plan*. www.ruralemergencyplan.com/

Feed and Water

- Calfcare.ca. *The Calf's Digestive System* www.calfcare.ca/calf-feeding/the-calf%e2%80%99s-digestive-system/
- Quigley J. (2001) *Methods of Feeding Water*. Calf note #077. CalfNotes.com. www.calfnotes.com/pdffiles/CN077.pdf

Resources for Further Information (continued)

Milk Feeding

- Bovine Alliance of Management and Nutrition (2008) *Guide to Calf Milk Replacers: Types, Use and Quality* www.aphis.usda.gov/animal_health/nahms/dairy/downloads/bamn/BAMN08_GuideMilkRepl.pdf
- Costello R. (2012) *Bloat in Young Calves and Other Pre-Ruminant Livestock*. Merrick's Inc. www.merricks.com/Images/Uploaded/TechLibraryPDF/pdf_Bloat_in_young_calves-2012.pdf
- Grober Nutrition (2009) *Clean-sterilized feeding utensils*. www.grobernutrition.com/grofacts/clean-sterilized-feeding-utensils
- Milk Products (2009) *Milk Replacer versus Whole Milk: Effects on Calf Performance*. www.certifeed.com/documents/articles/T001%2075e%20Milk%20Replacer%20vs%20%20Whole%20Milk.pdf
- Quigley J. (2001) *Rumen Acidosis and Rumen Drinking in Milk-Fed Calves*. Calf note #113. CalfNotes.com www.calfnotes.com/pdffiles/CN113.pdf

Solid Feeds

- Heinrichs J. & Ishler V. *Evaluating Forage Quality by Visual Appraisal, pH, and Dry Matter Content*. Penn State College of Agricultural Sciences DAS 00-7. www.dairyweb.ca/Resources/USWebDocs/ForageQuality.pdf
- Lang B. (last reviewed 2010) *Management of Grain-Fed Veal Calves*. Ontario Ministry of Agriculture, Food and Rural Affairs AgDex# 415/20. www.omafra.gov.on.ca/english/livestock/beef/facts/06-083.htm

Cold Weather Feeding

- Lang B. (last reviewed 2008) *Cold Temperatures Increase Feed Requirements for Calves*. Ontario Ministry of Agriculture, Food and Rural Affairs. www.omafra.gov.on.ca/english/livestock/veal/facts/info_colder.htm
- Philp L. (last reviewed 2008) *Feeding Pre-Weaned Veal Calves During Winter Months: Understanding Calf Metabolism and Milk Replacers*. Ontario Ministry of Agriculture, Food and Rural Affairs AgDex# 415/60. www.omafra.gov.on.ca/english/livestock/veal/feeding.html
- Quigley J. (2007) *Added CMR Feeding in Cold Weather*. Calf note #121. CalfNotes.com. www.calfnotes.com/pdffiles/CN121.pdf

Water Quality

- Olkowski A.A. (2009) *Livestock Water Quality: A Field Guide for Cattle, Horses, Poultry and Swine*. www5.agr.gc.ca/resources/prod/doc/terr/pdf/lwq_guide_e.pdf
- Quigley J. (2001) *Water*. Primer on Calf Nutrition Series #101. CalfNotes.com. www.calfnotes.com/pdffiles/CN101.pdf

Husbandry Practices

Handling and Restraint

- Farm and Food Care Ontario. Work Smarter Not Harder: Veal Handling with Bill Siemens [Video] www.youtube.com/watch?v=gvno25Rz_Vw
- Grandin T. (2008) Engineering and design of holding yards, loading ramps and handling facilities for land and sea transport of cattle. *Veterinaria Italiana* 44(1):235-245. www.researchgate.net/publication/43202698_Engineering_and_design_of_holding_yards_loading_ramps_and_handling_facilities_for_land_and_sea_transport_of_livestock.
- Grandin T. (Revised 2015) *Understanding Flight Zone and Point of Balance for Low Stress Handling of Cattle, Sheep, and Pigs*. www.grandin.com/behaviour/principles/flight.zone.html
- Grandin T. *The Principles of Low Stress Restraint – Cattle and Pigs*. www.grandin.com/restrain/rest.princ.html

Resources for Further Information (continued)

- Gill R. & Machen R. *Cattle Handling Pointers*. Texas A&M AgriLife Extension. www.effectivestockmanship.com/PDFs/Cattle-Handling-Pointers.pdf

Health Management

- Canadian Food Inspection Agency (last modified 2015-02-10) *Terrestrial Animal Diseases*. www.inspection.gc.ca/animals/terrestrial-animals/diseases/eng/1300388388234/1300388449143
- Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec. *Bonnes pratiques d'utilisation et d'entreposage des médicaments vétérinaires à la ferme*. www.mapaq.gouv.qc.ca/fr/Publications/Brochure_Bonnes_Pratiques_Medicaments_Veterinaires.pdf
- Nordlund K. *Housing Factors to Optimize Respiratory Health of Calves in Naturally Ventilated Calf Barns in Winter*. www.vetmed.wisc.edu/dms/fapm/fapmtools/8calf/Calf_Barn_Ventilation_Text.pdf
- Veal Farmers of Ontario. Assessing Calf Health. www.ontarioveal.on.ca/assessing-calf-health/
- Washington State University (January 2010) The top 11 reasons vaccines fail. vetextension.wsu.edu/wp-content/uploads/sites/8/2015/03/Top11ReasonsVaccinesFail_Jan20102.pdf

Transportation

- Canadian Food Inspection Agency (2007) *Livestock Transport Requirements in Canada*. P0586-07. www.inspection.gc.ca/english/anima/trans/transpoe.shtml
- Canadian Food Inspection Agency (2013) *Transportation of Animals Program Compromised Animals Policy*. www.inspection.gc.ca/english/anima/trans/polie.shtml[1].
- Canadian Food Inspection Agency (2020) *Health of Animals Regulations: Part XII (Transport of Animals)*. https://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._296/index.html.

[1] This reference is no longer valid, as the Compromised Animals Policy was archived when Part XII (Transport of Animals) of the Health of Animals Regulations was amended (effective February 20, 2020).

Participants

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Summary of Code Requirements

The following is a list of the Requirements within the *Code of Practice for the Care and Handling of Veal Cattle*. Refer to the cited Code section for further context about the Requirements.

SECTION 1 Roles and Responsibilities

- Managers must ensure that personnel are trained and supervised.
- Personnel working with cattle must have access to a copy of this Code of Practice and be familiar with, and comply with, the Requirements as stated in this Code.
- Neonatal calves must be assessed at least twice daily, and all other cattle must be assessed at least once daily, for general health and well-being.

SECTION 2 Calf Selection and Care of Newly Arrived Calves

2.2 Assessing Calf Health at Purchasing

- A written standard operating procedure detailing strategies to minimize the likelihood of purchasing unhealthy calves must be developed, made available to personnel involved in purchasing, and implemented.
- The written standard operating procedure must include not purchasing calves showing signs of an infected navel, illness, injury, or weakness when assessed at the dairy farm or auction. Signs of illness are provided in *Section 6.3 – Sick or Injured Cattle*.
- Calf selection and purchasing decisions must be made by competent personnel.

2.3 Managing Calves upon Arrival

- A written standard operating procedure detailing protocols for the care of newly arrived calves must be developed, readily available, and implemented.
- Upon arrival, calves must be provided access to water and individually assessed for general health and well-being.
- Prompt additional care must be provided to calves showing signs of heat or cold stress, illness, or injury on arrival. Signs of illness are provided in Section 6.3; signs of heat and cold stress are provided in Section 3.5.2.
- Steps must be promptly taken to rehydrate calves showing signs of dehydration on arrival. Signs of dehydration are provided in Appendix C.
- Refer also to the Requirements in *Section 7.2 – On Farm Loading and Unloading*.

SECTION 3 Housing

3.1 General Facility Design and Maintenance

- Housing systems and their components must be designed, constructed, and maintained in a manner that reduces the potential for injury and allows visual inspection of all cattle.

3.2 Young Animal Housing

Transition to Group Housing Methods - All Facilities

- Effective December 31, 2020, in all holdings:
  - Calves must be housed in groups as young as possible and not later than 8 weeks of age. Time in individual housing can only be extended past 8 weeks of age in exceptional circumstances for the health and welfare of individual calves on the advice of the herd veterinarian according to the herd health plan. Refer to *Section 6.1 – Herd Health Planning*.

Summary of Code Requirements (continued)

Transition to Group Housing Methods - New or Renovated Facilities

- Effective July 1, 2018, in all holdings which are newly built, substantially renovated, brought into use, or where existing stalls are modified:
  - Calves must be housed in groups as young as possible and not later than 8 weeks of age. Time in individual housing can only be extended past 8 weeks of age in exceptional circumstances for the health and welfare of individual calves on the advice of the herd veterinarian according to the herd health plan. Refer to *Section 6.1 – Herd Health Planning*.
  - If individual housing is used in the first 8 weeks of age, it must allow calves to turn completely around without assistance, groom, adopt sternal and lateral resting postures, easily stand up and lie down, and have visual and physical contact with other cattle. This can be achieved through stall design, stall size and/or the timing of when calves are grouped.

Tethering - Indoor Facilities

- Effective July 1, 2018, in facilities that are newly built, substantially renovated, brought into use, or where existing stalls are modified, those facilities must not be designed to permit tethering, and calves in those facilities must not be tethered.
- Effective December 31, 2020, tethering of calves is prohibited.

Existing Individual Stalls that Do Not Allow Lateral Resting

- Existing stalls where calves are housed untethered may be used after July 1, 2018, provided:
  - they are in good condition and allow calves to groom, adopt a sternal resting posture, easily stand up and lie down, and have visual contact with other cattle, and
  - effective December 31, 2020, calves are grouped as young as possible and not later than 8 weeks of age (as outlined under "Transition to Group Housing Methods - All Facilities").
- Existing stalls that meet the above Requirements (for "Existing Individual Stalls") and where less than 50% of each of the 2 side panels is solid (thus permitting physical and visual contact between calves) may be used for the lifetime of the stall.
- Effective July 1, 2033, existing stalls where more than 50% of the side panels is solid are prohibited.

Hutches and Outdoor Enclosures

- Calves in hutches and outdoor enclosures must be able to easily stand up and lie down, turn completely around without assistance, groom, adopt sternal and lateral resting postures, and have physical or visual contact with other cattle.
- Calves in hutches and outdoor enclosures must be able to stand fully upright without touching the top of the enclosure.
- Effective July 1, 2018, calves in hutches and outdoor enclosures must be grouped as young as possible and not later than 8 weeks of age. Time in individual housing can only be extended past 8 weeks of age in exceptional circumstances for the health and welfare of individual calves on the advice of the herd veterinarian according to the herd health plan. Consult *Section 6.1 – Herd Health Planning*.
- Effective December 31, 2020, calves in hutches and outdoor enclosures must not be tethered and calves in hutches must be able to access an area outside the hutch.

3.3 Cattle in Groups

- Cattle in groups must be able to easily stand up and lie down, turn around, groom, adopt sternal and lateral resting postures, and rest on the enclosure floor at the same time.

Summary of Code Requirements (continued)

3.4 Lighting

- Cattle must receive a light period (for at least 8 hours) and a dark period every day.
- In barns without natural light, supplemental artificial lighting must be provided daily for at least 8 hours.
- Light intensity, whether natural or artificial, must permit cattle to navigate their surroundings, feed, rest, and be monitored.
- Lighting (whether fixed or portable) must be available to enable detailed inspection of cattle at any time.

3.5.1 Ventilation

- Ventilation systems must be maintained in good working order.
- Air quality in facilities housing cattle must be maintained to provide cattle with fresh air, reduce the risk of heat stress, and prevent the buildup of noxious gases, dust, and moisture.
- Refer also to the Requirements in *Section 6.3.1 – Respiratory Illness*.

3.5.2 Temperature and Relative Humidity

- Temperature control systems (e.g. fans, heaters, thermostats) must be maintained in good working order.
- Protocols to mitigate heat and cold stress must be developed and implemented as part of the herd health plan. Refer to *Section 6.1 – Herd Health Planning*.
- Steps must be taken to mitigate heat and cold stress in cattle.

3.6 Flooring and Bedding

- Flooring must be designed and maintained to minimize slipping and injury.
- Corrective action must be taken if the number of animals with bursitis exceeds 15% in 3 consecutive cycles when assessed at shipping or once during the 2 weeks before shipping. Examples of corrective actions are provided in *Section 6.3.3 – Foot and Leg Health*.
- A dry, bedded area must be continuously available to calves in hutches, calves up to 16 weeks of age in an existing unheated building, and all cattle reared on solid concrete flooring.
- Newly built unheated barns must be designed to provide all cattle access to a bedded area.
- Bedding must be of a safe material and managed to provide comfort, insulation, dryness, and traction.
- For cattle in groups, bedded areas must be large enough to allow all cattle to lie down at the same time in sternal and lateral resting postures.

3.7 Facilities for Sick or Injured Cattle

- Farms must have the capability to segregate sick or injured cattle.
- Farms must have facilities to provide additional individual care.

3.8 Emergency Planning

- Emergency procedures, relevant to the farm's location and housing system(s), must be developed and communicated to personnel.
- A fire safety self-assessment must be completed annually. Refer to the sample listed in *Appendix L – Resources for Further Information*.
- For cattle that are reliant on electricity for ventilation or the provision of feed or water, alternative means of temperature regulation, ventilation, feeding, and watering must be available and implemented in the event of a power failure, mechanical breakdown, or other emergency.
- Alarms and fail-safe devices, including an on-farm alternate power supply, must be tested at least annually and corrected if a defect is identified.

Summary of Code Requirements (continued)

SECTION 4 Feed and Water

4.1 Feeding Management

- The ration must be in compliance with the *Feeds Regulations*.[1]
- Cattle must receive a ration that maintains health and vigour and promotes satiety.
- Neonatal calves must be assessed at least twice daily, and all other cattle must be assessed at least once daily, for signs of inadequate feed intake.
- Feed must be provided in ways that prevent competition resulting in injury or limited access to feed by some animals in the group.

4.1.1 Cold Weather Feeding

- Additional feed must be provided to meet increased energy requirements of cattle at risk of cold stress.

4.2 Milk Feeding

- Cattle must receive a milk ration (until weaning, if applicable) that maintains health and vigour and promotes satiety.
- Personnel must assist newly arrived calves not accustomed to milk feeding by bucket, trough or nipple.
- Milk replacer must be fed according to the label instructions or feed program developed in consultation with a nutritionist or veterinarian.
- Cattle must be fed milk or milk replacer at least twice a day (except during weaning, if applicable).

4.2.1 Iron Deficiency Anemia

- Cattle must have access to feed of quality and quantity to fulfill their nutritional needs.
- In milk-fed veal systems, a written protocol designed to prevent anemia must be developed, approved by a veterinarian, and implemented. The protocol must include blood hemoglobin monitoring (i.e. frequency and timing) and thresholds for iron supplementation.
- Through diet and/or supplementation, average blood hemoglobin concentration in a group must be maintained or corrected to at least 8.5 g/dl (5.3 mmol/l), with the exception of the last 4 weeks of rearing.
- If, in the last 4 weeks of rearing, average blood hemoglobin concentration in a group is found to be below 7.7 g/dl (4.8 mmol/l) corrective action must be taken.
- Individual veal cattle found to have a blood hemoglobin concentration below 7.2 g/dl (4.5 mmol/l) must receive iron supplementation.
- Corrective action must be taken for individual veal cattle showing signs of anemia.

4.2.2 Weaning

- Weaning must not be initiated until calves are at least 4 weeks of age.
- Weaning must be gradual over at least 5 days and must not be completed until calves are at least 6 weeks of age to minimize the risk of weight loss.
- Calves must be monitored throughout the weaning process and promptly assisted if showing signs of not coping with the transition to solid feed.

4.3 Solid Feeds

- Effective December 31, 2020, cattle must have access to solid feed from no later than 8 weeks of age.

[1] The *Feeds Regulations* are accessible through the following link (accessed: July 18, 2017) or by doing an Internet search for "Feeds regulations" www.laws-lois.justice.gc.ca/eng/regulations/sor-83-593/index.html

Summary of Code Requirements (continued)

4.3.1 Fibre

- If a significant number of cattle in a cycle are performing oral stereotypies or showing signs of ruminal acidosis, the feeding program must be adjusted in terms of provision of fibre and/or method of milk delivery.

4.4 Water

- Cattle must have daily access to clean water in quantities to maintain normal hydration and health taking into consideration factors such as environmental temperature and diet.
- Neither ice nor snow are suitable as a sole source of water.
- Water quality must be tested at least annually to ensure its suitability for cattle, and corrective action must be taken if an issue is identified.

4.5 Feeding and Watering Equipment

- Feeding and watering equipment must be in good repair, functional, and maintained free of manure and mold.
- Refer also to the Requirements in *Section 6.2.1 – Cleaning and Disinfection*.

SECTION 5 Husbandry Practices

5.1 Stockmanship Skills Related to Animal Welfare

- On-farm husbandry practices must only be done by competent personnel or under supervision of competent personnel.

5.2 Handling and Moving Cattle

- Animal handlers must be knowledgeable in cattle behaviour and use only quiet handling techniques acquired through training, experience, or mentorship.
- Abusive handling is unacceptable. This includes but is not limited to kicking, beating, dragging cattle, or slamming gates on cattle.
- Electric prods must never be used on calves that are less than 3 months of age.
- In animals older than 3 months, electric prods must not be used except when animal or human safety is at risk and as a last resort when all humane alternatives have failed and only when cattle have a clear path to move.
- In animals older than 3 months, electric prods must never be used on sensitive areas (belly, genitals, facial or anal areas) or repeatedly on the same animal.

5.3 Restraint

- Farms must have the capability (handling aids and/or personnel) to safely restrain cattle.
- Cattle must only be restrained for as long as necessary to carry out the procedure.
- Restraint equipment must be kept in good repair.
- Corrective action must be taken if the equipment or method of restraint causes injury to cattle.

5.4 Tail Docking

- Cattle must not be tail docked unless deemed medically necessary by a veterinarian for an individual animal. If deemed necessary, tail docking must only be performed by a veterinarian using anesthesia and analgesia.

5.5 Branding

- Cattle covered under this Code of Practice must not be branded. If additional identification is required for export, a method other than branding must be used.

Summary of Code Requirements (continued)

5.6 Disbudding, Dehorning and Castration

- Dehorning, disbudding, and castration must only be performed after training with a veterinarian and by competent personnel using proper technique and well-maintained, sanitary equipment.
- Disbudding, dehorning, and castration must be done at as early an age as possible. At any age, pain control must be provided in consultation with a veterinarian, including local anesthesia and systemic analgesia.
- Bleeding control must be used when dehorning.
- Cattle must be monitored after disbudding, dehorning, and castration to ensure there are no signs of infection or abnormal bleeding.
- Appropriate restraint (chemical or physical) must be used when disbudding, dehorning, or castrating cattle.

SECTION 6 Health Management

6.1 Herd Health Planning

- Producers must have a valid, ongoing veterinary-client-patient relationship with a licensed veterinarian and at least one on-farm visit per year by the veterinarian to assess overall herd health and welfare.
- A written herd health plan must be developed and implemented with veterinary and technical advice, readily available, and updated at least annually.
- Personnel must be trained in aspects of the herd health plan relevant to their assigned duties.

6.1.1 Health and Treatment Records

- Treatments (preventative and therapeutic), health problems, and disease outbreaks must be recorded.
- Mortalities (including reason for death or euthanasia, if known) must be recorded.
- The above records must be kept for at least 2 years (or longer, if needed for existing regulations).

6.1.2 Medications

- Pharmaceuticals and vaccines must be used according to the label or veterinary prescription.

6.2 Disease Prevention

- Vaccination options must be discussed with the herd health veterinarian as part of the herd health plan.

6.2.1 Cleaning and Disinfection

- Cleaning and disinfection procedures for all facilities housing cattle must be developed and implemented.
- Cleaning procedures for feeding and watering equipment must be developed and implemented.
- Prior to calf arrival, milk-mixing and milk feeding equipment must be cleaned and disinfected.
- Treatment tools including esophageal feeders must be cleaned and disinfected after each use.
- Reusable syringes must be cleaned and dried after each use.
- Manure and other wastes must be managed in a manner that promotes cattle health and welfare.

6.2.2 Pest Control

- Ongoing strategies to monitor and control pests and insects must be implemented.

Summary of Code Requirements (continued)

6.3 Sick or Injured Cattle

- The following Requirements also apply to the specific conditions in Sections 6.3.1 to 6.3.3.
- Personnel must be knowledgeable of normal cattle behaviour and signs of illness, injury and disease.
- Neonatal calves must be assessed at least twice daily, and all other cattle must be assessed at least once daily, for signs of illness, injury, and disease.
- Sick, injured, or diseased cattle must be monitored more frequently and receive prompt treatment and care, or be euthanized without delay. The treatment must be appropriate for the condition.
- For cattle that are not responding to treatment(s) according to the herd health plan, personnel must, without delay, obtain and follow veterinary advice or euthanize the animal.

6.3.1 Respiratory Illness

- Stocking density, ventilation, and bedding must be managed in a manner that provides air quality that is not harmful to cattle, and all reasonable steps must be taken to reduce the risk of respiratory disease.

6.3.2 Diarrhea

- Cattle showing signs of dehydration must receive fluids. The appropriate intervention depends on the severity of dehydration, as outlined in Appendix C.

6.3.3 Foot and Leg Health

- Corrective action must be taken if the number of animals with bursitis exceeds 15% in 3 consecutive cycles when assessed at shipping or once during the 2 weeks before shipping.

SECTION 7 Transportation

7.1 Pre-Transport Decision-Making and Fitness for Transport

- Before loading, each animal's fitness for transport must be individually assessed and evaluated within the context of each journey (e.g. weather conditions, anticipated total journey duration, and intermediate stops such as auction markets).
- Unfit animals must not be transported except for diagnosis or treatment and only if special provisions[2], including the recommendation of a veterinarian, are met. Refer to *Appendix G – Transport Decision Tree.*
- Compromised animals, if transported, may only be transported with special provisions directly (not through an auction or assembly yard) to the nearest suitable place where they can receive care or be promptly slaughtered or euthanized. Refer to *Appendix G – Transport Decision Tree.*
- Refer also to the Requirements in *Section 2.2 – Assessing Calf Health at Purchasing.*

7.1.1 Preparing Animals for Transport

- Personnel must be familiar with and follow federal and provincial transport regulations.
- On-farm preparations for transport must take into account the requirements for feed, water, and rest as described in federal and provincial regulations.

7.1.2 Arranging Transport

- Make arrangements in consultation with the transporter and other relevant parties that aim to avoid delays.
- Documentation must be completed in advance of shipping to avoid delays at inspection stations or other checkpoints.

[2] Section 139 (2) in Part XII (Transport of Animals) of the Health of Animals Regulations specifies four conditions that must be met when transporting animals for veterinary care (59). Refer to Appendix G – Transport Decision Tree.

Summary of Code Requirements (continued)

7.2 On Farm Loading and Unloading

- Loading/unloading facilities must permit the safe handling of cattle.
- Personnel involved in loading and unloading must be trained and knowledgeable and comply with the provincial and federal regulations for the movement and transport of animals.
- Personnel involved in loading and unloading must be knowledgeable in cattle behaviour and use only quiet handling techniques acquired through training, experience, or mentorship.
- Electric prods must never be used on calves that are less than 3 months of age.
- In animals older than 3 months, electric prods must not be used except when animal or human safety is at risk and as a last resort when all humane alternatives have failed and only when cattle have a clear path to move.
- In animals older than 3 months, electric prods must never be used on sensitive areas (belly, genitals, facial or anal areas) or repeatedly on the same animal.
- The truck/trailer must be strewn with material that is sufficient to absorb moisture (59).
- There must be no unprotected gap between the end of the ramp and truck/trailer (59).
- Ramps must have sides that are high enough to prevent cattle from falling off ramps (59).
- Ramps that are designed to reduce slips and falls must be used (59).

SECTION 8 EUTHANASIA

8.1 Evaluation for Transport

- Cattle must be euthanized without delay if they are suffering from pain or illness and:
  - do not have a reasonable prospect of improvement, or
  - fail to respond to treatment(s) within an appropriate timeframe, or
  - treatment will not be provided.
- A written euthanasia protocol detailing criteria for when to euthanize an animal and appropriate euthanasia method(s) for each phase of production must be developed with veterinary input, readily available, and implemented.
- Personnel who perform euthanasia must be trained in the protocol.

8.2 Methods of Euthanasia

- An acceptable method of euthanasia must be used. Refer to *Appendix I – Methods of Euthanasia*. Methods not listed in Appendix I (Table I.1) are considered unacceptable. Blunt force trauma to the head by means of anything other than the appropriate use of a captive bolt gun is unacceptable.
- The method of euthanasia must be quick, cause minimal stress and pain, and result in immediate loss of consciousness followed by death without the animal regaining consciousness.
- A secondary step to ensure death must be used when required according to the method of euthanasia. Refer to Appendices I and K.
- Every farm must have the equipment necessary for euthanasia or have ready access to such equipment.
- Personnel who perform euthanasia must have the required skills, knowledge, and abilities and be competent to perform the procedure.
- Equipment necessary for euthanasia, such as firearms or captive bolt devices, must be used, stored, and maintained according to the manufacturer's instructions to ensure proper function.
- Unnecessary handling and moving of cattle prior to euthanasia must not occur. Animals must not be dragged, prodded, or forced to move prior to euthanasia.
- When restraint is necessary, the safest, least stressful method available to facilitate effective euthanasia must be used, and euthanasia must be performed without delay following restraint.

Summary of Code Requirements (continued)

8.3 Confirmation of Unconsciousness and Death

- Cattle must be inspected for signs of consciousness immediately after the application of the euthanasia method.
- If any sign of consciousness is observed, the euthanasia procedure must be repeated immediately. Be prepared to perform a repeat procedure (or an alternate) if the first attempt does not render the animal immediately unconscious or if there are signs that the animal is returning to consciousness.
- Before moving or leaving the animal, the following 2 indicators must be used to confirm death:
  - absence of a heartbeat for at least 5 minutes and
  - lack of breathing for at least 5 minutes.
- Carcass disposal must be in accordance with federal, provincial/territorial and municipal regulations.