



NATIONAL FARM ANIMAL CARE COUNCIL
CONSEIL NATIONAL POUR LE SOIN DES ANIMAUX D'ÉLEVAGE

CODE OF PRACTICE



FOR THE CARE AND HANDLING OF

DAIRY CATTLE

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Preface

The National Farm Animal Care Council (NFACC) facilitated the development of the Dairy Code of Practice.

The NFACC Code development process aims to:

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

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 Codes are developed nationally as guidelines for the care and handling of the different species of farm animals. They are intended to promote sound management and welfare practices through recommendations and requirements for housing, management, transportation, processing and other animal husbandry practices. ***Requirements refer to either a regulatory requirement, or an industry imposed expectation outlining acceptable and unacceptable practices. Recommended best practices strive for continuous improvement and encourage a higher level of care.***

Codes represent a national understanding of animal care requirements and recommended best practices. They have been prepared by consensus amongst diverse groups interested or involved in farm animal care, welfare or research. Some Canadian provinces reference the Codes of Practice within their provincial animal welfare legislation.

A key feature of NFACC's Code development process is the inclusion of a Scientists Committee. It is widely accepted that animal welfare codes, guidelines, standards or legislation should take advantage of the best available knowledge. This knowledge is often generated from the scientific literature, hence the term "science-based".

In re-establishing a Code of Practice development process, NFACC recognized the need for a more formal means of integrating scientific input into the Code of Practice process. A Scientists' Committee review of priority animal welfare issues for the species being addressed provides valuable information to the Code Development Committee in developing or revising a Code of Practice. As the Scientists' Committee report is publicly available, the transparency and credibility of the Code process and the recommendations within are enhanced.

The 'Code of Practice for the care and handling of dairy cattle: Review of scientific research on priority issues' developed by the Dairy Code of Practice Scientists Committee is available on NFACC's website (www.nfacc.ca).

BRIEF HISTORY OF THE CODES

In 1980, the Canadian Federation of Humane Societies began coordinating the process of developing Codes of Practice for all livestock species. The Canadian Agri-Food Research Council then led the process from 1993-2003. NFACC was initiated in 2005 and facilitated consultations in 2006 that led to an updated Code development process. The updated Code development process was test piloted in 2007/2008, with the revision and finalization of a new Dairy Code of Practice.

The Canadian federal government, through Agriculture and Agri-Food Canada, has continued to provide financial support for Code of Practice development.



Introduction

Appropriate housing and husbandry are essential for the health and well-being of dairy cattle. The Dairy Code of Practice provides guidance to owners and employees for the welfare of cattle in their care. Animal handling is a key factor. Employers have an obligation to properly train employees.

Most husbandry systems impose restrictions on some freedoms of cattle. However, modern dairy farming should not cause unnecessary discomfort or distress. Producers should consider the following animal needs:

- shelter
- feed and water to maintain health and vigor
- freedom of movement and exercise for most normal behavior
- company of herd mates
- light during daylight hours and night-time lighting to enable inspection
- slip-resistant flooring
- veterinary care, diagnosis and treatment, disease control and prevention
- no unnecessary surgical alterations
- emergency preparedness for fire, mechanical breakdowns, and the disruption of feed supplies.

Producers meet the needs of their cattle under a variety of husbandry and management systems. Husbandry and housing are important determinants of appropriate cow numbers and densities within specific housing systems.

Whenever the use of technology increases on the farm, consideration should be given to its effect on animal welfare¹. Automation often controls temperature, ventilation, feed and water supply. These systems require alarms and backups to prevent cattle from suffering in the event of a mechanical failure.

All herd sizes require adequate human resources to ensure observation, care and the welfare of individual animals. Everyone handling dairy cattle should be familiar with their normal behavior. In addition, there must be adequate staff and time to inspect, service and maintain feeding, watering and milking equipment.

Facilities and resources must be available to supply safe housing, consistent, timely and reliable delivery of feed and water, disease prevention or treatment, individual animal identification and well-being of cattle. A sick, injured or distressed animal should receive prompt and appropriate medical treatment or nursing care. Neither financial cost nor any other circumstance should result in a delay in treatment or in the neglect of the animals.

The Dairy Code of Practice reflects current dairy management practices. It identifies welfare hazards, opportunities and methods to assure well-being. The authors recognize producers have more than one way to ensure welfare of their livestock.

In this Code the word cattle refers to dairy cattle of all ages. Where special provisions for animals under six months apply, the word calf has been used. This Code applies to dairy cattle (including bull calves and bulls) **on dairy farms**. It does not apply to associated industries (e.g., veal, beef, bull artificial insemination units).

¹ The National Farm Animal Care Council supports the following definition of animal welfare: Animal welfare means how an animal is coping physically, physiologically and psychologically with the conditions in which it lives. Physically includes pain and injury; physiologically includes environmental or disease stressors; and psychologically includes stressors that affect the senses, especially those that result in fear, fighting, distress or stereotypic behaviors due to either frustration or boredom. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment.

1

Accommodation, Housing, and Handling Facilities

1.1

Housing Systems

Housing conditions have a significant impact on the welfare of dairy cattle. Dairy cattle in Canada are housed according to their reproductive state, size, age, and lactation period using a variety of systems. Systems may include loose housing, free stalls, or tie stalls, each with or without outdoor and/or pasture access. Each type of housing system has advantages and disadvantages.

The welfare of dairy cattle depends not only on the specific housing system, but also on the details and management of a particular system. Details would include stall design, type of flooring, feeding system design, stocking density, cattle traffic patterns, location of water bowls or troughs, and handling system. Housing system design should take into consideration environmental and management factors (18).

At all stages of life, cattle should be housed under conditions conducive to health, comfort, nourishment and safety. The system should allow cattle to express innate behavior and be designed to avoid suffering from pain, fear, injury or distress.

1.1.1 Unweaned Calves

There are distinct advantages to housing unweaned calves in either individual pens, calf hutches, or in small groups. Most of the problems that affect calves in the first few weeks of life are associated with infectious agents or nutrition. However, individual housing may place limits on a calf's opportunity for exercise and social contact.

REQUIREMENTS

Calves must have a bed that provides comfort, insulation, warmth, dryness and traction. Bare concrete is not acceptable as a resting surface.

Housing must allow calves to easily stand up, lie down, turn around, adopt normal resting postures, and have visual contact with other calves.

The bedded area for group-housed calves must be large enough to allow all calves to rest comfortably at the same time.

RECOMMENDED BEST PRACTICES

- house unweaned calves individually or in well managed groups of less than 10 calves (9)
- provide bedding suitable for the housing system and seasonal conditions (e.g., straw offers more insulation than shavings for housing during cold months)
- provide calves with an opportunity to exercise and engage in normal social behavior
- position hutches to minimize environmental impacts (e.g., out of the wind, facing south, shaded areas).

1.1.2 Heifers, Milking Cows And Dry Cows

Heifers

Weaned heifers are generally housed in groups appropriate to their size. Heifers often have access to the outdoors. However, other housing practices are used as well (e.g., tethering). Little research has been done to examine the effects of housing on the welfare of weaned heifers (19).

Milking Cows

Choices in housing design and construction of facilities have a direct influence on cow comfort. Cow behavior and health can be used as gauges of cow comfort (2). The choices producers make in housing and management have an impact on the welfare of cows and hence the profitability of a dairy farm. Flaws in design or construction features can lead to welfare and health outcomes like traumatic injuries, sore feet, mastitis or metabolic diseases (3).

Fear-based behaviors can also lead to health and welfare issues. Cows may exhibit fearful or apprehensive behavior if:

- facilities are unsafe
- they experience pain as a result of facility features (e.g., improperly placed neck rails, poor flooring, obstacles)
- approached by a dominant cow or otherwise have their comfort zone invaded
- the cow does not cope well with features of the equipment or facility (e.g., lack of lighting, noise from air-operated gates, slippery floor surfaces) (3).

Cow walking patterns can also be used as indicators of cow comfort and to identify inadequacies of flooring and lighting. A healthy cow places the rear foot into the position vacated by the front foot on the same side. Slippery floors or dark conditions can alter a cow's walking behavior, placing greater stress on the outside claw (2).

The adoption of housing and management practices that reduce environmental risk factors for disease, and improve cattle health and welfare is encouraged (3).

Dry Cows

Dry cows are generally housed in groups and often have access to the outdoors via pasture or dry lots. However, other housing practices are used as well (e.g. tethering). Little research has been done to examine the effects of housing on the welfare of dry cows.

REQUIREMENTS

Housing must allow cattle to easily stand up, lie down, adopt normal resting postures, and have visual contact with other cattle.

Cattle must have a bed that provides comfort, insulation, warmth, dryness and traction. Bare concrete is not acceptable as a resting surface.

RECOMMENDED BEST PRACTICES (HEIFERS, MILKING AND DRY COWS)

- a. provide bedding even when using mattresses
- b. provide flooring with good traction to prevent slipping and falling
- c. provide non-abrasive flooring material where long travel routes may cause excessive claw wear
- d. provide soft, high traction flooring in areas where cattle stand for long periods
- e. provide restraint facilities for ease of management and handling (e.g., use self-locking stanchions or head gates at the feed bunk)
- f. provide opportunities for all cattle to exercise daily, if weather permits
- g. be aware of behaviors that indicate an animal is feeling unsafe or fearful and rectify issues
- h. inspect cattle for injuries that indicate hazards in barns (e.g., hair loss, abrasions or swellings on legs, necks or other body parts)
- i. observe animal walking patterns and monitor gait scores to assess floors for traction and surface conditions (e.g., level, abrasiveness, obstructions)
- j. repair housing defects (e.g., broken stall partitions, concrete or other protrusions)
- k. ensure access routes to the milking parlor are free of hazards and consistently illuminated such that the cattle can see where they are going
- l. design facilities to allow for easy moving and grouping of animals.

1.2 Facilities for Special Needs

Special needs facilities are an option for grouping animals to provide for the special needs of calving, transition or sick/infirm cows (20). Special needs facilities should be designed to minimize stress. Appropriate stocking density and design are needed within special needs facilities to minimize competition for limited resources (e.g., feed bunks, stalls). Cows like to engage in the same activity at the same time so overstocking is a source of frustration if this need cannot be met (8).

REQUIREMENTS

Special needs facilities must provide comfort, insulation, warmth, dryness and traction. Bare concrete is not acceptable as a resting surface.

1.2.1 Calving

Cows are especially active in the hours before calving, so factors affecting the comfort of the calving area are especially important. Well-designed maternity pens benefit the cow and farm workers who supervise calving.

Newborn calves are susceptible to disease so calving facilities should be designed and maintained to minimize disease transmission.

RECOMMENDED BEST PRACTICES

- a. ensure each cow has an individual calving pen or cows in group calving pens have adequate space to permit any required assistance during delivery, and provide a comfortable, dry, sanitary environment for the cow and calf

- b. monitor and manage cows in group calving pens for aggressive behavior
- c. provide softer, non-slip flooring, such as soft rubber or straw pack
- d. equip pens with a feeder and source of water
- e. keep pens well lit and properly ventilated, but with minimal draft.

1.2.2 Post-Calving (Fresh Cows)

Most welfare problems of dairy cows arise during the post-calving period. Fresh cows need special care and a less competitive environment, which may be best achieved if managed as a separate group for free stall barns. Physical barriers, including head locks and feed stalls, can help reduce competition at the feed bunk and increase feeding time, particularly for subordinate cows (10).

RECOMMENDED BEST PRACTICES

- a. ensure appropriate stocking densities are maintained (i.e., one cow per stall)
- b. minimize competition at the feed bunk (e.g., use physical barriers at the feed bunk (10), or provide at least 30in (76cm) of linear bunk space per cow (8))
- c. provide softer, non-slip flooring, such as soft rubber or straw pack
- d. minimize competition at the water troughs.

1.2.3 Sick And Injured Cattle

Provision should be made for the segregation, humane treatment and comfort of sick and injured animals.

REQUIREMENTS

Areas must be provided to segregate and treat sick and injured cattle.

RECOMMENDED BEST PRACTICES

- a. segregated areas should be sheltered and well-bedded
- b. provide softer, non-slip flooring, such as soft rubber or straw pack.

1.3 Ventilation, Temperature, and Humidity

Ventilation

Excessive ammonia levels can pose a health threat to both animal handlers and cattle. Proper ventilation is needed to remove ammonia from livestock buildings. While there are no guidelines related to acceptable levels of ammonia exposure for livestock, the National Institute for Occupational Safety and Health recommends a short-term exposure limit of 35 ppm and a time-weighted average concentration (for up to a 10-hour workday during a 40-hour work week) of 25 ppm for humans (16). All measures should be taken to keep ammonia levels within acceptable human health guidelines. There are several detection methods for ammonia, including litmus paper, detection tubes and electronic devices (1).

Temperature and humidity

Mature dairy cattle are generally able to tolerate low temperatures (down to -37°C) better than high temperatures (>25°C) (19). Heat stress is recognized as a major cause of production losses, and specific recommendations to address the issue continue to be developed. Lactating dairy cattle are more sensitive to heat, particularly high producing animals, since considerable metabolic heat is generated during lactation (6). Humidity levels and ventilation affect an animal's ability to cope with heat stress.

Cows are at risk of heat stress when temperature and humidity exceed a THI, (temperature-humidity index) of 72 (17) (see Appendix B - Temperature-Humidity Index Table for more detail). When the THI exceeds 72, additional management is required to keep cows cool.

Signs of heat stress include:

- reduced feed intake
- increased water intake
- changed metabolic rate and maintenance requirements
- increased evaporated water loss
- increased respiration rate
- increased body temperature (4).

While dairy cattle can tolerate colder temperatures if acclimatized, calves have a greater vulnerability in cold temperatures.

Animals that are acclimatized to a particular temperature range will face challenges if suddenly required to adjust to extremes of temperature outside of that zone of comfort (i.e., hot to cold or cold to hot).

RECOMMENDED BEST PRACTICES

- a. maintain adequate air quality and ventilation at all times (ammonia levels < 25ppm).
Ventilation systems should be capable of keeping the barn dry, removing stale air and strong odors, bringing in fresh air without drafts, and removing excess heat and moisture
- b. remove manure from livestock buildings frequently
- c. avoid exposing dairy cattle to sudden extremes of temperature wherever possible
- d. strive to avoid conditions of heat stress.

When facing cold stress:

- a. allow for increased feed energy intake during cold winter months
- b. protect cows from wind and moisture during winter months
- c. ensure that the relative humidity inside a housing facility does not exceed 75%.

When facing heat stress (THI exceeds 72):

- a. provide shade as the first step in any cooling system
- b. consider average temperature and relative humidity in deciding upon an appropriate cooling system (5)
- c. use evaporative cooling if environmental temperatures are near or above normal cow body temperature for a significant portion of the summer (5)
- d. use a combination of evaporative cooling, tunnel ventilation and feedline soaking for high temperature/high humidity conditions. Do not depend on evaporative cooling alone, except in very arid environments (5)
- e. keep milking parlors, holding pens and housing areas cool during hot summer periods (21).

1.4 Stall Design

Stall design is a very important factor in cow comfort that translates to more and better quality milk, healthier cows and fewer animal welfare concerns. Cows spend more than half of their time lying down, and get up and down frequently. Uncomfortable stalls result in less frequent or shorter duration resting periods. Injuries are associated with standing on concrete surfaces. Cows forced to stand for prolonged periods because of uncomfortable or too few stalls have reduced dry matter intake (DMI) and, as a result, lower milk production.

The dimensions and design of free stalls will differ depending on type of barn, configuration of the barn and where the stall is located (see Appendix C - Flowchart for Evaluating Free Stalls). A growing body of research has now demonstrated that the surface we provide for cows is one of the most important factors in designing a suitable lying area (11).

REQUIREMENTS

Build stalls to minimize hock and knee injuries and to allow cows to rise and lie down with ease.

RECOMMENDED BEST PRACTICES

- a. build stalls that provide adequate room for cows to lay comfortably for at least 12 hours per day
- b. ensure stalls are designed to minimize hock and knee injuries and allow cows to rise and lie down with ease (e.g., width and length, lunge space, brisket board location, neck rail height and location, length of chain). Refer to Appendix C - Flowchart for Evaluating Free Stalls and Appendix D - Flowchart for Evaluating Tie Stalls
- c. provide a comfortable resting surface in stalls (e.g., sand, deep bedding, mattresses with bedding) (11)
- d. ensure stalls are clean and dry.

1.5 Space Allowances

In loose housing systems such as free stall barns, increased cow density in the pen increases competition among cows for access to feed, water and stalls. Reduced space per cow at the feed bunk also increases competitive interactions among cows, reduces bunk attendance times and increases the time spent standing, waiting for access to feed. This might not cause problems for dominant cows but it does directly affect subordinate cows and heifers (12).

REQUIREMENTS

Stocking density must not exceed 1.2 cows per stall in a free stall system.

Resting areas must provide 120ft² (11m²) per mature cow in bedded-pack pens.

Provide adequate linear feed bunk space to meet the animals' nutritional needs.

RECOMMENDED BEST PRACTICES

- a. provide one stall for each cow in each group (12)
- b. provide 120ft² (11m²) per cow of resting area in a bedded-pack barn or a composted-pack barn
- c. provide 160ft² (15m²) per cow of resting area in individual cow maternity pens
- d. build wide alleys at feed bunks to allow cows to pass freely while other cows eat (approximately 14ft, 4.3m)
- e. provide traction on concrete in alleyways (e.g., darby or broom finish, grooved)
- f. clean alleyways regularly
- g. provide adequate linear feed bunk space (e.g., 24in, 60cm, per cow).

1.6 Bedding Management

To ensure cows spend time lying in stalls, it is important that the stall surface be comfortable. There are many alternatives that can be used for bedding and each has its advantages and disadvantages. Some choices would be clean sand, straw of various kinds, kiln-dried shavings or sawdust. To reduce the amount (depth) of bedding, mattresses can be utilized. Sanitation and bedding is essential for the calving area (11).

REQUIREMENTS

Bare concrete platforms or hard rubber mats without bedding are unacceptable surfaces for the humane housing of cows.

Daily removal of cow patties and use of generous amounts of bedding assures cleanliness of cows kept in bedded-pack pens.

RECOMMENDED BEST PRACTICES

- a. ensure stalls are routinely bedded and raked out
- b. add and level new sand routinely to sand-bedded stalls
- c. ensure the cows are lying in the stalls (not in the alleyways or standing in the stalls)
- d. observe the legs of the cows over pressure points for signs of abrasions, swelling or sores
- e. use straw choppers to decrease the amount of straw required
- f. ensure calves and cattle have a dry area to lie down (i.e., if your knees get wet in 25 seconds of kneeling in the rest area, then it is too wet)
- g. for bedded-pack pens, add clean, dry bedding (e.g., straw, sawdust, shavings) daily
- h. for bedded-pack pens, remove cow patties a few times each day to assure cow cleanliness and to reduce the quantity of bedding needed
- i. for composted bedded-pack pens, bed as needed and till twice per day
- j. for composted bedded-pack barns, assure excellent ventilation to reduce humidity
- k. for bedded-pack or composted-pack barns, provide access to pasture or an exercise yard to decrease labor and bedding requirements.

1.7 Feeding Area

To maximize milk production, it is important to maximize the Dry Matter Intake (DMI) of the cow. To achieve this goal, cows may be fed a Total Mixed Ration (TMR) or alternatively a component based ration. Regardless of the type of ration, it is important to ensure cows have easy access to fresh feed throughout the day and that water is easily accessible. Most feeding activity occurs around the time of fresh feed delivery and when cows return from milking. Cows are herd animals and if one feeds, often all want to feed. It is important that cows have ample space to eat and that dominant cows cannot restrict access to feeding areas. Stocking densities at the feed bunk that prevent all cows from feeding at one time increase aggressive competition and keep subordinate cows away from feed (13).

RECOMMENDED BEST PRACTICES

- a. in free stall and bedded-pack barns:
 - provide 24in (60cm) per cow fence line feeding space for mature milking cows
 - provide 30in (76cm) of linear bunk space for pregnant dry cows
- b. ensure feed surfaces are smooth and approximately 4-6in (10-15cm) higher than the standing area
- c. minimize competition at the feed bunk (e.g., use physical barriers at the feed bunk (10))
- d. ensure alleys at the feed bunk are at least 14ft (4.3m) wide to allow easy movement of cattle.

1.8 Milking Systems

There are three main types of milking systems: pipeline, parlors and robotics. All systems require attention to maintaining the equipment in good working condition. Minimizing stress on cows in the milking facility is very important. As there is a correlation between the amount of time standing on hard surfaces and lameness, minimizing the time cows spend away from feed and water and a comfortable stall is desirable.

REQUIREMENTS

Equipment must be inspected by a qualified person a minimum of every twelve months.

RECOMMENDED BEST PRACTICES

- a. ensure the milking system is comfortable for cows
- b. ensure the interior of the milking parlor is free of protrusions or other hazards and that gates and restraining devices of individual holding units operate safely
- c. ensure the facility is constructed to minimize the time cows spend away from feed and water and a comfortable stall
- d. ensure only milking equipment with an appropriate vacuum level, pulsation rate, and pulsation ratio is used
- e. ensure all milking equipment is maintained in good working condition
- f. ensure access routes are safe, illuminated and clean
- g. ensure the floor has good traction and is kept clean
- h. do not use electrified crowd gates.

1.9 Pastures, Yards, and Transfer Alleys

Pastures and yards

Pasture and yards can be used to provide cows with comfortable walking and lying surfaces. Pasture in particular has been found to reduce lameness rates. Time off hard (i.e., concrete) surfaces is an important factor for reducing lameness rates. Access to pasture or a yard can be used as one option for meeting this goal (15). Outside yards, laneways and pastures may be hazards during wet conditions. High traffic areas in yards, at feeders, on trackways and at gateways can be built with geotextile fabric techniques that reduce the loss of soil fines and allow water to drain. When built and maintained correctly, the areas decrease exposure to mud and contribute to clean cows.

Transfer alleys

Alleyway floors are generally made of concrete and are a place where manure accumulates, so frequent and thorough alley scraping is needed. Cows spending excessive time on hard surfaces under wet, manure-contaminated conditions are more likely to have infectious diseases of the foot (7). Cows benefit from rubber trackways on slatted floors in transfer alleys to and from the milking parlor.

RECOMMENDED BEST PRACTICES

- a. adjust cattle gradually to pasture feeding to prevent digestive problems
- b. use geotextile fabric to build laneways, trackways to pastures, high-traffic gateways, yards, or outdoor feeding areas
- c. provide cattle with pastures and yards that have good drainage
- d. ensure pastures and fences (including electric fences) are safe and properly maintained
- e. limit exposure to areas that may compromise animal health and safety
- f. provide clean water and supplementary feed on a daily basis to meet recommended nutritional needs if pasture forage is not adequate
- g. ensure cattle are provided with shade and protection from inclement weather if provided outdoor access (e.g., natural or artificial shade in the summer, or shelter in the winter, dry area during wet weather)
- h. provide handling facilities at pastures that are far from the barn
- i. inspect and maintain cow paths to minimize risk of injury and lameness (e.g., sharp protrusions)
- j. minimize the time cows spend in concrete alleyways
- k. flush and/or scrape alleyways 2-3 times per day.

1.10 Handling Facilities

It is important to have effective handling facilities. Equipment used for restraint and handling of animals should be effective without causing unnecessary stress or pain to the animals and should be designed for maximum safety of the handler. Appropriately designed handling facilities enhance animal welfare while reducing stress and injuries.

REQUIREMENTS

All dairy operations must be equipped for the safe restraint and handling of animals.

RECOMMENDED BEST PRACTICES (14)

- a. provide non-slip flooring
- b. ensure restraint devices are used properly. A slow steady motion with optimal pressure is calming to cattle. Excessive pressure that causes pain or discomfort should be avoided
- c. ensure the entrance to a restraint device is well lit
- d. ensure handling equipment is engineered to minimize noise. High-pitched sounds are more disturbing to cattle
- e. ensure restraint devices do not exert uncomfortable pressure points on an animal's body.

1.11 Breeding Bulls

Dairy bulls are dangerous. They are unpredictable and may be aggressive toward humans and other bulls. They must be handled with extreme caution. Handlers should never work alone with bulls. Bulls are generally fitted with a nose ring to ensure the safety of animal handlers.

Producers are not normally involved in semen collection on dairy bulls. However, in the few instances where this practice is done on farm, only trained and skilled individuals should complete the task.

REQUIREMENTS

Housing must allow bulls to easily stand up, lie down, adopt normal resting postures, and mount safely.

Bulls must have a bed that provides comfort, insulation, warmth, dryness and traction.

RECOMMENDED BEST PRACTICES

- a. ensure bulls have visual contact with other cattle and a minimum of 200ft², 18m², of pen space for mature bulls
- b. post warning signs at entrances to barns or fields
- c. build secure, sturdy housing
- d. design the bull pen so the bull can be fed, watered and restrained without anyone entering the pen.

2

Feed and Water

2.1 Body Condition Scoring

Body condition scoring (BCS) is a tool for determining if an animal is too thin, too fat or in ideal condition. Ideal BCS is a range and will vary depending upon stage of lactation (25). Appendix E - Body Condition Scoring Chart, provides information to assess BCS. Evaluators can assign quarter or half scores for animals that fall between two BCS units. For the purposes of this Code, all Body Condition Scores refer to the scale shown in Appendix E.

Cows should be at an ideal BCS at dry off and should be fed to maintain this condition until calving. Post calving (calving to 120 days) cows can be expected to lose 0.5 to 1 unit of BCS. Cows should not lose more than 1 BCS at any time. BCS should remain constant or begin to increase during mid-lactation. During late lactation cows should gain back the BCS lost during the post-calving period (22).

Cows that are too fat at calving ($BCS > 4$) are more prone to reproductive and metabolic diseases (e.g., difficult calving, retained placenta, cystic ovaries, uterine infections, ketosis, displaced abomasum, milk fever). Cows that are too thin at calving ($BCS < 3.25$) may not have sufficient body reserves to support high levels of milk production. Cows that lose more than 1 BCS experience reduced fertility, particularly if the loss is too rapid (22).

REQUIREMENTS

Producers must take corrective action for animals at a BCS of 2 or lower.

RECOMMENDED BEST PRACTICES

- a. use Appendix E - Body Condition Scoring Chart to regularly assess the BCS's of cows
- b. aim for the following ideal BCS ranges:
 - dry off, 3.25 to 3.75
 - calving, 3.25 to 3.75
 - early lactation, 2.50 to 3.25
 - mid-lactation, 2.75 to 3.25
 - late lactation, 3.00 to 3.50
 - growing heifers, 2.75 to 3.25
 - heifers at calving, 3.25 to 3.75
- c. employ corrective measures if more than 15% of the herd is above or below ideal BCS for their stage of lactation (25)
- d. keep records - identify animals that are too thin or too fat, ascertain the cause, and fix.

2.2 Nutrition and Feed Management

The nutritional requirements of the cow can be met using a variety of feed components. Cows can be fed a total mixed ration (TMR) or alternatively a component based ration.

Correct feed management is necessary to ensure good health and welfare. Cows are motivated to perform the same activity at the same time (e.g., feed, rest, ruminate). Cows also prefer to eat during daylight hours. Increased feeding frequency (at least twice per day) has been found to reduce the amount of total mixed ration (TMR) sorting that occurs and allows subordinate cows to access feed more often. Feed management programs that consider such behavioral needs are likely to reduce stress and aggressive behaviors within a herd, and have a positive impact on herd health and productivity (27).

Dairy cattle experience a number of transition periods (unweaned to weaned, dry to fresh) that present nutritional challenges for producers to meet. Feeding practices have a major impact on the overall health and welfare of cattle. Cattle that are not fed adequately will be hungry, and are also more likely to have reduced immune function (31).

REQUIREMENTS

Cows must receive a ration that is adequate for maintaining health and vigor.

RECOMMENDED BEST PRACTICES

- a. ensure the composition of diets reflects production level, reproductive stage, body size, housing and weather conditions
- b. test nutrient content of feed ingredients used
- c. ensure all rations have been balanced and that all feed components used in the ration are of good quality and free of spoilage
- d. Provide fresh feed to the cow daily when she is in the barn, except when fasting is required for medical reasons
- e. minimize factors that create stress or aggressive behaviors within a herd
- f. provide adequate linear feed bunk space (e.g., 24in, 60cm, per cow)
- g. keep a consistent feeding schedule
- h. provide adequate bunk access time
- i. ensure continuous access by pushing up feed in the bunk.

2.2.1 Unweaned Calves

The early nutritional status of calves has a marked influence on their later productivity. Colostrum feeding management has an important influence on the health and welfare of calves. The timing of first colostrum is particularly important since calves' ability to absorb colostrum is substantially reduced six to eight hours after birth. The ability of the calf to defend itself against infectious diseases is directly related to the amount (liters), quality (immunoglobulin level and hygiene), and timing of colostrum intake. The result of inadequate colostrum intake is a low concentration of circulating immunoglobulin (Ig) in the blood of the calf, a condition known as 'failure of passive transfer' (FPT) (23).

Calves are motivated to consume large volumes of milk (in excess of eight liters per day for Holsteins). Calves especially benefit from higher milk intakes during the first four weeks of life when their ability to digest solid feed is limited. The optimal amount of milk will vary with a number of factors. For example, under cold conditions, energy requirements increase, as the calves need this energy to generate body heat. Whole milk has a higher protein, fat, and digestible energy content, as well as a better balance of nutrients than some commercial milk replacers. Abrupt changes in diet, use of poor quality milk or milk replacer, and force-feeding of milk are all associated with health risks for the calf, including diarrhea (24).

Environment also has a substantial effect on calf growth. Calves will become cold-stressed at approximately $<10^{\circ}\text{C}$, requiring additional energy for maintenance and growth (34). Ad libitum nipple feeding of milk to dairy calves can allow for increased milk intake and weight gain with no detrimental effects on intake of solid food after weaning.

REQUIREMENTS

Calves must receive at least four liters of good quality colostrum within 12 hours of birth, with the first meal occurring as soon as possible, and no more than six hours after birth.

Calves must receive a volume and quality of milk or milk replacer to maintain health, growth and vigor.

Increase milk intake during cold stress.

RECOMMENDED BEST PRACTICES

- a. provide supplemental colostrum feeding even when calves are allowed to suckle from the cow (23)
- b. check the quality of colostrum with a colostrometer (23)
- c. measure immunoglobulin status in calves and feed colostrum to achieve a blood serum immunoglobulin concentration of 10mg/ml (23)
- d. use good hygiene practices when collecting, storing, and feeding colostrum (23)
- e. provide whole milk, equivalent milk replacer, or pasteurized waste / discarded milk to calves ad libitum (24)
- f. offer milk that is between $15\text{--}40^{\circ}\text{C}$
- g. offer calves a minimum total daily intake of 20% of body weight in whole milk (or equivalent nutrient delivery via milk replacer) until 28 days of age (e.g., approximately eight liters per day for Holstein calves)
- h. provide milk via a teat or provide a dry teat after milk feeding to satisfy the calf's motivation to suck (24)
- i. increase milk intake when the environmental temperature drops below 10°C (increase all fluid diets by 25% in winter months)
- j. wean calves by gradually reducing their milk over 5-14 days
- k. manage group feeding systems to reduce competition between calves (24).

2.2.2 Heifers

The nutritional management of dairy heifers requires a systematic approach to meet growth targets (34). Nutrition and growth rate affect age of first calving and lifetime productivity (26).

REQUIREMENTS

Heifers must receive a ration that is adequate for maintaining health, growth and vigor.

RECOMMENDED BEST PRACTICES

- a. test nutrient content of feed ingredients used
- b. ensure all rations have been balanced.

2.2.3 Dry Cows

Dry cows require changing levels of nutrients for maintenance and growth of the fetus. Rumen dynamics also change as cows move from a high concentrate diet during lactation to a high fiber diet early in the dry period, and then back to a high concentrate diet post-calving. A sudden introduction of grain post-calving can predispose cows to ruminal acidosis (28).

A well balanced diet during the dry period (including trace minerals and vitamin supplementation) has been shown to minimize the incidence of diseases and metabolic disorders that can occur as cows transition from pregnancy to lactation (33).

The National Research Council (NRC) guidelines for dairy cattle provide separate nutrient guidelines for far-off dry cows and pre-fresh transition cows, recognizing the nutritional changes that accompany these periods. Unique diets for these periods should “reduce the risk of metabolic disorders during early lactation and improve lactation performance” (29).

REQUIREMENTS

Dry cows must receive a ration that is adequate for maintaining health and vigor.

RECOMMENDED BEST PRACTICES

- a. test nutrient content of feed ingredients used
- b. ensure all rations have been balanced
- c. feed diets high in forage to reduce the risk of sub-acute and acute ruminal acidosis
- d. reduce the risk of sub-acute ruminal acidosis from high concentrate diets by ensuring the diet contains sufficient coarse fiber, by feeding total mixed rations.

2.2.4 Transition Cows

Cows that are transitioning from gestation to lactation have increased nutrient demands that must be met. Inadequate nutrition during this period can lead to both metabolic and infectious diseases, (e.g., ketosis, fatty liver, milk fever). These health issues impact negatively on animal welfare, reduce milk production, reduce reproductive performance, and shorten the animal's life expectancy.

REQUIREMENTS

Cattle must receive a diet that is adequate for maintaining health and vigor.

RECOMMENDED BEST PRACTICES

- a. test nutrient content of feed ingredients used
- b. ensure all rations have been balanced
- c. 'dense up' or concentrate the ration so that a lower Dry Matter Intake (DMI) of a high quality, palatable feed is possible, but avoid feeding large amounts of concentrates at one time, to lessen changes in rumen pH
- d. monitor DMI, rumen fill, body condition score and rectal temperature of transition cows
- e. reduce incidence of milk fever by using forage that is low in potassium or by feeding anions to induce mild acidosis in close-up dry cows
- f. increase concentrate gradually. Concentrate should be increased gradually (0.5 to 0.7kg per head per day) according to appetite
- g. utilize feed additives, propylene glycol and rumen-protected choline, to prevent ketosis and fatty liver disease. Feeding additional grain or using dietary supplements of fat are not successful strategies for preventing fatty liver disease
- h. ensure cows are neither extremely thin nor over-conditioned. The cow in early lactation will lose BCS. This should not be too rapid and should not exceed a loss of greater than 1 point over the first 120 days in milk (see Appendix E - Body Condition Scoring Chart).

2.3 Water

Water availability and quality are extremely important for animal health and productivity (30). If the water supply is interrupted for more than 12 hours, an alternate watering method should be used. One lactating cow will drink between 80-120 liters per day.

Water quality (e.g., palatability) affects water consumption. Cows will limit their water intake to the point of dehydration if the quality of drinking water is compromised (e.g., polluted by algae, manure or urine) (32).

REQUIREMENTS

Cattle must have access to palatable and clean water in quantities to meet their needs.

RECOMMENDED BEST PRACTICES

- a. have an alternative watering system in the event of an interruption in water supply
- b. construct and locate watering systems so that they are protected from fouling and freezing
- c. keep water troughs, bowls, and nipples clean and check them at least once daily to ensure they are dispensing water properly
- d. situate watering points at walkthrough areas (cross-over alleys)
- e. provide water with a depth of at least 4in (10cm) in water troughs and mount troughs at a height comfortable for the cow to drink (24-30in, 60-75 cm)
- f. test water quality annually and occasionally test for stray voltage.

3

Health and Welfare Management

3.1

Relationship of Animal Health to Animal Welfare

Diseases are often measured by their economic impact but animal health also is a component of animal welfare. Factors that can affect animal health are nutrition, ventilation, housing and management practices. Pain and discomfort caused by health issues impact an animal's well being such that good animal welfare requires good animal health (52).

Records on the incidence and prevalence of various diseases are becoming more readily available because of on-farm record keeping systems. Producers need to be able to correctly recognize specific animal health issues early in order to enhance animal welfare, as well as the animal health status of their herd.

Prevention is always preferred to treatment. Herd Health Management and biosecurity protocols can help prevent and contain diseases.

RECOMMENDED BEST PRACTICES

- a. follow current biosecurity protocols on farms to prevent disease transmission (e.g., Johne's disease, Bovine Leucosis). Refer to Appendix K - Resources for Further Information.
- b. participate in continuing education activities related to animal health and welfare
- c. keep accurate and detailed animal health records.

3.2

Stockmanship Skills Related to Animal Health and Welfare

Management practices used on dairy farms are known to have a significant impact upon animal health, animal welfare, and milk quality. It is understood that certain best management practices (e.g., teat dipping to reduce somatic cell counts) are important for maintaining animal health. However, how well those best management practices are implemented is of equal importance.

Attributes identified that contribute to the effective implementation of best management practice include:

- positive attitude of producers and farm employees toward milking and the animals
- detail oriented (e.g., good record keeping, knowledge of individual animals) (42).

Human-animal interactions affect the productivity and welfare of dairy cattle (45). Not only is the technical competence of animal handlers important but also the way in which they interact with cattle. A negative belief about cows increases the likelihood of aversive handling, which results in a fearful animal. Fear leads to stress, reduced welfare, and reduced productivity (57).

Differences between the level of productivity and welfare of dairy cattle on farms may partially be explained by differences in how animals are handled:

- cattle with insufficient human contact will exhibit fear of humans
- gentle handling of young animals will habituate them to humans and reduce fearfulness in adulthood
- hitting, shouting, tail twisting, electric prods and kicking are aversive to cattle (58).

Aversive procedures may at times be necessary (e.g., injections). Animal handlers can avoid this leading to a learned fear of humans by ensuring that a sound foundation of positive contacts has been established (60).

Identifying what cattle perceive as positive interactions is more challenging. Brushing, patting, and speaking in a gentle voice may not be rewarding to cows unless these actions are associated with something cattle find inherently rewarding (e.g., food, head scratching) (59).

Fear of humans is an important factor affecting milk yield in cows (45). Making handlers aware of the negative effects of poor handling, along with providing them with the information and tools they need to do a good job, can increase job satisfaction and performance (61).

People that effectively use low-stress cattle-handling techniques will reduce the detrimental effects of handling stress on animal performance and health, due to fear (44).

RECOMMENDED BEST PRACTICES

- a. have best management practices in place
- b. ensure farm staff are trained in, and apply, best management practices
- c. ensure cow health is monitored regularly
- d. ensure that the interactions that calves and younger cattle have with people are rewarding rather than aversive
- e. avoid behaviors that cattle find aversive (e.g., hitting, shouting, aggressive tail twisting, electric prods and kicking)
- f. ensure animal handlers understand the behavioral principles of animal handling and understand how their attitudes and behavior impact dairy cattle welfare and productivity
- g. ensure equipment, holding, and handling facilities are in place and in good working order
- h. train animal handlers in low-stress cattle handling techniques.

3.3 Grouping and Animal Movement

Moving cows into new pens is stressful as confrontational behavior increases until new social hierarchies are developed. This is of special concern for low ranking cows. While moving animals into different groups within a dairy facility is inevitable, it should be limited to minimize the associated stress.

Factors affecting the size and number of cow groups within a dairy include: feeding strategies, reproductive status, labor efficiency and considerations around cow comfort (63). The number of cows in a group also is related to the capacity of the milking parlor and its holding pen. The number of cows in a pen is often a multiple of the capacity of the parlor for a single swing at milking. In general, group sizes are less than 100 cows.

RECOMMENDED BEST PRACTICES

- a. avoid moving single animals into new groups if possible. When moving single animals move them when other animals are otherwise engaged (e.g., feeding)
- b. move three to five animals with established social bonds (39)
- c. avoid overstocking
- d. limit the number of pen moves.

3.4 Veterinary Care and Herd Health Management Programs

Animal health is an integral component of animal welfare. Producers should maintain the health of their animals through appropriate nutrition, appropriate housing, disease prevention, detection, and treatment. Veterinarians should play a key role in helping producers to meet these animal health obligations.

A Veterinarian/Client/Patient Relationship (VCPR) (35) exists when all of the following conditions have been met:

- the veterinarian has assumed the responsibility for making clinical judgments regarding the health of the animal(s) and the need for medical treatment, and the client has agreed to follow the veterinarian's instructions
- the veterinarian has sufficient knowledge of the animal(s) to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s). This means that the veterinarian has recently seen and is personally acquainted with the keeping and care of the animal(s) by virtue of an examination of the animal(s) or by medically appropriate and timely visits to the premises where the animal(s) are kept
- the veterinarian is readily available for follow-up evaluation, or has arranged for emergency coverage, in the event of adverse reactions or failure of the treatment regimen.

An effective Herd Health Management Program contributes to animal well being by providing a strategy for disease prevention, rapid diagnosis and effective treatment.

REQUIREMENTS

Producers must establish a working relationship with a practicing veterinarian (VCPR).

RECOMMENDED BEST PRACTICES

- a. work with the herd veterinarian to develop a Herd Health Management and Biosecurity Program (refer to Appendix K - Resources for Further Information)
- b. have a Herd Health Management Program which includes the following components:
 - vaccination protocols
 - observation of all animals for injury or signs of disease
 - complete, accurate, and reliable record keeping
 - protocols for the prevention, detection, and treatment of disease or injury, including lameness
 - protocols for pest control

- training programs and protocols for animal handlers
- individual animal identification and treatment records to ensure no animal is shipped prior to drug withdrawal times
- ability to isolate new arrivals to the herd
- calving protocols.

3.5 Lameness

Lameness among dairy cows is widely recognized as one of the most serious (and costly) animal welfare issues affecting dairy cattle (40). Lameness results in decreased mobility, reduced Dry Matter Intake (DMI), decreased production, impaired reproduction, debilitated cows and early culling. Some causes of lameness are related to genetics and infectious disease but the majority of problems are related to nutrition and the environment that the cow lives in. Prompt recognition, diagnosis and early treatment minimize animal welfare concerns and allow the cow to produce to her potential. The majority of cases of lameness in dairy cows involve lesions of the claw.

Risk factors include:

- high-grain rations causing rumen acidosis
- lack of effective fiber in the ration
- standing on concrete, especially wet and rough
- infrequent hoof trimming
- uncomfortable, poorly designed stalls
- physical hazards
- contagious diseases such as digital dermatitis
- unsanitary conditions
- poor management of transition cows
- unbalanced genetic selection (corkscrew claw).

REQUIREMENTS

Lame cows must be diagnosed early and either treated, culled or euthanized. See Appendix F & G for more details.

RECOMMENDED BEST PRACTICES

- a. use Appendix F - Gait Scoring System for Dairy Cows to assess lameness
- b. routinely observe cows for lameness and aim for prevalence of:
 - <10% for obvious or severe lameness (e.g., Level 3 or 4 - Gait Scoring System) or,
 - <10% for sole ulcers and <15% for digital dermatitis (40)
- c. ensure alleyways are cleaned daily
- d. ensure stalls are comfortable and that cows are lying in the stalls
- e. minimize exposure to bare concrete floors
- f. routinely trim the hooves on all cows as needed (e.g., twice per year)
- g. balance the ration to prevent sub-clinical rumen acidosis
- h. avoid feeding large amounts of concentrate in a single feeding
- i. routinely use a foot bath and change routinely to maintain effectiveness (at least once daily).

3.6

Mastitis

Mastitis is an inflammation of the mammary gland caused by bacterial infection. Most bacteria enter the udder through the teat orifices.

Mastitis is a production, food quality, and safety issue. From an animal welfare perspective, it can be a local painful infection for the cow that can, depending on the type of infection and the resistance of the cow, also cause systemic illness resulting in fever, dehydration, depression and even death.

Mastitis is recognized as a clinical infection when flakes or clots are seen in a milk sample, the infected quarter is swollen and/or hot to the touch, the milk appears thin, discolored or watery and/or the cow has a rapid pulse and loss of appetite. More often however, mastitis is subclinical. This means that infection, tissue damage, milk damage, and production loss occurs without causing visible changes in the milk, the affected quarter or the cow. Somatic cell counts are used to monitor the prevalence of subclinical mastitis.

For the development of strategic prevention programs for particular herd mastitis, infections are classified as arising from either cow or environmental sources. Mastitis caused by infections whose sources are the cows themselves is called contagious mastitis. Contagious mastitis spreads from infected cow's udders and teat skin to uninfected cows at milking time (46). *Staphylococcus aureus* and *Streptococcus agalactiae* are the most common bacterial causes of contagious mastitis (47). Environmental mastitis occurs when bacteria from manure contaminating the cow's environment enters the teat ends. Cows are at risk of environmental infections at all times during the day and year; hence new infections are not just associated with milking practices (46).

Mastitis prevention programs are developed for a herd using knowledge of the mastitis infections the herd is most at risk of, the milk quality objectives, the facility design, current management practices, concurrent diseases, environmental conditions, and labor availability. Prevention of new infections and elimination of existing infections are the main objectives of a mastitis prevention program.

Goals are developed by a producer in conjunction with their herd veterinarian, often in a stepwise fashion, to develop an approach to improvements in animal health and milk quality.

Overall goals to strive for are:

- maintenance of a bulk tank milk SCC below 200,000 cells per ml (62)
- reduction in the occurrence of clinical mastitis to two or fewer clinical cases per 100 cows per month (<24% of cows affected per year) (50)
- eradication of *Streptococcus agalactiae* from the herd
- maintenance of a low culling rate due to mastitis.

Mastitis infections can be prevented by reducing exposure of the teat ends to bacteria. Appropriate practices should be implemented depending on the source of the bacteria identified in herd culture programs.

RECOMMENDED BEST PRACTICES

- a. consult with the herd veterinarian to develop a mastitis diagnostic, monitoring and control program.

To prevent contagious mastitis infections:

- a. dip each teat of all cows after every milking with an approved (DIN) teat dip
- b. ensure dip covers the area of the teat skin that had contact with the teat cup liner (51)
- c. ensure infected cows are milked last or separately from uninfected cows
- d. implement a monitoring system using individual cow somatic cell counting and strategic milk culturing as recommended.

To prevent environmental mastitis infections:

- a. clean and dry teats before milking
- b. implement a bedding routine to keep stall beds clean and dry
- c. use adequate amounts of bedding to keep cows clean, dry, and comfortable (46)
- d. add new, clean, dry bedding to stall backs frequently
- e. keep alleyways, crossovers and walkways free of manure and mud
- f. design stalls to give cows 12 hours of rest time (37)
- g. use a stocking density of at least one stall per cow
- h. have all cows calve in a clean, dry maternity pen
- i. protect the teat orifices of dry cows during the dry period
- j. feed a ration that prevents stress on the immune system of fresh cows
- k. record clinical cases of mastitis and treatment as they occur
- l. assess clinical records of mastitis cases to detect herd-specific risk factors for environmental mastitis (65).

To eliminate existing contagious and environmental infections (reducing prevalence):

- a. treat cows at the end of lactation with an approved intramammary dry cow preparation, as recommended by your herd veterinarian
- b. treat cows shown to have antibiotic susceptible infections during lactation, as recommended by your herd veterinarian
- c. cull cows with incurable cases of mastitis.

3.7 Health Conditions around Calving

The 'transition phase' begins three weeks prior to calving and ends three weeks after calving (54). The optimum management of the close-up dry cow is essential to ensure that the cow can achieve her potential in the next lactation. The main objective of the close-up period is to maintain and maximize Dry Matter Intake (DMI).

The transition phase is critical because cows must cope with a number of stressors including:

- social regrouping
- physical, hormonal, and physiological changes associated with calving and the onset of lactation
- a sudden increase in nutritional requirements.

These stressors likely contribute to the occurrence of several transitional diseases including retained placentas, metritis, ketosis, fatty liver, displaced abomasums, and milk fever. Further research is needed regarding how to prevent transition phase diseases through housing, nutrition and management (55).

Delivery without complication is the norm in cattle; however, cows that have difficulties (dystocia) should be assisted by a competent person maintaining high standards of hygiene and using proper equipment. Calving difficulties are associated with a higher incidence of stillbirths and health problems in surviving calves (53).

A separate calving area allows for easier observation and management of cow and calf. However, producers with larger dairy farms are successfully managing group calving pens.

REQUIREMENTS

The calving area must be kept clean prior to, and after, delivery of the calf to minimize the risk of disease or bacterial challenges to the calf's immune system.

RECOMMENDED BEST PRACTICES

- a. monitor cows close to calving at regular intervals (e.g., every four hours)
- b. move close-up animals into the calving area prior to calving
- c. give appropriate assistance where an animal is found having difficulty giving birth
- d. dip calf navels in disinfectant as soon as possible after birth, and repeat daily until the umbilical cord is dry
- e. ensure proper use of calf pulling equipment
- f. provide food, water, and shelter from adverse weather for cows that are unable to stand as a consequence of difficult births or milk fever. Such cows should be placed on bedding or on soft ground.

3.8 Calves

Generally, dairy calves are separated from their mothers shortly after birth. There are benefits to both calf and dam by allowing the pair to bond. Allowing the calf to spend a longer period of time with the dam may result in lowered morbidity and mortality in the calf; however, separation stress to both the cow and calf will be higher the longer they are together. Cow health is generally improved by allowing the calf to suckle (related to oxytocin effects on the post partum uterus). Whether the calf is removed immediately or allowed to suckle the cow, it is important to ensure that the calf receives adequate colostrum (41).

RECOMMENDED BEST PRACTICES

- a. monitor calf body temperature for two weeks following birth
- b. reduce separation distress by either removing the calf shortly after birth or by using a two-step weaning process (41)
- c. monitor calves closely for signs of illness and treat promptly.

3.9 Sick, Injured, and Cull Animals

The comfort and humane treatment of sick, injured or cull animals are priorities. An effective Herd Health Management Program (see Section 3.4) will identify sick or injured animals early and enable the development of protocols for the treatment or timely culling (fattening for slaughter, immediate slaughter or euthanasia) of those animals. Of special concern are downers (non-ambulatory animals) or severely debilitated animals. Prompt decision-making and action are vital to ensure the welfare of special needs animals.

Animal owners, veterinarians and laboratories are required to immediately report the presence of an animal that is infected or suspected of being infected with a reportable disease to a CFIA District Veterinarian. Control or eradication measures will be applied immediately. Reportable diseases are listed in the Health of Animals Act and Regulations (<http://laws.justice.gc.ca/en/showtdm/cs/H-3.3>) and are usually of significant importance to human or animal health or to the Canadian economy. Anthrax, Bovine Spongiform Encephalopathy and Rabies are examples of reportable diseases applicable to cattle.

REQUIREMENTS

Cattle that are sick, injured, in pain or suffering must be provided prompt medical care or be euthanized.

Cattle with untreatable conditions, not responding to treatment, or not fit for transport must be promptly euthanized.

Appropriate authorities must be advised of any suspect or confirmed cases of reportable disease.

If animals are culled, drug withdrawal times must be observed.

Apparatus to lift and support recumbent animals must be used with care and according to manufacturer's specifications. Animals must be able to breathe freely and not suffer unnecessary discomfort.

RECOMMENDED BEST PRACTICES

- a. have sheltered, segregated and well-bedded sick pens for cattle that are sick, injured or recovering from surgery
- b. monitor sick, injured or recovering animals at least twice daily
- c. consult with the herd veterinarian regarding treatment
- d. identify decision trigger points for culling including:
 - when to stop treating an animal if it is not responding
 - the point past which, if an animal is not meeting target requirements (e.g., milk production), it is to be culled.

3.10 Manure Management and Cleanliness Scoring

Cleanliness and proper waste management provide animals with a clean, dry and comfortable environment. Manure and dirty bedding are sources of contamination that can lead to infected mammary glands (i.e., mastitis). A regular schedule of disinfection, manure removal and bedding changes minimizes pathogens in the environment and helps to control the spread of disease. A clean environment also offers better traction for cows when walking.

Cleanliness scoring of dairy cattle is a tool for measuring environmental cleanliness and the relative risks for high somatic cell counts and diseases like mastitis. The lowest incidences of mastitis and somatic cell counts occur in herds with clean cows and bedding (38).

REQUIREMENTS

Producers must remove manure from alleys and beds to keep cows clean.

RECOMMENDED BEST PRACTICES

- a. scrape or flush traffic areas and walkways daily
- b. clean individual free stalls at every milking
- c. use straw, sand, sawdust or other suitable bedding materials to maintain sanitary conditions for animals
- d. use a cleanliness scoring system to assess environmental contamination (see Appendix K - Resources for Further Information, for links to available options) and aim for recommended target rates of cleanliness.

3.11 Pest Control

Pests can transmit diseases and cause discomfort. Pest control is one component of an overall dairy herd health program.

RECOMMENDED BEST PRACTICES

- a. implement procedures to monitor and control pests including, flies, mosquitoes, lice, mites, ticks, grubs, fleas, rodents, skunks, and pest birds.

3.12 Genetics

Improved genetics and environmental factors have allowed for a steady increase in milk production per cow. However, increased milk production, has put additional demands on the cow, leading to an increased incidence of disease and higher rates of involuntary culling (56). There is a complex interaction between genetics, husbandry, and environment that affects an animal's health and welfare status. However, it is important to recognize the impact that selection for high productivity can have on an animal's overall well being.

Genetics companies develop genetic evaluations for several traits in dairy breeds, including many functional traits (e.g., herd life, calving ability, somatic cell score, conformation traits) (64). The choice of bulls may affect the health and welfare of the herd.

RECOMMENDED BEST PRACTICES

- a. select bulls for traits that contribute to animal welfare (e.g., calving ability, mastitis resistance, foot and leg conformation).

3.13 Emergencies and Safety

Emergency management protocols provide for the welfare of dairy cattle in the event of an emergency.

RECOMMENDED BEST PRACTICES

- a. implement emergency management protocols
- b. ensure all staff are familiar with emergency procedures
- c. ensure newly designed or renovated housing facilities are constructed to facilitate emergency evacuation
- d. consider emergency management protocols when designing or renovating facilities
- e. develop a plan for evacuating cattle in the event of an emergency. The plan should include consideration of emergency housing, transportation and personnel
- f. install an effective alarm system for fire and power failure. Fire extinguishers should be available in all buildings
- g. ensure back up generators are available and functional
- h. employ corrective measures in the event of stray voltage problems
- i. ensure electrical panels are not accessible to cattle.

3.14 Electric Trainers in Tie-Stall Barns

The proper placement of trainers contributes to stall and cow cleanliness and udder and claw health. Incorrectly positioned trainers prevent some cows from showing strong signs of heat, making heat detection difficult and contributing to poor reproductive performance (48). Electric trainers will train cows to step back when arching their backs for defecation or urination. The purpose is to position cows so they defecate or urinate in the gutter, rather than the stall bed. The correct location above the chine is slightly ahead of the point where the back begins to arch when a cow defecates or urinates.

REQUIREMENTS

Energizers for electric trainers must not exceed 2500 volts.

Electric trainers must have a height adjustment.

Electric trainers must be located over the chine when the cow is standing with her hind feet near the gutter curb.

RECOMMENDED BEST PRACTICES (36)

- a. ensure electric trainers do not restrict the normal eating, standing or lying behavior of cows
- b. ensure trainers do not restrict access to feed or water
- c. raise the trainer bow to a higher position when a cow is expected to be or is in heat
- d. ensure trainers have a secure attachment so they do not fall upon a cow and cause abusive damage
- e. adjust the distance between the trainer bow and the top line of the cow to a minimum of 2in (5cm) for training (usually a 24-hour training period is adequate) (49)
- f. adjust the distance between the trainer bow and the top line of the cow to 4in (10cm) for maintenance
- g. ground the energizer to a rod outside the barn and not to any stabling within the barn.

4

Husbandry Practices

4.1 Handling, Moving, Restraining, and Treating Animals

Cattle are social animals with a natural desire to gather together in herds. Herd management and husbandry procedures should not compromise their social activity or isolate them unnecessarily. Animals should always be handled with care and in a calm, easy manner, following a consistent routine. This will reduce fear, avoid injury, make observation and treatment easier, and enhance animal well-being and productivity.

REQUIREMENTS

Electric cattle prods must only be used in extreme situations, such as when animal or human safety is at risk, and must never be used on the face, anus or reproductive organs of dairy cattle.

Electric prods must not be used on calves that can be moved manually.

Animal handlers must be familiar with cattle behavior and quiet handling techniques either through training, experience or mentorship.

RECOMMENDED BEST PRACTICES

- a. understand the field of vision, flight zone (personal space) and point of balance (shoulder) when moving cattle
- b. refrain from using loud noises to frighten or move cattle
- c. move cattle at a slow walk
- d. use panels, flags, plastic paddles, flappers (a length of cane with a short strap of leather or canvas attached), plastic bags and metallic rattles as aids for moving animals
- e. provide flooring with good traction
- f. provide adequate lighting
- g. have routine contact with cattle and handle them in a calm fashion
- h. avoid tail twisting, particularly in calves
- i. provide sufficient area that new animals can move into free space
- j. use properly designed and maintained restraint devices
- k. restrain animals for as brief a time as possible.

4.2 Breeding

Breeding management and care of pregnant cows have an impact on the welfare and future performance of cows and calves as herd replacement animals.

RECOMMENDED BEST PRACTICES

- a. establish a veterinary-client-patient relationship (VCPR) to maintain or enhance herd reproductive performance and use a veterinarian for herd reproductive examinations and consultations

- b. select sires for calving ease to mate to small framed heifers (avoid dystocia)
- c. breed heifers that have achieved adequate body weight and stature
- d. keep reproductive and calving records and use them to monitor performance
- e. employ trained operators for pregnancy diagnosis, artificial insemination and embryo transfer
- f. for natural mating:
 - be vigilant about diseases transmitted by natural service
 - provide secure footing and adequate ceiling height and freedom from hazards for mounting and breeding behavior
- g. match bull weight and stature to heifer or mature cow size and physical condition
- h. feed cows and heifers to achieve suitable body condition at breeding and calving time (see Section 2.1 - Body Condition Scoring).

4.3 Disbudding and Dehorning (66)

Disbudding and dehorning are done for the safety of cattle and their caregivers. Disbudding refers to removal of the horn bud prior to three weeks of age. Removal of the horn after this age is referred to as dehorning. Disbudding is recommended over dehorning because it is less invasive. All calves should be disbudded to avoid injuries and behavioral problems associated with horns in later life. It is also important that the job of disbudding be done correctly to avoid the re-growth of horn in the future.

Pain control reduces animal discomfort during disbudding and dehorning. Local anesthetics can reduce the pain caused by the procedure, but do not provide adequate post-operative pain relief. The most popular local anesthetic, lidocaine, is effective for two to three hours after administration. The use of analgesics in addition to a local anesthetic can minimize pain and stress in the hours that follow dehorning.

The use of a sedative can essentially eliminate calf response to the administration of the local anesthetic and the need for physical restraint during the administration of the local anesthetic and during disbudding/dehorning. Thus a combination of sedative, local anesthetic and an anti-inflammatory reduces the response to pain during and after disbudding/dehorning. The above drugs are only available with a valid VCPR.

REQUIREMENTS

Pain control must be used when dehorning or disbudding.

Bleeding control must be used when dehorning.

RECOMMENDED BEST PRACTICES

- a. disbud calves before three weeks of age
- b. adequately restrain the calf
- c. use a method that is appropriate for the size of horn and/or age of animal
- d. ensure only trained persons carry out disbudding/dehorning procedures
- e. use a combination of sedatives, local anesthetics and analgesics
- f. isolate calves following the use of caustic paste (to avoid accidental caustic burns to other animals)

4.4 Identification and Branding

In Canada all dairy animals (alive or dead) must be identified by an approved ear tag (71). National Livestock Identification for Dairy (NLID) ear tags are required by Canadian law. Animal identification is essential for tracing origin and destination of food-producing animals in order to protect both the nation's livestock industry and public health. Branding is not commonly practiced or recommended in the dairy industry.

REQUIREMENTS

All cattle must be identified using an approved ear tag as stipulated by applicable regulations.

Pain control must be used if branding is necessary.

Face branding is prohibited.

RECOMMENDED BEST PRACTICES

- a. rely on the NLID system as the primary means for identifying animals
- b. apply identification (e.g., ear tag or tattoo) carefully to avoid unnecessary pain or distress and to minimize traumatic experiences
- c. avoid branding unless essential for export requirements, and then only use one brand
- d. use pain control methods (e.g., anti-inflammatory and/or analgesics) when branding (68)
- e. use non-toxic paints for temporary markers
- f. adjust neck bands, chains, tail bands, or leg bands to avoid unnecessary discomfort.

4.5 Castration (69)

The most common methods of castration are those in which the testicles are either removed (surgery), cords crushed (Burdizzo) or blood supply restricted to the testes (rubber rings or latex bands). All methods of castration cause pain and distress. This response can be reduced by the use of sedatives, anesthetics and analgesics.

REQUIREMENTS

Pain control must be used when castrating.

RECOMMENDED BEST PRACTICES

- a. castrate calves, if required, at a young age
- b. use anesthetics, sedatives and analgesics to reduce the calf's response to pain.

4.6 Tail Docking (67)

Cows use their tails as a natural fly swat, and with each swat, the tail comes into contact with parts of their body. Some producers believe that tail docking contributes to cleaner cows, decreased risk of udder infections, and improved working conditions for milkers. However, research has not identified any differences in udder or leg hygiene, somatic cell count, or prevalence of intramammary pathogens that could be attributed to tail docking.

Tail docking of calves or adults causes pain and discomfort. Docked heifers show signs of chronic pain as indicated by greater sensitivity to heat and cold of the tail stump. Neuroma formation, risk of post-operative infections and loss of the switch for fly control are welfare considerations associated with tail docking.

REQUIREMENTS

Dairy cattle must not be tail docked unless medically necessary.

RECOMMENDED BEST PRACTICES

- a. use alternatives to tail docking (e.g., switch trimming)
- b. build stalls and floors that contribute to cow cleanliness
- c. clean stalls and floors frequently to ensure cow cleanliness (refer to Section 1 Accommodation, Housing and Handling Facilities)
- d. trim tail switches two to three times per year.

4.7 Extra Teat Removal

Supernumerary (also referred to as extra, sprig or web) teats may be found as extensions of a primary teat, between the front and rear teats, and behind the rear teats. Supernumerary teats are a concern for two reasons:

- they may be connected to the primary teat, posing a risk for leakage or entry for infection
- they may interfere with machine milking.

Supernumerary teats found behind the rear teats are the most common and may produce and leak milk. Supernumerary teats between front and rear teats are less common and seldom pose a problem.

REQUIREMENTS

Teat removal must be performed by trained personnel.

RECOMMENDED BEST PRACTICES

- a. remove extra teats as soon as they can be identified
- b. pain control should be used when removing extra teats (e.g., at the same time as dehorning)
- c. use proper equipment and veterinary techniques
- d. control bleeding.

4.8 Milking

Milking should not be a source of stress for cows. Proper milking procedures, gentle handling, calm cows, clean udders and a clean environment contribute to production of quality milk.

RECOMMENDED BEST PRACTICES

- a. implement specific milking routines appropriate to the milking system
- b. train milkers and monitor and correct their practices
- c. milk cows at regular fixed intervals (e.g., same time each day). Ensure lactating cows are not left un-milked or with overly full udders
- d. use recommended preparation, milking, and post-milking procedures
- e. achieve a complete milk-out
- f. avoid painful or stressful procedures (e.g., injections) in the milking parlor
- g. minimize milking and holding times (e.g., maximum one hour) such that time away from feed and water and a comfortable stall is kept to a minimum
- h. provide slip-resistant flooring in holding pens and parlors
- i. provide adequate lighting for cow movement and worker comfort
- j. inspect and maintain milking equipment on a regular schedule
- k. clean and sanitize milking equipment and parlors according to Grade A standards
- l. implement procedures to identify cows treated with antibiotics
- m. prevent contamination of bulk tank milk with milk from treated cows
- n. keep complete records
 - observe cows for signs of mastitis:
 - swelling, inflammation or hardening of the udder
 - abnormal milk
 - somatic cell count over 200,000.

4.9 Hoof Trimming

Claws grow about 1/4in (5-7mm) per month (73). However, the walking surface affects the rate of growth and location of wear. For example, toes wear quickly on sand or very abrasive surfaces. Overgrowth of the heel of the lateral claw of the hind foot is a common finding. Toes tend to wear more slowly because they are harder and heels wear faster since the horn is softer.

Claw trimming is an important tool to prevent and treat lameness and should form part of an overall claw-health program. Each claw must be trimmed to its own 'normal' structure in order to prevent hoof disease (74). Over-trimming is a common error that can cause lameness. Only skilled individuals should trim claws on cattle.

REQUIREMENTS

Feet and claws must be inspected and trimmed as required to minimize lameness.

RECOMMENDED BEST PRACTICES

- a. preferably, trim claws approximately two months before calving to prevent or minimize lameness after calving (70)
- b. employ trained claw trimmers. Seek out hoof trimmers that are associated with a professional association (e.g., Hoof Trimmers Association)
- c. ensure restraint devices are safe for personnel and cattle
- d. refer to Appendix K: Resources for Further Information, for more resources on claw trimming
- e. keep complete records.

4.10 Udder Hair Removal

Long udder hairs trap and accumulate dirt and manure. This increases difficulty, time and labor for sanitizing teats and prepping for milking. The risk of off-flavor milk is greater in herds that do not clip udders (72). Excessive hair affects the cleaning ability of automated (robotic) milkers. Clipping udders has not been found to increase the incidence of intramammary infections, reduce total milk bacterial counts, or counts of environmental organisms (75).

Producers use electric clippers to remove hair from udders; however, clipping is time consuming and hazardous. An alternative is flame-clipping or singeing. The technique uses a cool flame and quick pass under the udder to singe the hair off. Improper use of equipment or technique may burn teat ends.

RECOMMENDED BEST PRACTICES

- a. remove hair from udders on a regular schedule
- b. use clippers with sharp blades or flame-clip with a cool flame
- c. ensure animals are properly restrained
- d. train workers or employ competent individuals for the task.

5 Transportation

Each person responsible for transporting animals in Canada, or arranging for their transport, must ensure that the entire transportation process (including loading, transit, and unloading) does not cause injury or undue suffering to the animals.

The federal requirements for animal transport are covered under the *Health of Animals Regulations, Part XII* (80). They are enforced by the Canadian Food Inspection Agency (CFIA) with the assistance of other federal, provincial and territorial authorities. Some provinces also have additional regulations related to animal transport.

If you are responsible for transporting animals, you **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 regulations (78).

The scope of the Dairy Code of Practice ends at the farm gate, but includes requirements and considerations that affect the transportation process. So as to avoid duplication, the Code of Practice - Transportation should be used as a reference document for the actual transportation process (76)

5.1 Pre-Transport Decision Making (77,78)

It is the responsibility of the party that is shipping (or causing to be loaded) the animals to ensure that all animals are fit for the intended journey. For that reason, those responsible for arranging transportation services need to know how long the animals will be expected to be in transit, including intermediate stops, such as auction markets, and whether the transporter needs to provide additional services (e.g. - feed, water, rest, milking, etc.) during transit. If in doubt, assume the longest trip when assessing the trip.

5.1.1 Fitness for Transport

An effective herd health management program should minimize the number of compromised animals that need to be transported.

Compromised animals are animals with a reduced capacity to withstand the stress of transportation, due to injury, fatigue, infirmity, poor health, distress, very young or old age, impending birth, or any other cause. By following sound principles of herd health management most cases of compromised animals can be avoided (refer to Section 3.4).

Never transport an animal unless you are sure it is healthy enough to handle the stress of the entire expected trip (including intermediate stops). **If you are not sure an animal is fit for the trip**, contact your herd veterinarian.

If you take steps to prevent additional injury or undue suffering, you may move some compromised animals using special provisions such as:

- transport for immediate slaughter directly to the nearest appropriate slaughter establishment, keeping transport time to a minimum
- shipping in a separate compartment with ample bedding.

Please note that your transporter may charge an additional fee to provide this additional care.

On the advice of a licensed veterinarian, you can transport a non-ambulatory animal to a veterinary clinic for treatment or diagnosis. If this is the case, you should request written authorization from a licensed veterinarian and provide a copy of it to your transporter.

Some animals are completely unfit for transport. In this case, you must delay transport until the animal is fit for the trip if it is humane to do so (for example, when an animal has recently given birth). If delaying transport could result in undue suffering, and if the animal is unlikely to recover on its own, the animal must either be treated or euthanized on site (refer to Section 6 - Euthanasia).

Non-ambulatory animals, animals with a low body condition score indicating emaciation or weakness (see Appendix E - Body Condition Scoring Chart), or animals with severe lameness, would endure unnecessary suffering during the transportation process and must not be transported, except for veterinary treatment or diagnosis, on the advice of a veterinarian. This is true of any condition which would subject the animal to unnecessary suffering due to transport.

"Non-ambulatory" means unable to stand without assistance or to move without being dragged or carried, regardless of size or age. Non-ambulatory animals are also called "downers."

Producers have a primary responsibility for determining if an animal is fit for the expected duration of the trip. While the carrier or the driver should not be relied upon to determine whether an animal is compromised or unfit for transport, they have the right and responsibility to refuse to load an animal that they recognize as unfit.

REQUIREMENTS

Every animal must be assessed before being transported - Refer to Appendices G - Guidelines for Dealing with Compromised Animals, and H - Should this Animal be Loaded?

Non-ambulatory animals, animals with a body condition score indicating emaciation or weakness, or animals with severe lameness must not be transported, except for veterinary treatment or diagnosis.

Do not transport animals that are likely to give birth during the intended journey.

Do not transport cattle that require hobbling in order to walk.

RECOMMENDED BEST PRACTICES

- a. refer to Appendix G - Guidelines for Dealing with Compromised Cattle, for information on the categories of lameness
- b. identify less severe conditions early so that animals can be treated or shipped, as appropriate, before a condition worsens
- c. consult with the herd veterinarian in making decisions about cull animals. Evaluate fitness for transport in the context of each trip including relevant factors, such as the anticipated total trip duration from farm to final destination and prevailing weather conditions (e.g., compromised animals are more likely to suffer adverse effects of hot humid weather). For example, an animal that is fit for a short journey direct to an abattoir may not be fit for marketing through an auction
- d. refer to Appendix H - Should This Animal Be Loaded?, for further guidance on determining fitness for transport
- e. compromised animals should be shipped directly to an abattoir, not through auction markets.

5.1.2 Preparing Cattle for Transport

Preparation for transport starts long before the trip actually begins. Management factors such as opportunities for exercise, lameness prevention, nutrition and other factors have a collective impact on fitness for transport. They must be dealt with together and not in isolation.

REQUIREMENTS

Calves must have received adequate colostrum before being transported.

Dairy animals must be fed and watered within five hours before being loaded, if the expected duration of the animal's confinement is longer than 24 hours from the time of loading.

RECOMMENDED BEST PRACTICES

- a. ensure unweaned calves are given at least half of that day's ration of milk prior to transportation
- b. load calves for transport only if they are healthy and vigorous
- c. lactating cows should be milked out immediately before being transported
- d. dry off heavy lactating cows destined for slaughter before shipping to auction. If this is not feasible, ship directly to an abattoir (see Appendix G - Guidelines for Dealing with Compromised Cattle)
- e. remove any hobbles used for handler safety reasons before an animal is transported
- f. ensure all required documentation is completed to avoid unnecessary delays at inspection stations, other checkpoints, or for shipments of cattle leaving the country.

5.1.3 Arranging Transport

Producers have a responsibility to ensure that the transporter they hire is trained and qualified.

RECOMMENDED BEST PRACTICES

- a. ensure only trained people load, unload and transport dairy cattle
- b. ensure all required paperwork (e.g., livestock manifests, bills of lading, emergency contact information) is completed and provided to the transporter
- c. ensure loading facilities are compatible with the type of trailer being used by the transporter
- d. ensure the following information is discussed and agreed upon between transporter and shipper (refer to Appendix I - Livestock Transport Consignment Form):
 - number of cattle to be shipped
 - type of cattle (e.g., yearling heifers, mature cows, bulls, calves)
 - time and point of loading
 - destination
 - special requirements, if any, of the animals being transported
 - special protection for all cattle from cold weather, especially for calves
- e. follow these guidelines when selecting a carrier:
 - if you have never used a particular transporter before, ask for a list of references that provides information on other dairy and/or livestock shippers that have used that carrier
 - make sure that the carrier is experienced with your needs (e.g., short vs. long distance hauls)
 - how long has the carrier been in business
 - is the carrier a member of a recognized and credible trade association/organization?
 - most provincial transportation ministries maintain operating and safety data on commercial carriers, sometimes referred to as a Commercial Vehicle Operating Record or CVOR. In addition, carriers can apply to have safety ratings assessed against them (e.g., satisfactory, unsatisfactory). If they are assessed, their ratings are usually published on the provincial ministry website
 - does the carrier utilize formal training methods for their drivers in the care, handling and transportation of animals?
 - the carriers should be familiar with the Code of Practice for Transportation and have a copy
 - the carrier should have all the requisite vehicle registrations in place (e.g., vehicle licensing, fuel tax registration, appropriate operating authorities) if the load is moving out of the province (e.g., to another province or to the United States).

5.2 Loading and Receiving

When loading cattle, shippers should defer to the expertise of the driver who has a general understanding of allowable weight and loading density allowable on each part of the trailer. Drivers are also aware of variations between provincial/state requirements. Commercial vehicles must comply with provincial and state gross vehicle loading limits (e.g., the total weight of the tractor, trailer, and load).

Round crowd pens and curved single file chutes work better than straight ones. Curved cattle chutes are better for handling cattle because they take advantage of the natural tendency of cattle to go back to where they came from (79).

REQUIREMENTS

Electric cattle prods must only be used in extreme situations, such as when animal or human safety is at risk, and must never be used on the face, anus or reproductive organs of dairy cattle.

Electric prods must not be used on calves that can be moved manually.

The requirements for loading and unloading procedures and equipment as described in the Health of Animals Regulations must be complied with.²

Ensure cattle that are incompatible are segregated.

RECOMMENDED BEST PRACTICES

- a. ensure animal handlers are trained in proper loading and unloading practices
- b. ensure roads and loading areas are accessible in all kinds of weather
- c. ensure loading facilities:
 - have curved chutes with solid sides
 - are uniform in color and texture
 - are uniformly illuminated (avoid sharp contrasts and shadows)
- d. ensure ramps are designed to prevent slipping and falling and are free of protrusions or sharp objects
- e. move cattle in small groups
- f. load cattle calmly and quietly (do not yell or whistle)
- g. know how to determine proper loading densities in order to provide more accurate information to transporters when arranging for transport (refer to Transportation Code of Practice) (76).

² The Health of Animals Regulations prohibit loading or unloading an animal in a way likely to cause injury or undue suffering. The Regulations also require that ramps, chutes and other equipment used for loading and unloading animals:
- be maintained and used so as not to cause injury or undue suffering to animals,
- have sides of sufficient strength and height to prevent animals from falling off the ramp or other equipment, and
- have no unprotected gap between the ramp and the vehicle
The actual regulations are accessible at http://laws.justice.gc.ca/en/showdoc/cr/C.R.C.-c.296/bo-ga:l_XII-gb:s_139/en#anchorbo-ga:l_XII-gb:s_139

6

Euthanasia

6.1 On-Farm Euthanasia Protocols

Compromised animals are either unfit for transport or are fit for transport only under special conditions (refer to Section 5). If these animals do not respond to treatment, on-farm euthanasia may be the most humane option. Carcasses must be disposed of in accordance with provincial regulations.

Components of a euthanasia protocol should include:

- euthanasia training
- access to proper equipment
- when to stop treating an animal and instead euthanize, taking the following into account:
 - likelihood of recovery
 - pain and distress of the animal
 - ability to get to feed and water
 - productivity
 - diagnostic information.

REQUIREMENTS

Cattle with untreatable conditions, not responding to treatment, or not fit for transport must be euthanized promptly.

RECOMMENDED BEST PRACTICES

- a. work with a veterinarian to develop and implement an on-farm euthanasia protocol to facilitate timely and humane on-farm euthanasia
- b. euthanize animals with a BCS less than 2 that are not responding to treatment (see Appendix E - Body Condition Scoring Chart)
- c. use Appendix H - Should this Animal Be Loaded?, for guidelines on animals that should be euthanized on farm if not being treated.

6.2 Methods

Dairy producers will occasionally face situations where an animal is unlikely to respond favorably to treatment and must be euthanized on farm. It is the responsibility of livestock owners to make the right decision regarding euthanasia.

Euthanasia is the humane termination of the life of an animal. The method used must be quick, cause minimal pain and distress, and must be performed correctly using acceptable industry practices. Refer to Appendix J - Euthanasia of Cattle, for further guidance.

The following are currently the only acceptable methods for on-farm euthanasia of cattle:

- free bullet (.22 caliber for calves, .22 magnum or high-powered rifle for mature heifers, cows and bulls)
- penetrating captive bolt - followed by pithing, bleeding or cardiac puncture
- non-penetrating captive bolt - followed by bleeding (not for adult cattle)
- injection with barbiturates and other drugs (administered by a licensed veterinarian).

REQUIREMENTS

An acceptable method for euthanizing cattle must be used.

The method to euthanize cattle must be quick and cause the least possible pain and distress.

RECOMMENDED BEST PRACTICES

- a. ensure only trained individuals are involved in euthanizing an animal
- b. discuss euthanasia options with their veterinarian.

6.3 Evidence of Death

Death has been defined as, “the irreversible loss of brain activity demonstrable by the loss of brain stem reflexes” (82).

REQUIREMENTS

Confirm death immediately and before moving or leaving the animal.

RECOMMENDED BEST PRACTICES

- a. evaluate consciousness by lack of corneal reflex (touch the eyeball and note if the animal blinks). Confirm death following the use of an acceptable method of euthanasia. A lack of heartbeat and respiration for more than five minutes should be used to confirm death (81)
- b. evaluate heartbeat. Lack of heartbeat (can be best evaluated with a stethoscope placed over the left lower chest area of the animal)
- c. evaluate respiration. Lack of respiration (movement of the chest indicates respiration, breathing may be slow and erratic in an unconscious animal).



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***NOTE:** The Dairy Code Development committee determined that the Dairy Code of Practice should end at the farm gate to avoid duplication and variances between Codes (e.g., regarding transportation, sales yards). However, in Ontario, the Sales Yards section of the 1990 dairy code is referenced in the Standards of Compliance required for licensing of sales barns by OMAFRA. Other provinces have similar arrangements. As the deletion of this section from the new dairy code would leave a significant gap until a 'Sales Barn' Code of Practice can be developed, Section 7 referencing Assembly Yards and Sales Yards will be applicable until such time as an Assembly Yards and Sales Yards Code of Practice is in place. The Dairy Code of Practice committee encourages the timely development of an Assembly Yards and Sales Yards Code of Practice.*

Section 7. Assembly yards and sales yards

7.1 Facilities

- 7.1.1 Assembly yards and sales yards should be constructed to prevent cattle from slipping, falling, and injuring themselves. These areas should be regularly cleaned, disinfected, and supplied with fresh bedding.
- 7.1.2 Assembly yards and sales yards should be properly maintained and must be free from any objects such as protruding nails, bolts, or sharp corners that could injure the cattle or cause them discomfort.
- 7.1.3 All facilities must be covered and properly ventilated, and cattle must be protected against extreme weather conditions. All assembly yards must provide drinking water.
- 7.1.4 Uncovered pens may be used to hold any overflow of cattle; however, the welfare of animals held in such pens must be given careful attention, and the pens may be used only for brief staging periods under suitable climatic conditions.
- 7.1.5 One-way gates that prevent cattle from reversing direction are highly desirable.
- 7.1.6 All floors of pens, alleyways, and chutes must be paved, properly drained, scored, or treated to prevent slipping and must be graded gently to provide good footing. The slope of the floor in individual holding units should not be less than 2% or more than 4% (2-4 cm/m). Drainage grates, where required, should be at the side of the pens, alleyways, or chutes.
Ramps should not be steeper than 25°.
- 7.1.7 Alleyways, loading ramps, unloading ramps, and the entrance to transport vehicles should be well illuminated.

7.2 Unfit cattle

- 7.2.1 Each crippled, lame, sick, weak, or fatigued animal should be identified and documented as unfit.
- 7.2.2 Unfit cattle must be off-loaded without causing the animal undue pain and suffering.
- 7.2.3 Unfit cattle must be placed in a segregated pen. These animals must be kept comfortable, fed (if necessary), and watered. They must be provided with medical treatment as soon as possible or humanely destroyed.



7.3 Holding and handling

- 7.3.1 Pens should contain enough space to enable all cattle in them to lie down at the same time.
- 7.3.2 Cattle should be unloaded, penned, held, and loaded in a way that exposes them to a minimum of discomfort and excitement.
- 7.3.3 Pens should be available in various sizes to minimize the need to mix various lots of cattle. Adjustable dividing gates should be installed in the larger pens to help reduce mixing.
- 7.3.4 Pens should be designed to facilitate the movement of one-way traffic and should have a separate entrance and exit.
- 7.3.5 The use of electric prods, canvas slappers, and other similar devices should be avoided. Direct 120-V circuit prods are not permitted.
- 7.3.6 Prods must not be used on the genitals, anus, or face of cattle.
- 7.3.7 Excessive use of ear tags must be avoided. Back tags should be used for short-term or temporary identification.

7.4 Education of personnel

- 7.4.1 Ignorance is no excuse for inhumane handling of livestock. Employers have an obligation to train employees properly on humane handling, equipment use, and livestock care.
- 7.4.2 Employers should hold group discussions with their employees to instruct them on their responsibilities and obligations. Slides, pamphlets, and bulletins on these topics should be made available to employees.
- 7.4.3 A knowledge of basic animal behavior helps employees to become more tolerant and understanding of the functions of their job.



Temperature - Humidity Index Table

Temperature-humidity index table for dairy producers to estimate heat stress for dairy cows.
DEG = degrees. Relative Humidity expressed as %

Temperature		Relative Humidity																				
DEG	DEG	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
F	C																					
72	22.2																				72	72
73	22.8																			72	72	73
74	23.3																			72	73	74
75	23.9																			72	74	75
76	24.4																			72	75	76
77	25.0																			72	76	77
78	25.6																			72	77	78
79	26.1																			72	78	79
80	26.7																			72	79	80
81	27.2																			72	80	81
82	27.8																			72	81	82
83	28.3																			72	82	83
84	28.9																			72	83	84
85	29.4																			72	84	85
86	30.0																			72	85	86
87	30.6																			72	86	87
88	31.1																			72	87	88
89	31.7																			72	88	89
90	32.2																			72	89	90
91	32.8																			72	90	91
92	33.3																			72	91	92
93	33.9																			72	92	93
94	34.4																			72	93	94
95	35.0																			72	94	95
96	35.6																			72	95	96
97	36.1																			72	96	97
98	36.7																			72	97	98
99	37.2																			72	98	99
100	37.8																			72	99	
101	38.3																			72		
102	38.9																			72		
103	39.6																			72		
104	40.0																			72		
105	40.6																			72		
106	41.1																			72		
107	41.7																			72		
108	42.2																			72		
109	42.8																			72		
110	43.3																			72		
111	43.9																			72		
112	44.4																			72		
113	45.0																			72		
114	45.4																			72		
115	46.1																			72		
116	46.7																			72		
117	47.2																			72		
118	47.8																			72		
119	48.3																			72		
120	48.9																			72		
121	49.4																			72		

1

2

3

4

5

< 72F = No Stress

72-78 = Mild Stress

78-89 = Severe Stress

89-98 = Very Severe Stress

>98 = Dead Cows

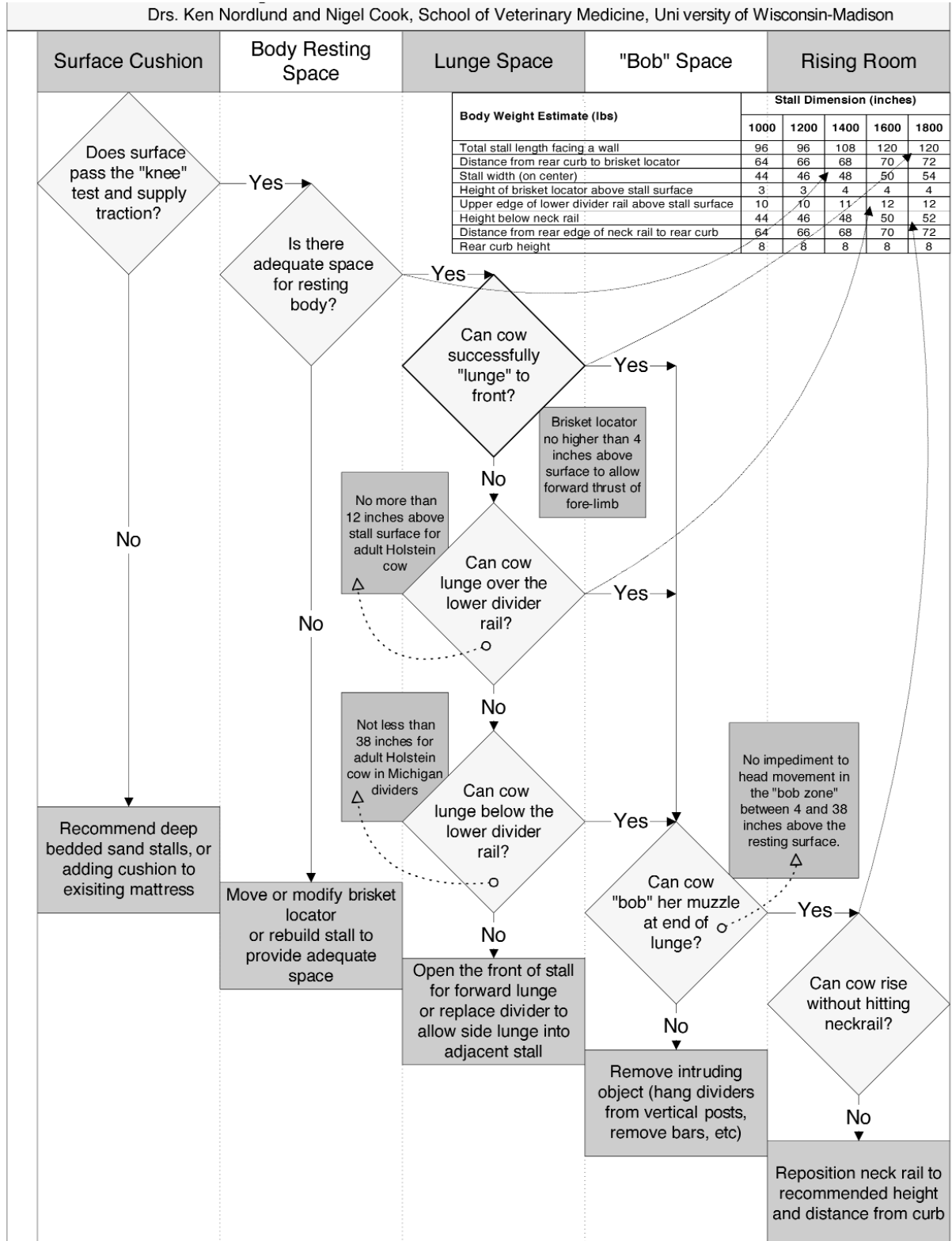
- 1 < 72F = No Stress
- 2 72-78 = Mild Stress
- 3 78-89 = Severe Stress
- 4 89-98 = Very Severe Stress
- 5 >98 = Dead Cows

Modified from Dr. Frank Wiersma (1990) Department of Agricultural Engineering, University of Arizona, Tucson



Flowchart for Evaluating Freestalls

Drs. Ken Nordlund and Nigel Cook, School of Veterinary Medicine, University of Wisconsin-Madison



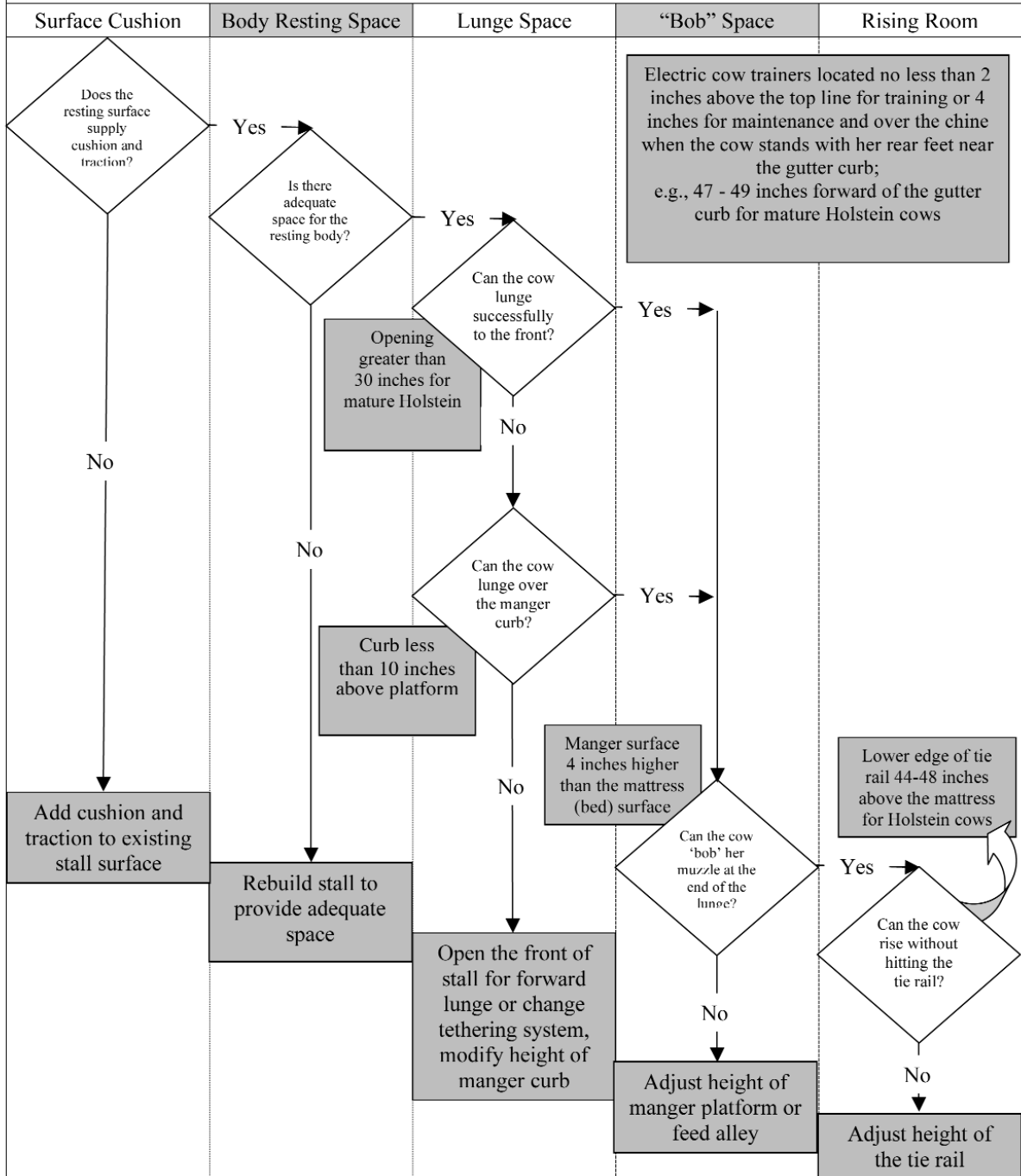


Flowchart for Evaluating Tie Stalls

Flowchart for Assessing Tie Stalls 2008

Neil Anderson, OMAFRA, Veterinary Services Group, Fergus, Ontario

Adapted from *Flowchart for Evaluating Freestalls 2008*, Drs. Ken Nordlund and Nigel Cook, University of Wisconsin - Madison

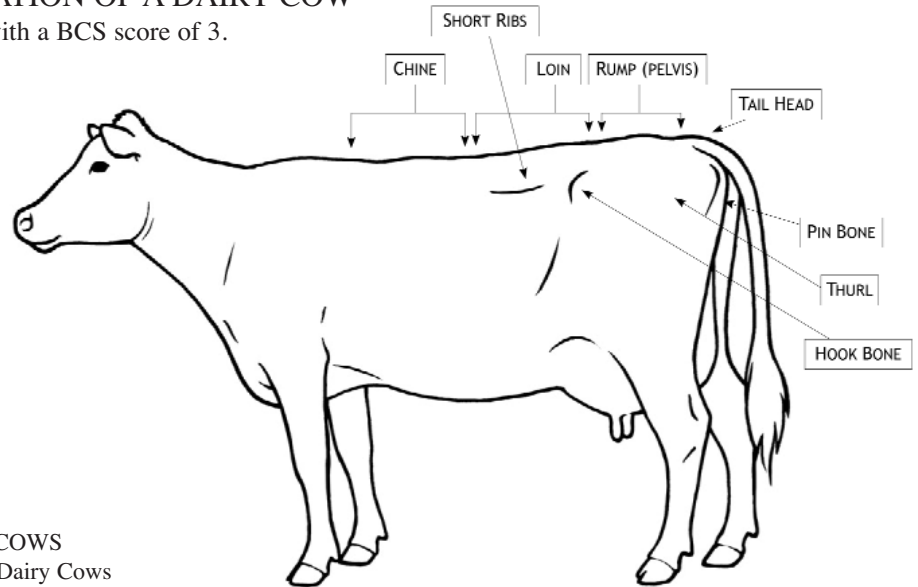




Body Condition Scoring Chart

LABELLED ILLUSTRATION OF A DAIRY COW

Illustration of a Dairy Cow with a BCS score of 3.



BODY CONDITION SCORES FOR DAIRY COWS

Overview of all the body condition scores for Dairy Cows

BCS 1:

SHORT RIBS:

- Ends sharp to touch
- Loin prominent, shelf-like appearance
- Obvious scalloping over top and ends

BACKBONE:

- Vertebrae prominent in chine, loin and rump area
- Individual bones easily visible

HOOK AND PIN BONES:

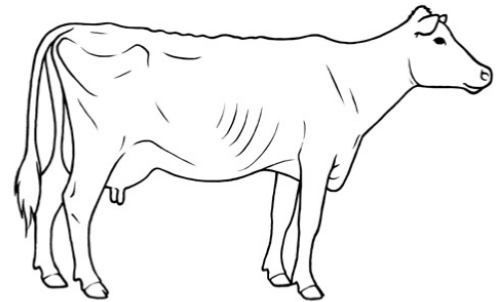
- Sharply defined, very angular in appearance
- No discernable fat pad

THURL (area over pelvis):

- Severe “V shaped” depression without fat cover

TAIL HEAD:

- Sunken and hollow on either side of tail head with obvious folds of skin
- Ligaments connecting pin bones to spine are sharply defined
- Vulva prominent.



BCS 2

SHORT RIBS:

- Ends not as prominent as BCS 1, but can be felt
- Edges easily felt, with slight fat cover, and slightly more rounded appearance
- Overhanging shelf effect less apparent

BACKBONE:

- Vertebrae in chine, loin and rump area, less visually distinct
- Easily feel individual vertebrae

HOOK AND PIN BONES:

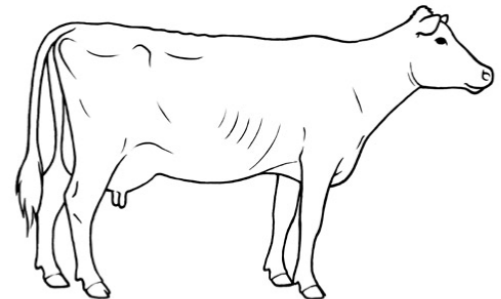
- Bones still prominent, angular
- No fat pad palpable

THURL (area over pelvis):

- Less severe “V shaped” depression
- Little tissue cover

TAIL HEAD:

- Both sides of the tail head are sunken and hollow
- Sharply defined ligaments connecting pin bones to spine





Body Condition Scoring Chart

BODY CONDITION SCORES FOR DAIRY COWS

Overview of all the body condition scores for Dairy Cows

BCS 3

SHORT RIBS:

- Ends can be felt with moderate pressure
- Ribs appear smooth without noticeable scalloping
- Overhanging shelf effect much less apparent

BACKBONE:

- Vertebrae in chine, loin and rump area appear rounded
- Backbone visible, but individual vertebrae not distinct

HOOK AND PIN BONES:

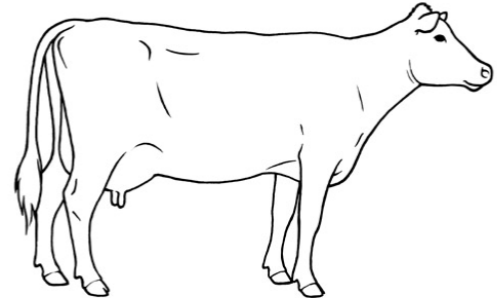
- Visible, but smooth, with rounded appearance
- Fat pad palpable

THURL (area over pelvis):

- Forms "U shaped" depression

TAIL HEAD:

- Both sides of tail head somewhat hollow, but skin folds not distinct
- Ligaments connecting pin bones to spine are rounded in appearance



BCS 4

SHORT RIBS:

- Individual rib ends not visible, only felt with firm pressure
- Overhanging shelf effect slight, barely visible

BACKBONE:

- Vertebrae in chine rounded, smooth
- Loin and rump areas appear flat

HOOK AND PIN BONES:

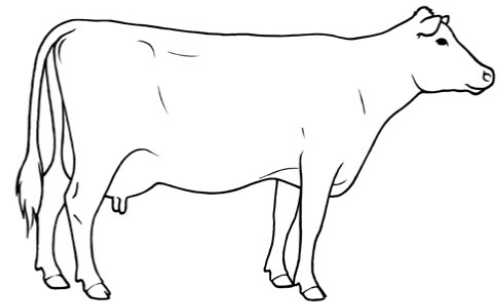
- Rounded, with obvious fat covering

THURL (area over pelvis):

- Area between hooks and pins almost flat
- Pelvic bone only felt with firm pressure

TAIL HEAD:

- Sides of tail head not hollow, no skin folds
- Some fat deposit palpable



BCS 5

SHORT RIBS:

- Ends can't be seen or felt
- No overhanging shelf effect

BACKBONE:

- Vertebrae in chine, loin and rump not visible
- Difficult to feel individual vertebrae

HOOK AND PIN BONES:

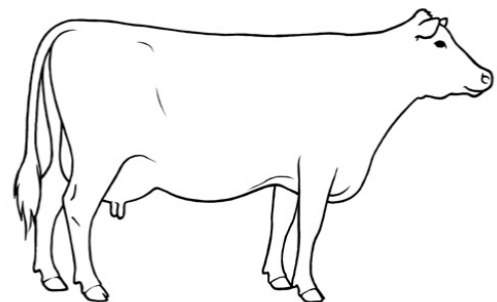
- Very round, buried (almost disappearing) in fat tissue

THURL (area over pelvis):

- Appears flat
- Filled in between the hooks and pins

TAIL HEAD:

- Hollow filled in
- Areas on both sides of tail head buried in fat tissue



Adapted from *What's the Score? Body Condition Scoring for Livestock* CD-ROM
 CD 400/40-1 with permission of Alberta Agriculture and Rural Development. www.agriculture.alberta.ca
 Copies of the CD can be ordered on-line at: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex9622](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex9622)



Gait Scoring System for Dairy Cows

Score	Description	Behavioural Criteria
1 Sound	Smooth and fluid movement	<ul style="list-style-type: none"> • Flat back when standing and walking • All legs bear weight equally • Joints flex freely • Head carriage remains steady as the animal moves
2	Ability to move freely not diminished	<ul style="list-style-type: none"> • Flat or mildly arched back when standing and walking • All legs bear weight equally • Joints slightly stiff • Head carriage remains steady
3	Capable of locomotion but ability to move freely is compromised	<ul style="list-style-type: none"> • Flat or mildly arched back when standing, but obviously arched when walking • Slight limp can be discerned in one limb • Joints show signs of stiffness but do not impede freedom of movement • Head carriage remains steady
4	Ability to move freely is obviously diminished	<ul style="list-style-type: none"> • Obvious arched back when standing and walking • Reluctant to bear weight on at least one limb but still uses that limb in locomotion • Strides are hesitant and deliberate and joints are stiff • Head bobs slightly as animal moves in accordance with the sore hoof making contact with the ground
5 Severely Lame	Ability to move is severely restricted Must be vigorously encouraged to stand and/or move	<ul style="list-style-type: none"> • Extreme arched back when standing and walking • Inability to bear weight on one or more limbs • Obvious joint stiffness characterized by lack of joint flexion with very hesitant and deliberate strides • One or more strides obviously shortened • Head obviously bobs as sore hoof makes contact with the ground
source: University of British Columbia Animal Welfare Program		

Taken from Alberta's Humane Handling of Dairy Cattle - Standards for the Transportation of Cull Animals, original source: University of British Columbia Animal Welfare Program.



Guidelines for Dealing with Compromised Cattle

Guidelines for Dealing with Compromised Cattle, Sheep & Goats

Federal Transportation Regulations

Health of Animals Regulations www.inspection.gc.ca

DO

- Segregate animals of different species, or substantially different weights and ages, or if incompatible by nature.
- Provide proper ventilation, drainage and absorption of urine.
- Have sufficient headroom for animals to stand in a natural position.
- Either strew the vehicle with sand or have the vehicle fitted with safe footholds, in addition to appropriate bedding.
- Ensure that animals unloaded for feed, water and rest remain at least five hours and longer, if necessary, for all animals to receive food and water.
- Ensure that calves too young to exist on hay and grain are provided with suitable food and water at intervals of no more than 18 hours.
- Ensure that animals segregated in trucks receive extra protection from cold and wind chill; supply ample bedding.
- Euthanize animals promptly when you identify conditions outlined in the "Should this Animal be Loaded?" chart.

DO NOT

- Transport a sick or injured animal where undue suffering may result, or when the animal is liable to give birth during the journey.
- Continue to transport an animal that is injured, becomes ill, or is otherwise unfit to travel beyond the nearest place it can be treated.
- Mishandle an animal on loading or unloading.
- Use goads or prods on the face, anal, udder or genital area.
- Load or unload animals in a way that would cause injury or undue suffering.
- Crowd animals to such an extent as to cause injury or undue suffering.
- Transport livestock in trailers not designed for safe handling of that species or class of livestock.

Source: *Transporting Livestock by Truck (CFLA)*

Lameness Classes

These categories can be used to determine the status of an animal's mobility, from normal to non-ambulatory.

Transport as soon as possible

Class 1

Visibly lame but can keep up with the group: no evidence of pain.

Class 2

Unable to keep up; some difficulty climbing ramps. *Load in rear compartment.*

Not Recommended for Transport*

Class 3

Requires assistance to rise, but can walk freely.

Do Not Load or Transport*

Class 4

Requires assistance to rise; reluctant to walk; halted movement.

Class 5

Unable to rise or remain standing.

*** Any animal, including Lameness Classes 3, 4 or 5 may be transported for veterinary treatment, on the advice of a veterinarian.**

Special thanks to the Ontario Humane Transport Working Group. Funding for this project was provided in part through Agriculture and Agri-Food Canada's Advancing Canadian Agriculture and Agri-Food Program. This is a collective outcome partnership with the Agricultural Adaptation Council in Ontario, the Manitoba Rural Adaptation Council, the Saskatchewan Council for Community Development and Alberta Agriculture and Food.

For more information or additional copies, please contact any of the groups listed below:



www.afac.ab.ca



Farm Animal Council of Saskatchewan Inc.

www.facs.sk.ca



www.mbfac.ca

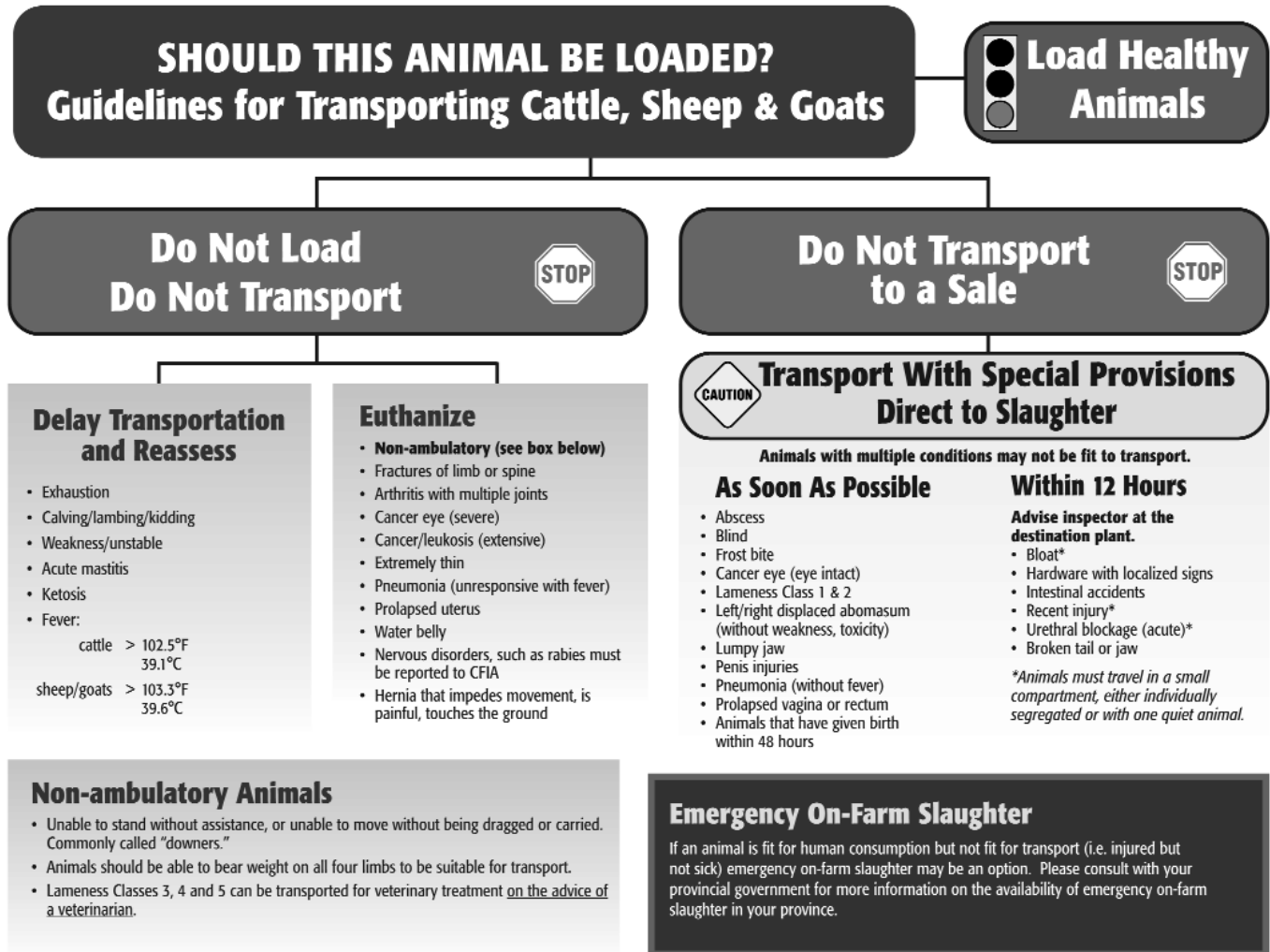


www.ofac.org

Updated 02/2008



Should this Animal be Loaded?





Livestock Transport Consignment Form

Consignor (Shipper) Information:

Business Name (if applicable): _____

Contact Name: _____ Position: _____

Mailing/ Billing Address: _____ City/Town: _____ P/C: _____

Carrier (Transporter) Information:

Business Name (if applicable): _____

Contact Name: _____ Position: _____

Mailing/ Billing Address: _____ City/Town: _____ P/C: _____

Driver Name: _____ Tractor Unit # _____ Trailer Unit # _____

Consignment (Load) Information:

Date/Time Animals Loaded: _____ Duration of Loading Process (minutes): _____

Point of Origin: _____ City/Town: _____ P/C: _____

Point of Destination: _____ City/Town: _____ P/C: _____

Description of Destination: ☐ Intermediate point (e.g. - sales yard) ☐ Final point (e.g. - plant, feedlot)

Description of Load (check all that apply): ☐ Beef Cattle ☐ Dairy Cattle ☐ Swine ☐ Equine ☐ Sheep ☐ Goats

☐ Other _____ ☐ Weanlings ☐ Yearlings ☐ Mature (breeding stock) ☐ Mature (Cull) ☐ Other _____

Animal ID by: ☐ Individual Tags ☐ Lot #(s) ☐ None Head Count: _____ Gender: ☐ M ☐ M(neutered) ☐ F ☐ Mixed

Average Weight/Animal: _____ lbs. or kg. Last Fed/Watered at (date/time or # of hours prior to loading) _____

Condition of Animals at loading: _____

Trip Information

Expected Length of Trip (# hours) _____ Expected Delivery Date/Time: _____

Special Requirements during Transit:

☐ Feed & Water ☐ Rest (unload for 8 hours) ☐ Milking ☐ Additional Bedding ☐ Segregation (describe) _____

☐ Increased Ventilation (hot weather) ☐ Reduced Ventilation (cold weather) ☐ Other (describe) _____

Special Instructions: _____

Weather Conditions at Time of Loading (Insert temperature and check all that apply):

Temperature (°C): _____ ☐ Wind Chill ☐ Humid ☐ Rain ☐ Snow ☐ Other precipitation

Potential conditions during transit that could delay shipment (e.g. - extreme weather, road construction, etc.) _____

Signature (on behalf of shipper)

Signature (on behalf of carrier)

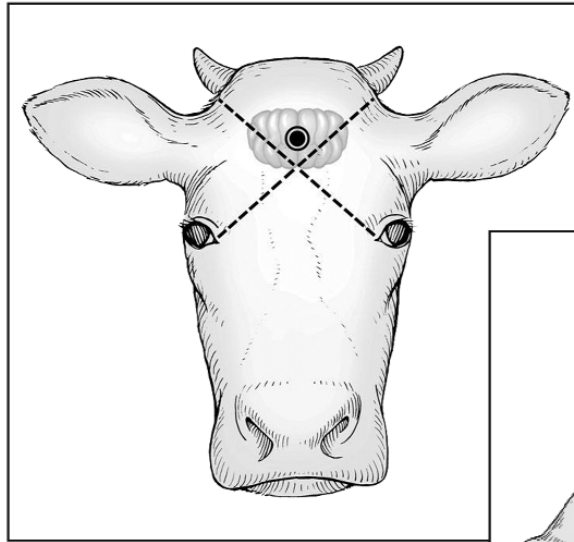
Date

Courtesy OTA Livestock Transporters' Division

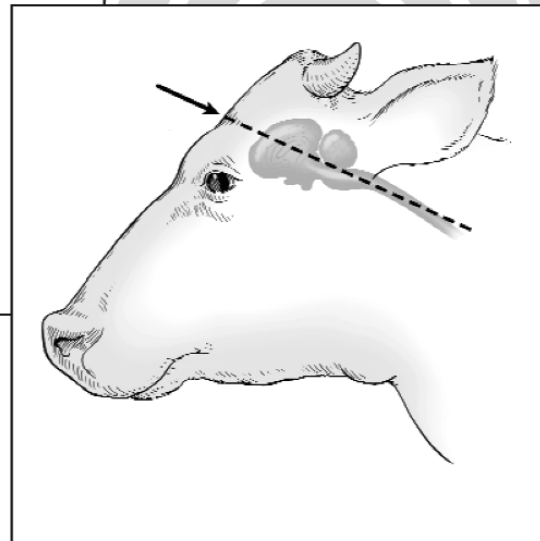


Euthanasia of Cattle

Anatomical Landmarks



**Not Between the Eyes! —but
above eyes as illustrated.**



Proper positioning of the firearm or penetrating captive bolt is necessary to achieve the desired results. When euthanasia is performed by gunshot, the firearm should be held within a few inches of the intended target. Ricochet may be prevented if the barrel of the firearm is positioned perpendicular to the skull as shown in the diagram.

The frontal target area is high up on the head of the animal, NOT BETWEEN THE EYES. An X can be made on the animal's head by drawing imaginary lines between the inside corner of the eye to the horn on the opposite side (or to the top of the opposite ear in an animal without horns). The shot is placed slightly above the intersection of the X (approximately 2 cm or 1 inch). The firearm should be positioned so that the muzzle is perpendicular to the skull and the bullet will enter the front of the head and travel toward the tail of the animal. There may be some differences in location of the shot based on the skull shape and horn mass of an animal.

Source: "Procedures for Humane Euthanasia, Humane Euthanasia of Sick, Injured and/or Debilitated Livestock," University of Florida Extension, Institute of Food and Agricultural Sciences, by J.K. Shearer DVM MS and Paul Nicoletti DVM MS, January 2002.
Some additional wording provided by Jennifer Woods, J. Woods Livestock Services.



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Dairy Farmers of Canada	Ron Maynard
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