



DRAFT CODE OF PRACTICE

FOR THE CARE AND
HANDLING OF

GOATS

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Glossary

Analgesic: a drug that relieves pain.

Anemia: a condition in which the blood does not have enough healthy red blood cells (1).

Assembly centre: for the purposes of Part XII of the *Health of Animals Regulations*, referring to a place where animals are transported and held on behalf of a slaughter establishment prior to slaughter soon afterwards.

Back up stunning equipment and stunning methods: equipment that is kept ready and available for use if the primary method does not work properly.

Barbiturate: an injectable anaesthetic and controlled substance, that when given in a high concentration, can be used by a veterinarian to perform euthanasia.

Buckling: a young prepubescent intact male goat (usually less than 1 year of age).

Canadian Standards Association (CSA): a provider of product testing and certification services for electrical, mechanical, plumbing, gas and other products.

Caseous Lymphadenitis (CLA, CL): a highly contagious bacteria transmitted goat-to-goat by contact with contaminated feed, bedding, and equipment. Widespread in goats in Canada but can be controlled through vaccination and biosecurity practices.

Cashmere: winter down usually removed by combing. May be obtained from Cashmere goats developed specifically for cashmere or in very small quantities from regular goats.

Claiming pen: a separate pen where freshly kidded does and their newborn kids are allowed to bond.

Cold stress: Hypothermia (temperature < 37° C) as a result of exposure to cold temperatures with or without the additional issues of drafts or wet conditions.

Comb lifter: a plate, fitted to the bottom of a shearing comb, to leave an insulating cover of mohair on the Angora goat.

Competent person: one who has acquired and demonstrated suitable skills, experience, and proficiency to perform, or assist in performing, a procedure.

Compromised animal: an animal with reduced capacity to withstand the stress of transportation due to injury, fatigue, infirmity, poor health, distress, very young or old age, impending birth, peak lactation, or any other cause. Special provisions must be taken for transporting these animals.

Container: a box or crate designed, constructed, equipped and maintained for the shipment of animals, suitable for the species (i.e., allows animal to stand upright on all feet in preferred position, with full range of head movement, without touching any part of its body to the roof, top or covering, is well ventilated and is used in a manner that is not likely to cause injury, suffering or death). Must also allow the animal to lie down and get up with ease and comfort. Can be moved independently from one mode of transportation to another.

Conveyance: a means of transportation of goats, including trucks, tractor-trailers, trailers, railway cars, busses, or automobiles that is not likely to cause injury, suffering, or death.

Crook: a shepherd's staff with one end curved into a hook.

Crutching: the removal of hair or mohair (Angora) from around the tail, flank, udder, and between the rear legs of the goat for the purposes of hygiene (e.g., kidding and suckling of newborn kids).

Dam raised: a kid that is left to suckle on its mother until weaned.

Dehorning: the process of removing horn tissue after the horn bud attaches to the skull (2, 3).

Descending: removal of the scent-producing oil glands located behind the base of the male's horns.

Dewatting: removal of wattles from the neck and throat area. Goats may have no, one, or two wattles (see "Wattles").

Disbudding: a procedure that removes the horn bud before it attaches to the skull (2, 3).

Doe: adult female goat.

Doeling: usually a female goat less than one year of age.

Dried off: cessation of milking either with or without tapering off of milking. The udder involutes and ceases to produce milk until the doe gives birth again. Tapering off from milking is not always recommended and weaning is not done gradually at least from the nursing point.

Dysentery: diarrhea that contains blood.

Electroejaculation: the retrieval of semen by electrical stimulation of the prostate using an electroejaculator device.

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

Exsanguination: removal of a substantial volume of blood from the animal.

Extra-Label Drug Use (ELDU): using a drug in any manner not indicated on the label. When a drug is used ELDU in any manner, any information on labeled meat or milk withdrawals is no longer valid.

Failure of passive transfer of immunity (FPT): when a newborn animal has not received adequate passive immunity (i.e., immunoglobulins from the colostrum consumed). It may be because the level of immunoglobulins provided was inadequate or that the animal was unable to absorb the immunoglobulins adequately.

Fire break: a natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.

Foot scald: is an infection between the claws of the foot (i.e., toes). Wet, dirty conditions such as may occur in pastures, yards and pens cause damage to the skin with secondary bacterial infection. The skin is reddened and swollen with a foul odour and the goat is lame.

Foot rot: disease of the hoof caused by infection. It can cause severe lameness and can be spread goat-to-goat by contaminated pasture and foot trimming equipment.

Foremilk: the first stream of milk from the teat. It represents milk that was present in the teat canal and can be used to check for mastitis.

Free choice (ad libitum): unlimited feed access.

Hand raised: when kids are removed from the dam and fed milk / milk replacer with either a nipple system (e.g. bottle, bucket or other container, or automated milk machine) or bucket system with no nipples, until they are weaned. AKA: “artificially reared”.

Heat stress: hyperthermia (body temperature > 41°C) usually due to abnormally hot weather that may be exacerbated by lack of shelter/shade from direct sun, lack of fresh air, high humidity, or inappropriate level of activity. Signs of hyperthermia are increased respiratory rate and in severe cases, open-mouth panting.

Immunoglobulins: antibodies produced by immune cells (B lymphocytes) in the animal’s body. There are several types of immunoglobulins (also measured as globulins), with IgG (immunoglobulin G) being present in the highest levels in the blood and colostrum.

Incidence rate: the number of new cases of a disease that develop over a specific time period (e.g. one year) divided by the number of animals at risk of developing that disease. E.g. the annual incidence of CAE arthritis in a herd was 5%; in a herd of 100 adult goats, this means that 5 goats developed arthritis in that time period.

Joint ill: a bacterial infection of the joints, usually of young stock. The joints most often affected are the knees (carpus), stifles, and hocks. One or more joints may be involved.

Keystone dehorner: a guillotine-type dehorning tool that should never be used in goats.

Kid: a baby goat.

Limit feeding: feed is only available to the animals for a specific period each day; the goats may not necessarily eat to satiation (to appetite).

Livestock guardian animal: an animal used to protect livestock from predators. Commonly used examples include livestock guardian dogs, llamas, and donkeys.

Loading/Stocking Density: the unit of space required per animal or animal's weight per unit of space on a conveyance.

Local anesthetic: an anaesthetic drug usually delivered by injection to a nerve that induces a loss of feeling or sensation of the area innervated by that nerve. It may be also applied to a mucous membrane or skin depending on the product used.

Low stress handling: handling goats in a quiet, calm, and controlled manner utilizing their natural herd instincts and behaviours in order to minimize unnecessary stress and the risk of injury to the animal(s) and handler(s).

Marking harness: a harness with coloured crayon block, or use of a special paint applied to the buck’s brisket, to mark the does that have been mounted and bred.

Mastitis: inflammation of the udder, usually due to an infectious agent such as bacteria but also virus (i.e., CAE virus). It may be clinical (e.g., the udder is swollen and hot, the milk discoloured) or subclinical (milk appears normal but milk production is decreased).

Milk vein: a large subcutaneous vein that extends along the lower side of the abdomen of the goat and returns blood from the udder.

Mohair: the fibre removed from an Angora goat.

Moribund: an animal very near death, death is imminent.

NEMA 4X: NEMA is an acronym for National Electrical Manufacturers Association. This organization gives electrical component enclosures ratings based on their protective qualities.

Non-ambulatory animal: an animal that is unable to stand or move forward without assistance. Non-ambulatory animals are also called "downers".

Nursery-raised goats: See "hand raised."

Pathogen: an organism (e.g. bacteria, virus, parasite) that can infect an animal and cause disease.

Perioperative analgesia: "analgesia" means control / reduction of pain usually through the administration of a local anaesthetic to block nerves or the use of a systemic medication such as a non-steroidal anti-inflammatory (NSAID). "Perioperative" means that the drug is administered and has its effect before, during and/or shortly after the procedure.

Photoperiod: the period of time each day during which goats receive illumination; day length. Can be increased through the use of artificial lighting.

Pithing: the process of destroying the brain tissue of an unconscious animal to prevent a return to consciousness and assure death. Pithing is performed by inserting a rod through the hole in the skull created by the penetrating captive bolt device.

Pizzle rot: an infection and severe inflammation of the foreskin caused by feeding a diet high in soluble proteins (e.g. second cut alfalfa hay). May lead to scarring of the preputial opening and possibly urine retention. Aka: infectious balanoposthitis.

Pizzle: the penis of a goat.

Prepubescent: the period preceding puberty.

Prevalence: the number of cases of a disease or condition present in the herd at a specific time point (e.g. day, month) divided by the number of animals in the herd at risk of getting that disease.

Rigor Mortis: stiffness of the limbs starting a few hours after death caused by chemical changes in the muscles in response to lack of oxygen.

Ritual slaughter: the term "ritual slaughter" is not specifically defined in the *Safe Food for Canadians Act* nor in the *Safe Food for Canadians Regulations*. In general terms, "ritual slaughter" refers to the practice of slaughtering livestock for meat in the context of a ritual. Ritual slaughter involves a prescribed method of slaughtering an animal for food production purposes. The requirements are outlined in the religious rules for Jewish Shechita or Islamic *Dabīḥah* slaughter, with any deviation from the protocol rendering the resulting derived meat non-Kosher or unfit as Halal.

Scalding: skin irritated from extended exposure to urine.

Scurs: a deformed horn resulting from damage to the germinal epithelium of the horn where horn growth occurs; damage may be from injury or more frequently from poor disbudding technique.

Shearing headstall: a stand that is constructed to hold a goat while being sheared.

Shorn: animals whose coat has recently been sheared or clipped close to the skin.

Stanchion: a set of adjustable, upright partitions made from either wood or metal that close around a goat's neck, so the goat(s) can be temporarily held (e.g., for milking and feeding).

Stillbirth: a kid born dead at term.

Strip cup: a cup with a black lid and hole for drainage. A squirt of milk from the teat (after the foremilk is discarded) is directed onto the lid and is observed for abnormalities, e.g. discolouration, clots, consistency.

Stunning: rendering an animal insensible.

Sub-acute ruminal acidosis (SARA): occurs when goats have an unbalanced ration consisting of rapidly fermentable carbohydrate source (e.g. grain, pellets). May worsen if the diet contains insufficient effective fibre (e.g. long-stemmed hay). Can cause chronic damage to the wall of the rumen and is an important risk factor for laminitis.

Tail web: a web of skin on either side of the base of the tail.

Top dress: when grain, mineral, or other supplement is added on top of another feed and offered to the animal without first mixing.

Unfit Animal: an animal that is sick, injured, disabled or fatigued and that cannot be moved without causing additional suffering. These animals must not be transported unless under the recommendation of a veterinarian for veterinary care (with measures taken to prevent additional suffering).

Urinary calculi: mineralized stones that form in the bladder when dietary conditions allow. In male goats, these stones may become lodged in the urethra and slow or prevent urination.

Wasting: a goat with a body condition score ≤ 1 with weakness usually due to a chronically poor appetite or inadequate access to food over time (e.g., inadequate ration offered, competition).

Wattles: dangling skin-covered appendages that serve no purpose but contain blood, nerves, and cartilage.

Weaning shock: when kids grow more slowly, stop growing, or even lose weight at weaning.

Webbed teats: a congenital condition where an extra teat is joined to the true teat, either partially or fully.

Wether: a castrated male goat.

Wool blindness: when excessive mohair growth near the eyes interferes with normal sight.

Workplace Hazardous Materials Information System (WHMIS): Canada's national hazard communication standard.

Introduction

In Canada, the goat industry consists of three sectors: chevon (goat meat), dairy (milk), and fibre (mohair and cashmere) (5). In recent years, the goat industry has become more prominent in Canada's agri-food sector. This can be seen in the expanding operations of goat farmers since the early 1990s as well as increases in production and demand for goat products (6).

Goat milk production is a small proportion of total milk production in Canada; however, there has been substantial growth in the past decade in both the number of animals, number of farms, and total milk produced. In Canada, the number of goats, both meat and dairy, has gradually increased over the last decade with a total of 230,074 goats reported in the 2016 Census (7).

Ontario and Quebec are the main producers of goat products in Canada. Goat milk is mainly made into cheese with a lesser amount being processed into yogurt, ice cream, fluid milk, butterfat, and powdered milk. The meat goat sector has also experienced some growth in recent years due to changing demand in Canada (6).

This Code of Practice represents a significant update to the previous Code (published in 2003; 8). It also affirms the continuous improvement approach to animal health and welfare among those involved in goat dairy, meat, and fibre industries.

In updating the Code, the Code Development Committee has relied on scientific research and a wide range of practical experiences drawn from those who deliver care to goats. The revised Code aims to provide feasible approaches to meeting health and welfare and focuses on the needs and preferences of goats, where they are known. The Code addresses and advances responsible animal care and handling in areas that are both common to and unique for animals in the goat dairy, meat, and fibre sectors.

While the scope of the Code is focussed on goats raised commercially for the production of milk, meat, or fibre, the Code **applies to all goats kept for any purpose** (e.g., pets / companions / show / weed control).

It is also important to note that the requirements of the Code are enforced by provincial governments in some provinces.

The Code focusses on Health, Nutrition, Husbandry, Housing, Euthanasia, Pre-transport planning*, and Emergency management. In all areas, it strives to advance animal welfare in ways that are practically manageable and highly relevant for day-to-day care. To the extent possible, the Code is outcome-based, and is intended to achieve a workable balance between the best interests of the goats, producers, consumers, and general public.

To this end the Code contains both Requirements and Recommended Practices. Requirements are considered to reflect practices that are essential for the delivery or maintenance of responsible care and handling. Requirements are often animal-based, as these are most directly linked to animal welfare, and can be applied in a wide range of production systems. Since requirements often state necessary outcomes, producers have flexibility to determine how the outcomes can be achieved using individual management and husbandry practices. Recommended Practices encourage continuous improvement in animal care and are intended to support Code requirements (though failure to implement Recommended Practices does not imply that acceptable standards of animal care are not being met). All chapters contain succinct statements of "desired outcomes" that are intended to reflect and frame desired welfare outcomes in accord with each chapter topic (and even beyond the enclosed content). Supplementary supportive materials are provided in the appendices to allow the Requirements and Recommended Practices to be better adapted to a specific farm or management system.

The goat Code is not intended to describe all production and management practices relevant to each stage of production. Anyone building or modifying a facility or assuming management of an existing goat farm will need to comply with local, provincial/territorial, and federal requirements for construction, land use, environmental management, deadstock disposal, and other areas outside the scope of this document. Individuals requiring further details than what can appropriately be included in this Code should refer to universities, agricultural ministries, and other resources (see *Appendix A – Resources for Further Information*).

* The goat Code includes important pre-transport considerations but does not address animal care during transport. Consult the Code of Practice – Transportation for information on animal care during transport (9)

1 Roles and Responsibilities

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

REQUIREMENTS

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

Producers must ensure that personnel involved in the care and management of goats are knowledgeable, skilled, trained, competent, and supervised.

RECOMMENDED PRACTICES

- a. Develop and implement a written Goat Welfare Policy outlining the farm's commitment to responsible and humane animal care (see *Appendix B – Sample Goat Welfare Policy*).
- b. Identify supervisors or managers that personnel can approach with questions or concerns about animal care.

2 Housing and Handling Facilities

Desired Outcome:

Housing and handling systems need to:

- Provide shelter and protection from extreme weather
- Provide adequate space
- Have good air quality
- Allow safe movement of goats
- Accommodate natural behaviours

Goats may be raised indoors in loose housing, group pens, or with partial/full access to outdoor dry lots, yards, or pastures with night pens or shelters. They may also be raised exclusively outdoors with natural or manufactured shelter. Goats are highly adaptable to the various climates in Canada, however, they do require shelter from windy, rainy, and extreme cold weather as well as protection from extreme heat.

Goats tend to seek shelter or hide overnight during adverse weather, when there is a risk of predators, and/or to escape aggressive behaviour (10, 11, 12, 13, 14).

Facilities should be designed to meet the specific requirements of each farm. At a minimum, goat operations require buildings for shelter from adverse weather. Goat kidding in winter or extreme cold and goats raising kids on their dams need a facility with maternity pens for kidding and early care to promote kid survival. Hand-raised or nursery-raised goats (common with dairy goats and disease eradication programs) need facilities to separately house kids and does. Dairy goat operations need facilities for milking in a sanitary environment to promote udder health.

Natural landscape features are also acceptable forms of shelter. Valleys, lee sides of hills, and bush areas can provide shade, a cool place to lay, and some protection from wind. Properly designed windbreaks and hedgerows can also provide additional relief from wind chill. It is critical that an adequate manufactured shelter is available to goats if natural shelter does not provide sufficient protection from extreme weather. Monitoring body condition and goat health will support decision-making to build or use manufactured shelter.

REQUIREMENTS

Goats must have access to shelter.

Goat shelters or buildings must be clean and dry.

Building materials that goats come into contact with must not contain harmful compounds (e.g., pressure treated wood, lead based paint).

Natural features used for shelter must provide relief for goats from extreme cold, wind or hot temperatures OR an adequate building must be available (14).

2.1 Building Environment

2.1.1 Temperature

While goats tolerate hot and cold temperatures they should be protected from large fluctuations in temperature, drafts, and wind chill.

Goats will be comfortable in cold weather if they have clean, dry bedding. The bedding provides insulation from the cold ground and decreases the amount of energy that animals have to expend to keep warm. Shelter from snow and rain allow goats' coats to remain dry and to provide maximum insulating value. The comfort zone for dairy goats is between 15 and 21°C (59 and 70°F) (15). Temperatures over 26°C (80°F), however, seriously reduce feed intake and milk output.

Goats need higher energy in their diet to maintain body temperature and body condition during extreme cold. Cold stress can be observed in goats when they shiver and huddle together.

Newborn kids quickly use up their fat stores when born into a cold environment. It is very important to provide, along with adequate colostrum - critical for caloric needs, a warm, draft-free area for newborns and very young kids (e.g., a warming box, small shelter, straw bales, deep bedding, or heated nursery) to prevent hypothermia (chilling) and starvation. Safe, supplementary heating should be provided, if needed, in kidding and kid-housing areas (17).

Goats experiencing heat stress may have increased respiration rates (panting), reduced feed intake, and milk production. Heat stress also lowers natural immunity making animals more vulnerable to disease in the following days and weeks (18).

REQUIREMENTS

Newborn kids must be protected from wind chills and drafty, cold conditions.

Stockpersons must be able to recognize and treat hypothermia and promptly assist goats displaying signs of heat or cold stress.

RECOMMENDED PRACTICES

- a. The ideal barn temperature range for kids under 3 months should be maintained at 10-18°C; between 6 and 16°C for kids over 3 months of age (19).
- b. Heating systems should be checked regularly, kept safe and in good working order (20).
- c. Plan breeding to avoid winter kidding if housing and/or management cannot keep kids warm.
- d. Steps to mitigate cold stress (4):
 - increase the ambient temperature in heated barns,
 - provide insulated and/or heated flooring,
 - protect goats from wind and moisture (e.g. wind break, 3-sided shelters facing south) with the addition of a screen for wind protection,
 - provide straw bedding (which offers more insulation than other bedding types) and ensure the depth permits goats to nest,
 - adjust the feeding program to meet increased energy demands,
 - prevent condensation, and
 - provide goats with clean and dry goat coats or calf coats.
- e. Steps to mitigate heat stress (4):
 - provide shade through natural or artificial means (e.g. shade cloths, trees),

- provide ample cool, clean water,
- avoid handling or other stressors especially during the hottest times of the day,
- increase air flow: open barn vents fully, add more fans to indoor housing.

2.1.2 Ventilation and Air Quality

Proper ventilation is critical to maintaining good air quality and a good barn environment for goats. Pneumonia, hypothermia, and cold stress all contribute to kid mortality and can be minimized with properly ventilated buildings (21).

Air quality is a factor of humidity, as well as dust, odours, and the buildup of gases such as ammonia. Decomposition of feces and urine produces ammonia, hydrogen sulfide, methane gas, and other odours (22). A well-designed ventilation system that is well maintained and operated properly will remove gases and odours and help to optimize air quality.

The ventilation system, whether natural or mechanical, should (21):

- provide adequate fresh air at all times
- distribute fresh air uniformly without causing drafts
- exhaust the respired moisture
- remove odours and gases (23) such as ammonia

Humidity levels vary depending on weather conditions, stocking rate, bedding management, and goat diet. Air circulation that reaches the manure pack reduces buildup of humidity. Excess moisture from wet bedding and expired air will condense on cold surfaces (e.g., ceilings and steel beams), adversely affect air quality, and settle on the goats which will lower the ability of the animal to withstand cold stress. Insulation of walls and ceilings will reduce condensation on these surfaces as well as odours and ammonia at goat level. Good ventilation is essential as goats do not tolerate high humidity indoors.

High levels of ammonia in barn air temporarily stops activity of cilia in the lungs, and interferes with immunity. Sheep (and possibly goats) exposed to ammonia levels of 21 mg/m³ or higher may reduce feed intake and weight gain (24).

Ammonia can increase the risk of respiratory infections and pneumonia by interfering with the immune system of the lung, in particular its ability to clear pathogens such as viruses and bacteria. As the concentration of ammonia is higher closer to the ground (because of its density), young animals are especially affected by high concentrations of ammonia in poorly ventilated barns or sheds (25).

Ammonia is recognized as an irritant to goats' eyes and respiratory tract, and can pose a health threat not just to goats but also the people that work with them. An ammonia concentration of 25 ppm corresponds to safety standards established for humans for continuous 8-hour exposure but is not necessarily pleasant for humans or animals (26, 27). The smell of ammonia generally becomes aversive to humans at a concentration of at least 17 ppm (28). Once aversive, steps should be taken to establish a comfortable environment for goats and personnel. There are several tools for measuring ammonia concentration, including test strips, detection tubes, and electronic devices (4).

Effective ventilation avoids damaging ammonia levels (21). **Providing sufficient fresh air to lower ammonia** without causing cold drafts, may involve increased monitoring of the environment, installing additional equipment, renovating building(s), and adjusting settings on windows, doors, chimney baffles, curtains, and ventilation fans. It is important to regularly remove bedding soiled by manure and urine to minimize the formation of excessive amounts of ammonia. Covering a manure pack with fresh bedding also prevents ammonia from being released into the air.

Improved air quality reduces incidence of respiratory illnesses, and promotes better welfare for goats and humans within the barn environment.

REQUIREMENTS

Goat facilities must have a working ventilation system to bring in fresh air and exhaust humidity.

Action must be taken if condensation levels affect the health of the goats.

Ammonia levels must be routinely assessed in pens at animal level. Corrective actions must be taken if either detected by smell or if levels are more than 25 ppm.

RECOMMENDED PRACTICES

- a. Establish a protocol or written SOP for inspecting and maintaining ventilation systems.
- b. Stockpersons should be able to recognize the physical human response to high ammonia levels when entering barns (e.g. odour, irritation of the eyes (tearing), nose, and lungs).
- c. Remove manure regularly (at least annually) or when air quality decreases.
- d. Add more bedding to manure packs to reduce ammonia release.
- e. Consider feed and manure additives that tie-up or neutralize ammonia and reduce odours.
- f. Consult an agricultural engineer to help solve ventilation issues.
- g. In hot weather:
 - Adjust stocking density or ventilation rate based on the occurrence of heat stress and respiratory disease
 - Lower the stocking density in anticipation of seasonal hot weather to reduce demands placed on the ventilation system
- h. In cold weather:
 - Cold drafts at animal level should be eliminated.
 - Maintain some air flow during cold weather in mechanically ventilated barns (i.e. ventilation systems should not shut off at a low temperature threshold).

2.1.3 Lighting

Goats are seasonal animals which are sensitive to photoperiod.

Light is required for proper observation, herding care, and goats' activities during the day. Lighting can be controlled or artificially manipulated, depending on breeding management needs. An appropriate period of rest from artificial lighting (e.g. 6 hours) allows goats to maintain their natural photoperiod.

REQUIREMENTS

Goats must have sufficient light to facilitate care and observation.

Goats must be allowed to experience their natural day and night (diurnal) cycles.

RECOMMENDED PRACTICES

- a. Artificial lighting should be considered in buildings with low natural light.
- b. Window area should equal a minimum of 5% (1/20) of ground surface area (22).
- c. Clean windows to maximize light entry.
- d. Ensure that all electric wires and fittings are well out of reach of the goats and well protected (29).

2.2 Building Features

2.2.1 Pen Design

Penning should be effective, comfortable, safe, durable, and permit the observation of all animals. Pens should also provide room for rest and exercise. Pen sizes should allow for kidding, treating sick animals, isolation and husbandry procedures, as well as low-stress movement within a facility. Some farms may choose to separate groups of goats for management purposes (e.g., lactating / dry / replacement / late gestation does). Designated pens are needed to separate and treat animals with specialized needs (e.g., sick, injured or weak goats). Hospital pens should allow more space per goat for resting, feeding, and drinking.

Pen and alley design should consider common goat behaviours:

- Goats are naturally playful with a propensity to climb, jump, and escape.
- Goats are curious. Horns, heads and feet can get trapped in small openings.
- Goats do not like to step up out of a pen.
- Goats like to stand with front feet elevated on horizontal gates, penning, fences, and equipment.
- Goats want to see where they are going and do not like to turn corners.
- Goats prefer to be near their herd, and are stressed when alone.

REQUIREMENTS

Fences, gates, penning and feeders must be designed to prevent entrapment.

All penning must be inspected regularly and repaired or replaced as needed.

Barriers, pen dividers, other penning or handling structures, must have no sharp edges and protrusions that might injure goats (21).

Isolation and hospital pens must be available to separate and treat special needs goats.

Individually housed goats must be able to see and hear other goats or other livestock.

RECOMMENDED PRACTICES

- a. Any gaps or missing spindles in penning or equipment should be corrected promptly to prevent escapes and entrapment.
- b. Animal flow designs should consider natural goat behaviours to minimize stress.
- c. Animal handlers should be aware of repeated injuries or mortalities, and determine causes to prevent future injuries.
- d. Locate hospital and maternity pens apart from one another.
- e. Provide safe options for goats to climb, such as raised platforms. Providing raised resting areas can decrease aggression in the herd by providing a safe hiding place for lower-ranking goats (30, 31).

2.2.2 Floor Space Allowance in Pens

The amount of space needed per goat varies greatly depending on breed, age, size, presence of horns, feeding, reproductive stage, temperature, environment, production style, and pen management. For

example, the space needed for a pregnant doe with horns may double in the last month of gestation as her size increases, and becomes more irritable, especially in hot weather.

It is important to observe goats for negative behaviours such as

- overcrowding (32, 33):
- clashing and butting
- pushing and displacing
- threatening (or bullying)
- nipping and biting
- dirty hair (from goats climbing over each other to access feed)
- noticeable queuing at feeder or waterer
- lower feed intake, lost body condition (particularly among goats of lower social ranking)

Overcrowding is stressful for goats, and can lead to fighting as goats try to establish social dominance. At higher stocking densities, lower-ranking goats will spend less time at feeders and less time laying down resting. When laying down, goats prefer not to touch other goats and prefer laying against walls versus the middle of a pen (34). Families tend to lay close together.

Stocking density can be decreased by extending pen space, moving animal groups, or culling. Providing raised platforms in goat housing is an effective way to increase space allowance without increasing the footprint of a pen, while allowing goats to perform their natural behaviours of climbing and hiding. Multiple levels may also reduce aggressive behaviours between goats (34).

While research data is lacking on minimum space allowances for goats, some general commercial guidelines are reflected in Table 1. It is critical that stockpersons also observe goats for overcrowding behaviours (i.e., indicating a need for more space per goat).

Exceeding minimum floor space guidelines will likely decrease fighting and stress, and benefit goat welfare.

Table 2.1 - Minimum floor space required for group housed goats

Type of Goat	Production System	Weight of Goat Pounds (kg)	Minimum Pen Floor Space per doe ft ² (m ²)	Recommended Space per doe (Canadian industry)
Miniature goats (e.g. Nigerian)	Backyard enclosure	10 – 45 (5 – 20)	15 (1.4)	20 ft ² /goat for small numbers of goats in outdoor run with shelter
Angora or fibre does (full fleece)	Pasture with shed/barn	80 – 100 (35 – 45)	25 (2.3)	
Dairy does	Indoor housing (loose pens)	100 – 150 (45 – 68)	15 (1.4)	15 – 25 ft ² (1.4 – 2.3 m ²) depending on animal size
Does with 1-2 kids	Winter housing and indoor kidding (pasture)	100 – 160 (45 – 72)	25 (2.3)	Actual space depends on kidding management needs
Large Boer does (meat goat) with 1-3 kids	Indoor housing (loose pens)	150 – 200 (68 – 90)	25 per doe + 10/kid (2.3/doe + 1/kid)	25 – 30+ft ² (2.3 – 3m ²) depending on animal size
Bucks	Buck shed for isolation from breeding does	150 – 300 (90 – 120)	30 – 40 (2.8 – 3.7)	

REQUIREMENTS

Goats must always be provided with the minimum space allowances in Table 1.

Goats must be housed in groups and have enough space to turn around, lie down, stretch-out when lying down, get up, rest, and groom themselves comfortably at all ages and stages of production (35).

If overcrowding behaviours are observed, action must be promptly taken to reduce stocking density.

RECOMMENDED PRACTICES

- a. Increase space for goats in late gestation.
- b. Increase space for goats in warm weather.
- c. Increase space for goats with horns.
- d. Increase space for goats in pens when bucks are present for active breeding.

2.3 Flooring

Goats prefer to walk on hard surfaces. Hard surfaces allow for natural wear of the hoof wall and may help promote hoof health. Unlike other livestock, goats will sometimes choose to lay on hard, dry surfaces like metal, wood, or rubber mattresses while they use surfaces like shavings and straw for urination and defecation (38, 39). For this reason, providing both a bedded area and a hard, dry surface may be beneficial.

Flooring can be earth, wood, or concrete covered with safe bedding materials to absorb moisture. There are typical welfare issues associated with different types of flooring.

Wood and earthen floors, if wet or muddy, create ideal conditions for hoof rot and flies. Drainage, diverting rainwater, combined with bedding management, can mitigate wetness. Dry lots (corrals) should be well-drained. Inside, earth / gravel floors should be set-up so drainage can occur (on grade, use of drainage tiles, correct materials).

Concrete floors, if designed to drain well, can be easily cleaned and sanitized. Newborn kids born on bare concrete can slip in birth fluids, and are prone to splayed leg injuries. Good bedding management can overcome these issues.

Slatted floor nurseries (i.e. renovated pig barns) need to be kept warmer. For optimum kid health, floors need to be clean, with no drafts from below. The primarily milk diet, high urine production, higher temperatures, and lower amounts of bedding all promote the production of ammonia vapours. Young kids are particularly sensitive to ammonia and respiratory infections - good hygiene and ventilation are imperative for raising healthy kids on slatted floors.

REQUIREMENTS

Flooring must be designed and maintained to minimize slipping and injury (4).

Slatted floors in kid nurseries must be kept clean; drafts and ammonia levels must be minimized to reduce adverse health effects.

- a. Choose flooring types that are non-slip but not overly abrasive (40, 41).
- b. Sheds and other structures with earthen floors should be located on well-drained sites or have runoff diverted away from goat housing.

2.4 Feed Bunk design

There are many ways to provide feed to goats. Forage may be fed using round bale feeders, hay racks, loose hay in feed alleys, or by using a total mixed ration (TMR) in bunk feeders. In grazing systems, hay bales may be rolled out onto snow. Offering forage free choice (*ad libitum*) satisfies a goat's need to ruminate, their natural desire to sort and select feed, and avoid boredom. Social hierarchy within the herd is an important consideration as goats that are prevented from accessing feed are a welfare concern.

Design feeders and feeding systems so that all goats can easily obtain feed comfortably and at the same time, especially when limit feeding a ration. Allowable feeding space is a moving target, as the physical size of goat can change quickly as young stock grow, pregnancies progress, and size varies across breeds and body types. Decreased feeder space per goat can lead to lower-ranking animals being forced to share feeding spaces with higher-ranking animals taking up multiple feeding spaces (42). For lower ranking goats, this can lead to decreased time spent feeding, less frequent feeding, more time waiting to feed, and more aggressive behaviours (43).

Horned goats are more affected by reduced feeding space (22). Large framed breeds, pregnant goats, and goats with horns may all require more physical space at feeders - up to double the space compared to hornless, dry goats. It is very important to observe goats while feeding, note aggressive, overcrowding behaviours, and increase feeding spaces accordingly. This may include installing new feeders, adding portable or temporary feeders or feed stations to pens, providing trays or buckets or meals for individual timid goats – or moving goats to different pens or pastures.

Table 2.3 - Minimum feeder space per goat

Type of goat	Limit Feeding (1 feeding space)		Notes
	cm/goat	Inch/goat	
Small does: 45 kg (100 lb)	30	12	Forage fed free choice in bale feeders and racks requires about half the limit of feeder space. When feeding a TMR, grain ration, or top dress increase bunk space or reduce number of goats in pen until all goats can access feed bunk at same time.
Average size does: 45-68 kg (100-150 lb) or Angoras (80-100lb) in full fleece	35 – 45	15 – 18	
Larger does/Meat goats: 68 – 90 kg (150-200 lb)	40 – 50	16 – 20	
Heavily pregnant does or horned does	Feeding space per doe almost doubles		Critical to get high feed intake in last trimester of pregnancy.
Bucks: 90 – 135 kg (150 – 300 lb)	40 – 60	16 – 24	Bucks in breeding pens may disrupt doe feed intake and take up multiple feeding spaces.

The use of partitions between feeding spaces may decrease aggressive behaviours and increase time spent feeding (44). Furthermore, goats prefer to eat from raised feeders, feeding at head-level (45).

Feeding systems that are easy to clean-out and discourage fecal contamination make it easier and more likely to provide clean, palatable feed. Goats will have higher feed intake and better health when feeders are kept clean.

REQUIREMENTS

Limit fed goats must all be able to access feed at the same time.

Feeders must be designed not to entrap animals.

Feeders must not have sharp edges that could injure goats.

Feeders must be cleaned when contamination (e.g. feces, spoiled feed) is observed in the feeders.

Feeders must be checked, maintained in good working order, and repaired promptly.

RECOMMENDED PRACTICES

- a. Additional feeder space (up to double) should be allowed for pregnant does, especially at late stages of gestation.
- b. Monitor the herd and increase feeder space per goat if there is queuing (lining up) at the feeder.
- c. Tombstone feeder fronts prevent goats from jostling and pushing each other at feeders and reduce aggression.
- d. Using raised feeder designs allow goats to express their natural instinct to reach up and out to eat (45).
- e. Mangers should be elevated 25-30 cm (10-12”) above the floor or curb level.
- f. Feeder height should accommodate increasing depth of manure pack.
- g. Feeders should be designed and managed to prevent contamination of feed with manure, urine or spoiled feed.
- h. Set large bales into bale feeders to avoid crushing/smothering injuries from bale collapse.

2.5 Watering Systems

Whatever system is used to provide water, clean, fresh, palatable water should be available to goats at all times. Goats are very picky about the water they drink.

In winter, unfrozen water must be available for goats to drink as much as they want. Water intake decreases when water temperatures are cold, and as a result, feed intake can also decrease. Electrically heated pails and water trough de-icing or heating devices, if not operating correctly, can give a small shock to goats as they drink, thus limiting their water consumption. Electrical panels should be checked to ensure that devices are properly grounded.

Young kids play and explore. Deep water troughs and 20L (5 gallon) pails of water are a drowning hazard. Buckets should be secured so they cannot be tipped. Buckets and pails that get tipped over create a wet environment for kids, with more potential for flies, bacteria, and disease.

Walking far distances to find water consumes energy, which is a greater consideration in very cold and very hot or dry weather. Goats on lush pasture may only drink 1-2 times per day, but on dryer forage, goats will need to drink more often. See Section 4.8.

REQUIREMENTS

Watering systems must be monitored daily to ensure that palatable water is available.

Water bowls/troughs and pails must be designed and positioned to minimize contamination (e.g. fecal matter, feed).

Watering devices must be scrubbed and cleaned whenever contaminated (e.g. algae, organic material).

Stray voltage must be controlled in electric watering or de-icing devices.

Water bowls/troughs/buckets accessible by kids must be sized, positioned, and protected to prevent drowning.

Producers must have a plan to supply water in an emergency (i.e. power failure, drought).

RECOMMENDED PRACTICES

- a. Warm water temperature encourages and increases water intake, especially for lactating dairy goats. 15 C is ideal (46).
- b. Warmer water temperature is preferable to cold water when goats are experiencing heat stress.
- c. Watering devices (troughs, bowls, nipples or buckets) in pens should be clean and unsoiled. Buckets and pails should be cleaned with every water refill. Water bowls and troughs should be scrubbed weekly.
- d. Well water and surface water used for drinking (including ponds and streams used by grazing livestock) should be tested annually for coliform bacteria (46).
- e. Access to surface water in pastures should not cause erosion or reduce water quality.
- f. On pastures, water should be within 0.8 km (1/2 mile) of grazing area (46).
- g. Water pails in pens where does will kid should be elevated and secured.
- h. For tanks and troughs used by kids, limit depth of water to 20 cm (8") (46).

2.6 Handling Systems

Goats can be moved through crowding tubs, chases or chutes, treatment areas, scales, and sorter gates for routine husbandry tasks. For larger herds and difficult jobs, a good handling system contributes to lowering both animal and human stress. While a handling system is not always feasible or necessary, developing a process for handling will considerably help to manage stress.

Goats should be handled quietly during working operations. Goats will startle at sounds such as air compressors, metal gates slamming, and dropped implements. Excess noise creates agitation.

A basic working facility to handle larger numbers of goats is comprised of a catch or crowding pen, a working chute, a “squeeze chute” and head gate, and a sorting arrangement of alleys, gates and pens to separate the goats (25).

Longer chutes tend to cause crowding and trampling at the forward end, and should be divided into sections with stop gates. An adjustable chute will allow for the handling of small goats and kids through to large bucks and goats with horns. The sides of the chute should be smooth and solid to prevent climbing and encourage forward movement.

Goats do not flow as smoothly as cattle and sheep, and tend to rush toward an actual or expected opening. Goats readily drop to the ground under crowding pressure and are at greater risk from trampling and smothering.

Corrective action must be taken if the equipment or method of restraint causes injury to goats (4).

RECOMMENDED PRACTICES

- a. Handling systems should be designed for goats.
- b. A chute with solid sides contributes to easier movement and prevents entrapment of horned goats.
- c. Before moving goats, walk the route and look for things that may cause distractions or balking.
- d. Provide sufficient area and a clear, well-lit path for goats to move in desired directions.
- e. Ensure equipment is designed to minimize noise.

2.7 Enrichment

Goats need to be kept busy, as boredom is a welfare concern. Enrichment, such as brushes, platforms, and brush or trees offer amendments to housing that allow goats to perform their natural behaviours.

Providing enrichment can have long-term benefits such as reducing stress and aggression when exposed to changes in routine (such as handling or transport). Providing enrichment may also increase growth rates (47).

Goats like to hide their newborn kids (48) and young kids will hide in small and safe enclosed spaces and corners.

RECOMMENDED PRACTICES

- a. Provide safe enrichment for goats, such as:
 - fixed or mechanically operated grooming brushes
 - platforms for resting, climbing and hiding under
 - straw bedding
 - brush or trees in outdoor areas
 - rock piles in pastures to climb on (also helps to wear hooves)
- b. Provide boxes, and create corners or other places for goats to safely hide.
- c. Add trees, or tree branches with leaves to indoor-housed goats to vary their diet and offer some browsing material. Make sure all plants are not toxic to goats.

2.8 Bedding and manure management

Safe, dry and non-toxic bedding added consistently will keep animals comfortable and dry.

Avoid wet conditions. All goat housing areas, regardless of system, should be well-drained to avoid wet conditions that can create welfare and health challenges (e.g. foot diseases, flies). Bedding provides warmth, insulation and comfort for goats. Bedding should be provided in all buildings used for housing goats to create a clean, comfortable, dry surface. Various materials can be used as bedding for goats. Straw, wood shavings, paper products, dried compost, and peat moss are all examples of effective bedding options (49). Sawdust is not preferred because it is too dusty, is not very absorbent, and promotes the risk of coliform mastitis. In bedded pack systems, it is important to add fresh bedding material as necessary to keep bedding clean and dry.

Bedding management is particularly important during kidding. Bedding in maternity pens should be clean and dry and replaced regularly as diseases may be spread through birthing fluids.

Manure and waste present a risk for spread of disease. For example, Johne's disease and coccidiosis are spread through fecal-oral contact. Infectious abortion diseases are shed in birth fluids at kidding time and for up to two weeks after kidding. Waste may be an attractant for flies, scavengers, predators and pests.

As a guide, bedding is too wet if one's knees feel wet after 25 seconds of kneeling in the area. Goats look visibly dirty when bedding is insufficient and/or the pen environment is too wet (50).

REQUIREMENTS:

Bedding must be provided in all buildings housing goats (except systems using slatted floors) to create a clean, comfortable, dry surface.

When kidding in cold temperatures, extra bedding must be provided.

Manure and waste must be stored in a manner to:

- *avoid run-off getting into goat housing areas*
- *prevent contamination of water sources and feed*
- *prevent attracting scavengers to housing areas*

RECOMMENDED PRACTICES

- a. Avoid using sawdust bedding.
- b. Do not throw spoiled hay into pens for bedding (risk of listeriosis).
- c. Observe the legs of goats over pressure points for signs of abrasions, swelling or sores.
- d. Add clean, dry bedding to maintain a dry, comfortable surface for goats (for bedded-pack pens).
- e. If bedding is too wet, check for leaky water bowls and repair promptly.
- f. Establish a protocol or written Standard Operating Procedure (SOP) for waste removal.

2.9 Outdoor Facilities – Grazing & Pasturing

2.9.1 Fencing

Secure and robust fencing limits injury or escape. No single fence design is suitable for all landscapes, site conditions, or containment requirements (51).

Goats confined in smaller enclosures have more time to investigate and damage fencing (52). Goats naturally want to stand on, or climb over, fences creating sagging gaps and pressing fences outward. Horned goats can easily become entrapped in page wire fencing. It is very important to monitor fences every day and release goats promptly.

Escaped goats usually do not stray far from their herds, although they become more vulnerable to predators.

Table 2.4 - Acceptable types of fencing for goats

Type of fencing	Ideal size	Advantages	Disadvantages/Challenges
Woven fence Page wire Field Fence	<u>Varies with goat size:</u> Larger mesh better for smaller goats (e.g. Angora) Small mesh better for larger goats (e.g. Boer).	Good for disbudded goats. Sheep fence has extra lateral wires in lower 8-12" to prevent escapes.	Horned goats may get heads stuck near posts, or sagging and enlarged openings. Need to monitor fence.

Electric fence	Live wires should be minimum of 6-8” apart, including a wire placed ~ 6” from the ground to prevent goats from slipping through fence- may need up to 7 strands.	Higher voltage (4000 to 5000 volts for goats) using a pulsing current will not damage a goat or predator, but leaves a lasting impression.	Goats jump forward when they feel a shock and will try to go through fence. Long hair or fibre insulates the goat from feeling the charge. The fence needs to be checked daily for charge and to detect items that may be grounding the fence (e.g. weeds, fallen rails). Requires a source of electricity the entire time goats are in the pasture. Need to train goats to electric charge.
Ideal: Woven or Field fence combined with electric fence Board fence combined with electric fence	Strand of electric wire placed on inside of fence at nose height; and to prevent jumping – 1 or 2 strands 25cm (10”) above top of fence.	Offers more security than either fencing method on its own. Can safely utilize existing page wire fencing of most gauges. Electric wire prevents rubbing and damage to fence.	Goats can ingest toxins from treated wood or lead-based paint in board fence. Same challenges as electric fence.
Temporary electric netting with step in posts	1.1m (4 ft) height		Horned goats can get snagged in netting. Need to train goats and monitor as with electric fencing.
Stock fencing or hog panels (vertical steel rods welded)	1.1m (4ft) height is usually adequate. To contain bucks - ideal height is $\geq 1.5\text{m}$ (5-6ft).	Goats are unlikely to get feet caught when standing on fence.	Welds can break when goats push/ butt heads. Need to repair gaps and protruding rods.
Chain-link fencing	3-4” openings.	Small weave is most secure.	Small feet can get stuck. More expensive
Use with caution		Disadvantages	
Page wire fence for cattle with no secondary electric fencing.		Horned goats get heads stuck. Young kids can escape through bottom.	

Table 2.5 - Unacceptable types of fencing for goats

Type of fencing	Disadvantages
Picket fence Skids or pallets used as fencing	Broken legs, strangling.
Barbed wire	Entangled goats become highly stressed. Thin skin of goats can tear easily, causing severe damage including lacerated skin and udders.

Sources: Belanger J. & Bredesen S.T. (2018) Storey's Guide to Raising Dairy Goats, 5th Edition: Breed Selection, Feeding, Fencing, Health Care, Dairying, Marketing, Storey Publishing. Ontario Goat (2014) *Best Management Practices for Commercial Goat Production*. Guelph ON: Ontario Goat.

There must be no sharp edges or protrusions in fencing or in pasture that could injure goats (including barbed wire fencing).

Fencing must be monitored daily for entrapped goats.

If entrapment is a recurring problem, stockperson must investigate and repair.

Barbed wire fencing must not be used.

RECOMMENDED PRACTICES

- a. Inspect all fences monthly (and repair if necessary). Additional inspections may be necessary immediately after a wind storm, snow blizzard, heavy blowing snow, or after escaped animals have returned (51). Additional inspections may be necessary for electric fencing.
- b. Check fences to ensure that they are firm and upright and that tension is being maintained (46).
- c. Test electric fences for proper voltage and clear scrub and weeds from around the electrified strands (46).
- d. Ensure that all perimeter gates have secure mechanisms to prevent accidental opening (e.g., latches, hooks, chains).

2.10 Milking Parlours

Most dairy goats are milked in a parlour although in a smaller operation, goats may be milked in a stand. The parlour needs to be well designed so the animals are not stressed or injured at milking time and move easily in and out. Good parlour design will also aid in complete, fast and stress-free milkout (53). Most design layouts have 2 components: the milking parlor and the collecting area.

The collecting area is next to the parlor and holds groups so that milking can be done with a continual flow. A good design will make it easy for the animals to see where they are going (i.e. the parlour). No slope, or a steady low slope, will ensure that goats are not scared to climb up to be milked or when leaving. A space allowance of 3.5 square feet [.325 square metres] is used as the goats are crowded only for a short time. A safe backing gate can be used to bring the latecomers.

The milking facility, which may vary widely in design, needs to be safe and not stressful for the animal. The floor should be smooth enough to be easy to clean, but with enough gripping surface so as to not be slippery. The headlock (if used), panels separating the goats during milking, and milking units should be well adjusted so as not to injure any animals. Feeding in the parlor is optional and contributes to keeping the goat occupied, although may not be ideal for nutritional health. It is important to keep these working areas well illuminated (54).

Parlours should be easy to maintain and keep clean to safeguard animal health (by reducing potential for udder infections). Traffic through a parlour will inevitably cause a build-up of manure, urine, spilled milk, teat dip and feed. It is critical for udder health that the parlour be set-up for routine washing down and sanitizing. It will also prevent a build-up of flies which cause mastitis (55). See *Section 5.0 – Husbandry Practices*.

REQUIREMENTS

Parlour areas must be free of protrusions or sharp edges that could injure goats.

Section 2 – Housing and Handling Facilities

Producers must ensure that milking machines are functioning correctly by conducting proper maintenance and adjusting vacuum levels and pulsation rates and ratios in accordance with manufacturers' recommendations.

Pens, ramps, milking parlours, and milking machines must be suitable for goats and be inspected and maintained to prevent injury, disease, and distress.

Gates and restraining devices of individual holding units must operate smoothly and safely.

RECOMMENDED PRACTICES

- a. Milking parlors and collecting areas should be free of steep slopes.
- b. Floors should provide good traction to prevent slipping, even when wet.
- c. Parlour areas should be well illuminated and ventilated.
- d. Holding in collecting areas should not be longer than 30 minutes.
- e. Pen and parlour gates must operate freely and quietly. Hinges should be lubricated and latches padded to reduce noise. Latch protrusions should be reduced to maintain the safety of the goats (See *Section 5.0 – Husbandry Practices*).
- f. Fans, sprinklers or other technology should be used to moderate temperature extremes and eliminate condensation in milking parlours and collecting areas.

3 Emergency Preparedness and Management

Desired Outcome: To safeguard goat welfare by minimizing threats from barn fires, power or mechanical failures, extreme weather and natural disasters.

3.1 Emergency Preparedness

Emergencies may arise and compromise goat welfare as a result of power failures, barn fires, wildfires, flooding, and disruption of supplies.

Emergencies are, by their nature, atypical and undesirable. They interrupt normal routines and can be quite devastating. It is normal, therefore, to avoid thinking about, let alone planning, for such. Advanced planning, however – meaningful planning – may help to prevent bad situations from becoming much worse.

Pre-planning (i.e., predicting, planning, and preventing) will enable producers to respond in a timely and effective manner, thus providing for the welfare of goats during emergencies.

Emergency planning should begin with the recognition that emergencies create stress, and that stress makes it harder to think clearly and act rationally. For this reason, effective emergency planning should strive to be as clear and as actionable as possible. There is a need for all stockpeople and members of farm families to be very familiar with the essentials of any emergency plan. While no two farm plans will be identical, there are common elements or steps that should be addressed (e.g., See *Appendix C – Emergency Telephone List for primary contact numbers suggestions*; See *Appendix D – Mapping Barns and Surrounding Areas for Fire Services*). For most, if not all emergencies, the steps to be followed in terms of planning and responding are similar. Differences are normally due to the time of year, commodity affected, and unique farm layout.

Preparedness requires a long-term approach that involves looking at the fundamentals of emergency planning. Common sense actions, taken well in advance, will often reduce if not eliminate harm to animal welfare during emergencies.

Do not assume that everyone knows what to do in the case of emergencies – this may not be the case. It is one thing to have policies and procedures in place, but quite another to have a trained workforce ready. Make sure that everyone around the farm knows what to do and that they have practiced different emergency plans – at least once. Practising emergency scenarios is important to ensure that people respond calmly and automatically in possibly panic-inducing situations. Farms should review safety and emergency procedures on a seasonal basis.

REQUIREMENTS

An emergency telephone list must be readily available for the producer, stockpeople, and emergency crews.

Emergency procedures, relevant to the farm's location and housing system(s), must be written and communicated to stockpeople, family members or anyone else involved around animal care.

A map of the barn and its surroundings must be drawn and kept readily accessible for emergency crews.

When designing or renovating facilities, emergency management protocols must be considered in the housing design as it relates to emergencies (e.g. rapid evacuation of livestock, installation of fire alarms that can be heard and responded to at any time, emergency lighting, etc.)

RECOMMENDED PRACTICES

- a. Stockperson and family members training should include an annual review of the plans related to different emergency situations.
- b. Decide where your animals will be relocated in the event of a barn destruction. (See *Section 3.1.4 – Deciding to Evacuate or to Shelter in Place*).

3.1.1 Fire in Farm Buildings

Fires in farm buildings are devastating event. The loss of animals, buildings, and equipment can be devastating. Approximately 40 per cent of all barn fires are caused by faulty electrical systems, making it one of the leading causes of barn fires (56). Regular inspections and maintenance are key to reducing the risk of a barn fire.

REQUIREMENTS

A fire safety self-assessment must be completed annually (See Appendix E – Assessing Farm Buildings for Fire Prevention).

RECOMMENDED PRACTICES

- a. Local fire services should be consulted for specific advice on fire prevention, including the correct number and best location of fire extinguishers in all facilities.
- b. Fire extinguishers should be maintained according to manufacturer's instructions and stockpeople should know where they are located and should be trained in their proper use.
- c. Electrical work should be conducted in accordance with jurisdictional regulations.
- d. Smoking, or the use of torches for "hot work", should not be allowed in barns or near any flammable materials.
- e. Engines should be refueled outside of barns, and only once they have cooled down and are no longer running.
- f. Areas where grain handling and feed preparation activities generate dust should be vented and provided a fresh air supply.
- g. Electrical fixtures should be properly protected using conduit fittings and NEMA 4X.
- h. Totally enclosed, fan-cooled motors, are recommended.
- i. Good housekeeping practices should include removing combustible materials from around electrical systems and farm buildings.
- j. Pesticides should be stored in a separate building and clearly identified by means of a warning sign and applicable WHMIS label information (57).
- k. Fuel should never be stored inside buildings but in separate storage areas suitable for combustible materials.

- l. Hay should be harvested and stored properly to lower the risk of spontaneous combustion. Only a small amount of hay should be stored near animal housing with the bulk stored in a separate structure.
- m. Extension cords should only be used temporarily and unplugged when not in use. Electrical fixtures should be hard-wired if possible.
- n. When using heat lamps, keep the area around the heat lamp clear of clutter or combustible bedding materials. Only use heat lamps with the CSA or ULC label. Heat lamps should be suspended with non-combustible materials (chain) at a height that is not accessible to animals (56).

3.1.2 Wildfires

A wildfire involves the uncontrolled burning of grasslands, brush, or woodlands. Wildfires destroy property and valuable natural resources and may threaten the lives of people and animals.

Wildfires can occur at any time of year, but usually occur during dry, hot weather. Check federal and provincial government websites for wildfire probability forecasts (e.g., [Environment Canada](#)). Local radio and television stations also broadcast information and warnings on local fire conditions.

Wildfires are normally recognized by dense smoke, which may fill the air over a large area.

Usually, when a wildfire occurs, the best thing to do is to evacuate with or without animals. In this case, see *Section 3.1.4*. There are several actions that can be taken to reduce wildfires.

The first is to reduce the risk of starting a fire in your own backyard. See *Section 3.1.1 – Fire in Farm Buildings*, for guidance. Other actions may include the following:

RECOMMENDED PRACTICES

- a. Use only fire-resistant materials on the exterior of your barn or home, including the roof, siding, decking, and trim.
- b. Consider installing fire suppression systems for buildings as well an outdoor system for your lawns.
- c. When constructing pools and ponds, make them accessible to fire equipment - they may serve as a source of water for fighting wildfires.
- d. Ensure that dedicated hoses are long enough to reach all parts of your building.
- e. Create and maintain a fire break around the perimeter of the property, pastures, or buildings.

3.1.3 Power/Mechanical Failure

Power and mechanical failures may trigger on-farm emergencies capable of endangering animals and their caretakers. These failures have a greater impact on goats that are reliant on power and mechanics to provide feed, water, ventilation, and milking.

REQUIREMENTS

An alternative method or power source must be available to run critical systems (e.g. water, ventilation, milking, feeding, etc.)

Producers must have enough feed and potable water for their goats for at least 72 hours.

All equipment and services including water bowls and troughs, ventilating fans, heating and lighting units, milking machines, fire extinguishers and alarm systems must be inspected and cleaned at least annually and kept in good working order.

RECOMMENDED PRACTICES

- a. Calculate the minimal amount of water that your goats need daily. A back-up, reliable source of water should be identified. This can be your well if a generator is available to operate a pump.
- b. Estimate the electrical needs of your farm to ensure production and management continuance.
- c. A generator (fuel or tractor powered) should be available for emergency use.
- d. Fuel reserves sufficient to run the generator for 72 hours should be kept on-site.
- e. Alarms and fail-safe devices, including an on-farm alternate power supply, should be tested annually to ensure that they are in working order. A standard operating procedure for maintenance of all equipment and services on-farm should be developed and available for stockpeople.
- f. An emergency lighting system, sufficient for night-time inspection of animals and equipment, is recommended.
- g. The minimum daily feed ration per class of goat should be determined. Consult with your nutritionist or supplier to establish these minimums.
- h. Extra maintenance supplies and parts should be kept on hand in case of longer delivery times due to adverse weather conditions or road closures in your area.

3.1.4 Deciding to Evacuate or to Shelter in Place

In times of extreme environmental conditions, and if thorough preparations are in place including a good emergency plan that can be implemented if or when needed, staying on-farm may be conceivable. In emergency situations involving flooding or wildfires, the evacuation of animals and/or humans may be necessary. To help prepare for proper evacuation planning of animals and family, consider the following:

- Contact local emergency management authorities to become familiar with at least two possible evacuation routes.
- Arrange for a place to shelter animals (fairgrounds, other farms, racetracks, exhibition centres, etc.). Accommodations will need to include milking equipment for dairy goats (as applicable).
- Ensure that enough feed, water, and medical supplies are available at the destination.
- Establish safe transportation, contact potential carriers (may need access to a portable loading ramp).
- Make sure animals have enough identification (e.g., ear tags or leg bands) to be able to tell them apart from others.
- Make sure to have adequate and safe fencing or pens to separate and group animals appropriately.
- Prepare an emergency kit that will follow the animals. The kit should include:
 - current list of all animals;
 - basic first aid kit;
 - handling equipment such as halters;
 - water, feed, and buckets;
 - tools and supplies for sanitation;
 - flashlights;
 - portable radios (with weather radio band) and/or weather radio, and batteries; and
 - other safety and emergency items for your vehicles and trailers.

There may be circumstances where the risk to life is great and there is not enough time to evacuate animals (e.g. having a wildfire start in the immediate area). In this situation:

- Protection of human life and safety should be the first priority (in order to be able to return to the farm and provide care for all animals following the event).
- After ensuring human safety, and if it is safe to do so and if time permits:
 - Open gates between pens and pastures to give the animals more room to escape the hazard. Do not let animals out into unfenced areas as they could become hazards on roads or for emergency rescue teams.

- Put extra feed and water out where the animals can get to it, as it may be a few days before being allowed to return home.
- Consider turning off power and natural gas to reduce the chance of these utilities causing additional problems.

If a decision is made to remain on the property during an emergency, decide whether to confine animals in an available shelter or leave them outdoors. A safe pasture has:

- No overhead power lines or poles.
- No debris or sources of blowing debris.
- Adequate and safe fences that will contain the animals.
- Enough open space to allow animals to avoid blowing debris.
- Access to at least 3 days of food and clean water.

REQUIREMENT

Adequate advanced preparation must be in place in case leaving the farm becomes necessary.

RECOMMENDED PRACTICES

- a. When advance notice of an emergency is available, evacuation plans should be applied at least 72 hours before anticipated landfall to avoid being caught in high winds, flooded roads, or heavy traffic.

3.1.5 Catastrophic Animal Losses

Even if well prepared, emergency circumstances can bring about situations where animal health and welfare may be compromised to a point that euthanasia must be considered. In some situations, entire groups of animals may have died (e.g., following a barn fire or other natural disaster) and carcasses will need to be removed and disposed of.

In some cases, government representatives may be involved in the decision-making and euthanasia processes. Euthanizing an entire herd of goats must employ humane techniques (see 8.0 – *Euthanasia*).

A plan for euthanizing an entire herd should provide guidance in the event of a disease outbreak or other unexpected disaster. Plans will need to be reviewed regularly and updated as needed.

Plans should include:

- euthanasia method(s)
- biosecurity considerations
- identification of appropriately trained individuals to oversee and participate in the process
- reporting procedures (to designated authorities)
- safety procedures for personnel
- carcass disposal

Those involved in euthanizing large numbers of goats, particularly when they are ill but may still appear healthy, can suffer emotional stress. Moreover, individuals may encounter physical fatigue. Both types of stress can have a negative impact on goat welfare during the euthanasia event.

REQUIREMENTS

A euthanasia plan must be readily available or accessible.

Approved methods for euthanizing goats on-farm must be listed (see Section 8.0 – Euthanasia & On-Farm Slaughter).

Individuals involved in euthanasia must be competent (knowledgeable, skilled, and trained) in the methods used.

All equipment used for euthanizing goats must be maintained in good working order per manufacturer's guidelines.

RECOMMENDED PRACTICES

- a. A veterinarian should be consulted when developing farm protocols for mass euthanasia.
- b. A planning discussion should be conducted with personnel to coordinate activities, review safety practices and expectations.
- c. One competent individual who is knowledgeable about the procedure(s) being used, and the associated risks involved, should be designated to oversee the event.
- d. A plan should be developed in advance of each mass euthanasia event for the appropriate disposal of carcasses (refer to current provincial and federal regulations).

3.2 Emergency Management

Once emergency preparations are complete, action plans must be established in case emergencies arise. The following requirements and recommendations should be included in plans for the emergencies listed above.

REQUIREMENTS

Emergency plans must include specific actions and those designated to conduct specific actions.

Plans must be easily accessible at the onset of an emergency.

RECOMMENDED PRACTICES

- a. The plans should ensure that the welfare of the animals is maintained in any potential emergency event such as climatic extremes, floods, snowstorms, droughts or disruption of services or mechanical breakdown.
- b. Plans should be communicated to family members and stockpeople.
- c. Emergency plans should be reviewed at least once a year or whenever changes to farm management practices occur.

See *Appendices C, D, E, and F* for emergency preparedness and management planning.

4 Feed and Water

Desired Outcome: For goats to receive sufficient quantities of feed and water to maintain good health, body condition, and to minimize nutrition-related diseases.

4.1 Feed

4.1.1 Managing Feeding and Nutrition

Providing good nutrition prevents disease and enhances welfare. Goats receiving inadequate diets are more prone to disease and will fail to reach their genetic potential.

Diets must take into consideration:

- environmental conditions/weather,
- type of production system,
- level of activity,
- level of production
- age, size, and species,
- body condition,
- production stage, and
- feed quality and availability.

The normal feeding behaviour of goats involves continual picking and choosing and sorting of feed. When high production is required, the goat must be allowed enough extra feed that it can choose what it eats, thereby achieving an increased level of feed intake and a richer, more nutrient dense ration (22).

When offered a choice of feed with different quality levels, goats will show a preference for the feed with the highest quality. When forage quality decreases or is limited, goats compete for feed. Furthermore, goats have a complex feeding behaviour, varying what they eat, how long they eat, and in what posture (i.e. standing on hind legs; 31). Goats are selective foragers, and when given the choice will browse at or above eye level; they are capable of adapting to different feed types and qualities.

Selective-feeding goats housed indoors may not desire a uniform feed (i.e. Total Mixed Ration or TMR). Managing feed and feeding to allow goats to select and sort their feed can satisfy their instinct to browse, as well as alleviate boredom (31).

Goats will refuse feed that is contaminated with urine, feces, or musty smells. It is important to utilize systems that prevent soiling and contamination of feed and routinely remove rejected feed (see *Section 2.4 – Feed Bunk Design*). Volume fed can be different than the volume consumed and those situations should be investigated further.

Qualified small ruminant nutritionists can provide specific information on appropriate types of feed ingredients, feed sample results, and correct balancing of rations (58).

REQUIREMENTS

Feed must be available every day.

Diet must meet nutritional needs of goats appropriate for species, age, size, and stage and level of production.

Forage and high fibre diets must be provided to allow goats to ruminate.

Controlling risk of metabolic diseases must be considered when formulating and feeding rations.

Diet changes must be made gradually to allow acclimation of the rumen microflora. High volumes of grain must not be introduced suddenly.

RECOMMENDED PRACTICES

- a. Producers and stockpersons should be familiar with the basic nutritional requirements of their goats.
- b. Work with a qualified nutritionist to formulate diets.
- c. Mineral should be formulated specifically for goats (21).
- d. Test nutrient content of feed ingredients used and balance rations as necessary (21).
- e. Producers and stockpersons should become familiar with potential micronutrient deficiencies or excesses in their geographic area and formulate rations accordingly (21).
- f. Keep up-to-date feed and ration ingredient lists or tags or formulations, including mineral/vitamin mixes, to verify balanced diet.
- g. Encourage feed intake by providing quantities at each feeding that will be fully used and pushing up feed in bunks/alleys to ensure it can be easily accessed (46).
- h. Rejected, soiled, or spoiled feed should be removed from feed alley or trough before adding more feed (46).
- i. For optimal rumen performance, consistently and routinely provide only the amount of feed required for one day (46), and provide fresh feed every day.

4.1.2 Managing Feeding and Body Condition

Goats need to be monitored on a regular basis and feed resources must be well managed and readily available according to the animals' changing needs and environmental conditions. Goats that are not fed adequately will lose body condition and will not perform to their capacity. Body condition scoring (BCS) where the amount of muscle and fat is evaluated over the ribs, spine and brisket, is a tool widely used by livestock producers as an aid to herd management (59).

On-farm husbandry and management directly influence body condition; therefore, body condition scoring can be a key tool for on-farm assessment and management of goat welfare. Both emaciation (a BCS of less than 2 out of 5) and obesity (BCS of 4 or greater out of 5) can compromise the health and welfare of the individual goat and the herd. Doe condition has a major effect on kid development and survival. Obesity is a particular welfare concern for pregnant does, which may experience reduced appetites and be at risk for developing pregnancy toxemia. Emaciation may result from inadequate feed intake, chronic disease, or dental problems (21).

Target body condition scores will vary depending upon stage of production (Table 4.1 and *Appendix G – Body Condition Scoring*). Body condition scoring also allows producers to optimize the utilization of feed resources and animal productivity. In accelerated systems the interval between weaning and breeding is very short. It is, therefore, important to the does' well-being, to attempt to maintain a consistent body condition for accelerated herds. Body condition scores are most applicable to mature goats.

Table 4.1. Acceptable Body Condition Scores for production stages

Body Condition Scoring (out of 5)	Ideal BCS	Acceptable Range
For most stages of production	3.0	2.5 - 4.0
At kidding, or before winter	3.5	3.0 - 3.5
Does at breeding	3.0	2.5 - 3.5
Bucks at breeding	3.0	3.0 - 3.5

Source: Ontario Ministry of Agriculture, Food and Rural Affairs (2016) Body Condition Scoring Dairy Goats. Available at: <http://www.omafra.gov.on.ca/english/livestock/goat/news/dgg1708a5.htm>

REQUIREMENTS

Goats must have adequate feed intake to maintain body condition.

Body condition must be routinely assessed and monitored for change.

Corrective action must be taken if Body Condition Score falls below 2 (out of 5), or above 4 (out of 5).

RECOMMENDED PRACTICES

- The technique of Body Condition Scoring (see *Appendix G – Body Condition Scoring*) should be learned and used to assess whether the diet of the herd is maintaining goats in an acceptable range of body condition appropriate to their stage of production.
- Incorporate BCS scores into livestock record keeping system.
- If the body condition of a group or herd drops, consult a nutritionist and /or veterinarian to investigate and remediate.
- Note the body condition of goats that hang back from a group at feeding time, queue to feed after main group, or experience persistent bullying from other goats.
- Take remedial action if goats are being deprived of feed (i.e. goats could be fed separately, moved to different or smaller groups/pens where it can compete, or culled from herd).

4.1.3 Managing Feed Quality

Preventing goats from eating spoiled feed is easier than treating diseases caused by poor feed quality.

Ensiled feeds contaminated with soil or manure, and with a high pH (> 5.0), pose a risk for listeriosis. Spoilage is accelerated in warmer weather due to contact with air.

Feed must be carefully monitored so that any spoiled feed or forage can be removed and not fed to goats. Not all spoilage or contamination is visible or commonly tested for.

Purchased feed may already contain toxins that can be damaging to goats. Some toxins may form inside on farm storage (19). Nutritionists and/or feed suppliers can be valuable resources to help mitigate toxins.

Hay and straw containing particles of soil increases the risk for bacteria such as *Clostridium tetani* and *Listeri*. Hay and straw contaminated with cat feces or dead rodents increases the risk for toxoplasmosis. The spores of *Clostridium perfringens* D (the cause of enterotoxemia) are shed in goat feces and can contaminate feed, bedding and water.

Urine or feces increases the risk for Toxoplasmosis.

REQUIREMENTS

Feed must be handled, stored, and fed to maintain quality and minimize spoilage.

Feed contaminated with visible mold, spoilage (19), soil, or fecal material must not be fed to goats.

Suspected cases of listeriosis and tetanus must be diagnosed quickly and accurately. Early treatment saves goats.

Reasonable steps must be taken to prevent exposure to toxins (e.g., poisonous weeds and shrubs, moldy or spoiled feed, toxic construction materials, antifreeze, lead, and pesticides).

RECOMMENDED PRACTICES

- a. Monitor and observe goats for signs of feed refusal or illness. Investigate promptly.
- b. Feed should be stored in a dry area to avoid mold formation and spoilage (19).
- c. When handling haylage/silage, take care to disturb as little as possible. Any air that enters will cause it to become organically active again, decreasing feed value and palatability (19).
- d. When feeding haylage/silage in warmer weather, feed smaller amounts more frequently to reduce spoilage and feed refusal (19).
- e. Feed should be kept fresh.
- f. All feed hoppers, bins, carts and storage containers should be covered to prevent and minimize contamination by feces from birds and other animals.
- g. Hay and straw should be protected from access by cats, rodents and raccoons.
- h. Regularly inspect all feedstuffs for mold or spoilage (19).
- i. Spoiled or contaminated feed should not be fed to goats, and should be disposed or composted away from feed storage and production areas.
- j. Plastic-wrapped ag bags and baleage may have a compromised seal. Check plastic wrapping for holes and reseal with tape (60).
- k. Particularly on the ends, wrapped bales and bagged ensilage should be thoroughly inspected for spoilage before feeding.

4.1.4 Feeding Goats by Physiological Stage

Goat nutritional needs are higher when goats are actively growing, during late gestation, and for stages of high production of milk, meat, and fibre.

Between higher demand stages, a maintenance diet is adequate (i.e., enough nutrition to live and maintain the same body weight and condition). The quantity and quality of diet needed for maintenance will vary across all goat types even within the same production system or farm.

The herd nutritionist is a good resource person to consult when developing feeding program. Additional sources of information about goat nutrition and feeding management can be found (see *Appendix A – Resources for Further Information*).

Approaching winter, animals need extra energy reserves to keep warm. Goats living outdoors over winter will need more energy in their diets to maintain body heat (60).

BUCKS

Bucks are not fully grown until they are 2 to 3 years old. Maintaining body condition ranging between 3 and 3.5 is important for buck health and reproductive integrity. During breeding season, bucks may not eat enough feed to maintain an appropriate BCS. Out of season, dominant bucks may overeat and become too heavy to mount smaller does. Bucks may also disrupt doe feeding during breeding.

RECOMMENDED PRACTICES

- a. Feed bucks to achieve a BCS above 3.0 before the start of breeding season (60).
- b. Provide additional nutrient during bucks' first two years when their major growth occurs (60).

DRY DOES

Dry means non-lactating. Dry does need a maintenance ration with forage, fibre, and mineral. The dry period allows the mammary system to regenerate and heavy milkers can rebuild body reserves for next lactation. Lower quality forages can be fed to dry does to promote a sense of fullness.

RECOMMENDED PRACTICES

- a. Thinner does ($BCS \leq 2.5$) should be identified and managed to increase body condition to 3.5.
- b. Heavy dry does ($BCS \geq 4$) should gradually switch to primarily forage diet.

PREGNANT DOES

A maintenance diet with fibre and forage is adequate from early to mid-pregnancy. It is very important to provide more high energy grains and concentrates in the last trimester of pregnancy.

Doe nutrition and management during late gestation have a significant impact on colostrum quality (31, 61) and kid size at birth. Smaller kids are at higher risks for starvation and hypothermia. For best colostrum quality, does should be dried off 60 days or more prior to kidding (31, 62).

Yearling does are still growing during their first gestation and need extra nutrients (22). Prolific does have higher energy needs. Multiple and large kids can interfere with the doe's ability to consume adequate feed. To support fetal growth, the doe will mine her own body reserves at the expense of her health.

REQUIREMENTS

Diet changes must be made gradually.

Higher energy and protein diets must be provided to does in the last 4-6 weeks of gestation.

Late gestation does must be monitored for signs of pregnancy toxemia.

Dry off does at least 60 days before expected kidding.

RECOMMENDED PRACTICES

- a. Pregnant does should be monitored for changes in body condition. Does with a $BCS < 3$ require a higher energy ration to prevent further loss of BCS. Does with a $BCS \geq 4$ should be monitored for signs of pregnancy toxemia (ketones, feed intake).

- b. High quality forages (higher digestibility, less mature) should be directed toward pregnant does in late gestation.
- c. Monitor prolific does on lower quality pastures and feed close-up does more energy dense rations (to provide higher nutrition – option).
- d. Provide a mineral supplement formulated for goats.
- e. Over-conditioned pregnant does should still have adequate feed intake to support multiple fetuses in late gestation.

LACTATING DOES

Lactation is the most critical period for doe nutrition, placing the highest nutritional demands on does (60). Shortages of energy in the diets of lactating does translates quickly to reduction in milk production (a concern for nursing meat and fibre does). High producing dairy goats can lose weight (up to 7 kg) during the first months of lactation as they mobilize body reserves ('milk off their back') to produce milk. They eventually need to regain this weight (22). Feeding too much grain and not enough forage can lead to ruminal acidosis and subacute ruminal acidosis (55).

REQUIREMENTS

Does must receive adequate nutrition to maintain body condition throughout lactation.

Does nursing kids (especially multiples) must receive adequate nutrition to produce sufficient milk to sustain their kids until weaning.

RECOMMENDED PRACTICES

- a. Provide ample amounts of source of roughage and fibre to milking does.
- b. Feed particle size shouldn't be too fine, too sloppy, or wet (promote cud chewing).

NEWBORN KIDS & COLOSTRUM

Kid illness and mortality are welfare concerns. Proper colostrum management is a crucial practice for the prevention of kid mortality and assuring optimal health (31). Immunity is only gained in the critical period within 24 hours after birth (63, 64).

Colostrum is the first milk produced immediately after kidding, and is characterized by high energy and antibody content. There are several factors that impact the absorption of colostrum (65).

Quantity	Kids should receive 20% of their bodyweight of good quality colostrum in the first 24 hours of life.
Quality	Colostrum quality refers to the amount of energy (fat and protein) and of immunoglobulins. A reliable on-farm method of measuring quality is to use the Brix refractometer; only colostrum with a measurement of at least 19-21% should be fed to kids under 24 hours old. Higher is better.
Quickness	Provide the first colostrum feeding as soon as possible – first 2 hours is best. The ability of a kid to absorb the antibodies from colostrum begins to fall immediately after birth. Absorption occurs only in the first 24 hours of life.

Failure of passive transfer of immunity (FPT) is the term given to a newborn animal that has not received adequate immunity from the colostrum consumed. Some studies indicate FPT occurs if a kid possesses a serum IgG concentration of less than 10-15 mg/mL IgG or 5.4 - 6.0 g/dL total protein at 24 hours of age. Kids with FPT are at higher risk for infection (i.e. joint ill, septicemia) (66) as well as increased scours, pneumonia, and mortality.

Additional information about colostrum management is provided in *Appendix A – Resources for Further Information*.

REQUIREMENTS

Newborn kids must receive their first colostrum feeding as soon as possible (first 2 hours is best) and no later than 6 hours after birth.

During kidding season, stockpersons must plan for early morning checks and prompt care and feeding of new kids born overnight.

4.2 Colostrum Management for Dam-Raised Kids

In a dam rearing system, it is impossible to measure how much colostrum and milk a newborn kid is consuming. The kids' vigour and fullness in the gut needs to be carefully assessed early on to identify kids that need additional energy and immunoglobulins from supplemented colostrum. Inadequate intake of good quality colostrum leads to FPT, lower growth rate, starvation, and higher mortality before weaning (31).

Kids that do not nurse well in the first 2-6 hours need to be supplemented with another source of colostrum (e.g., bottle or tube fed) within the first six hours to ensure survival (63, 64). Triplets, quadruplets, and small or weak-born kids are at greater risk of insufficient intake (67).

RECOMMENDED PRACTICES

- The doe's teats should be checked for good flow and colostrum quality. Any blockages or dried milk should be removed. Teats and udder should be clean to lower risk of the kid ingesting bacteria.
- Assist kids to the udder to initiate nursing. Stockpersons should observe 2 or 3 good feedings (lasting 2-5 minutes) in the first 2 hours after birth.
- If no signs of nursing are observed or are imminent within 2 hours after birth, supplement colostrum by bottle feeding or esophageal tube feeding. Follow same procedures outlined in next section.
- Supplement when dam's colostrum is poor quality (clots, bloody or abnormal colour or consistency, signs of mastitis).
- Always keep a supply of good quality colostrum on hand.

4.3 Colostrum Management for Kids Removed from Dam at Birth

Cleanliness is critical when milking does and handling colostrum (including colostrum other species and colostrum replacement products). Stockpersons attending to kids must be diligent with cleaning all milking, mixing, and feeding equipment. The teats, udder and hands should be clean and dry. Bacteria in colostrum restricts the uptake of immunoglobulins, and can become a source of infection in young kids.

Quality of colostrum is critical to survival and long-term health of newborn kids. Colostrum from the first milking of a doe immediately after kidding is richest in nutrients and immune properties and become diluted the longer is taken to remove the colostrum from the udder. Good quality colostrum can be frozen for future use. Commercial goat colostrum replacement products are typically of bovine origin, which supplies the necessary energy, but may impact their effectiveness in building antibodies specific to

goats. Improper or overheating of fresh or frozen colostrum can degrade antibodies and reduce passive transfer of immunity.

Bottle feeding colostrum allows kids to learn suckle. Suckling triggers the esophageal groove reflex, which is the most efficient way for antibodies to reach the gut wall. Tube feeding allows the most control over amount, quality and timing of feedings.

REQUIREMENTS

A newborn kid must be fed a minimum of 20% of its birthweight in colostrum in the first 24 hours.

If not fed immediately, colostrum must be covered and chilled immediately after collection to minimize bacterial growth. DO NOT LEAVE AT ROOM TEMPERATURE.

When heat treating colostrum,

- *Do not exceed 60 C*
- *Do not heat for longer than 60 minutes*
- *Always use a method that provides even heating of the colostrum*

When thawing colostrum, thaw slowly, e.g. in refrigerator or water bath at cool temperatures (e.g. < 20 C) (do not use a microwave oven).

RECOMMENDED PRACTICES

Table 4.1. Recommended Colostrum Management Practices

Ideal Feeding Volume	<ul style="list-style-type: none"> Kids should receive 20% of body weight (~ 200 mL/kg) of colostrum in the first 24 hours divided into at least 3 feedings. For example: <ul style="list-style-type: none"> 3 kg kid (6 ½ lb) needs 600 mL (200 mL per feeding) 4 kg kid (8 ½ lb) needs 800 mL (270 mL per feeding) 5 kg kid (11 lb) needs 1000 mL (340 mL per feeding) This should provide minimum requirements for passive transfer, more is better.
Quality	<ul style="list-style-type: none"> Only feed colostrum from first milking. Fresh or frozen or heat-treated goat or bovine colostrum, freeze-dried bovine colostrum powder are all acceptable sources. Only colostrum with a Brix refractometer measurement of at least 19-21%% should be fed to kids under 24 hours old. Lower quality colostrum (brix under 19%) should not be used or should be supplemented.
Heat Treating	<ul style="list-style-type: none"> Heat treat for 1 hour at 56 - 60°C. To reduce bacterial levels and increase availability of the immunoglobulins to be absorbed. Used for CAE and Johne's prevention/eradication program to kill pathogens in the colostrum.
Esophageal Tube Feeding	<ul style="list-style-type: none"> Each farm should have a stockperson trained in proper method of tube feeding a newborn kid. Insert tube carefully and assure the tube is in esophagus and not the lungs. Feeding tubes should be washed with soap and water, and rinsed between

	kids.
Cleaning & Sanitizing Colostrum Equipment	<ul style="list-style-type: none"> • Colostrum equipment should be cleaned using soap and hot water (80°C). • Sanitize to reduce and/or kill bacteria. • Air dry thoroughly to reduce bacterial levels. • Feeding tubes are prone to biofilms, and must be cleaned and sanitized daily between uses with high water pressure.

Source: Ontario Goat (2015) Management Practices for Raising Dairy Buck Kids for Meat: Success from the Start! Available at: <https://ontariogoat.ca/wp-content/uploads/2016/03/Buck-Kid-Booklet-LR8.pdf>

4.4 Raising Kids on Milk Replacer

Dairy kids are typically separated from their dams at birth and are raised on milk or milk replacer. Orphans, rejected kids, and multiples are often separated from their dams and raised on milk replacer. For more resources see *Appendix A – Resources for Further Information*.

REQUIREMENTS

Milk replacer powder must be well mixed to stay in solution, mixed at correct concentration, and deliver consistent nutrition to all goats in group.

All kids must be able to drink, or must be trained to drink, from a nipple or drinking device.

Kids must receive a volume and quality of milk or milk replacer to promote health, growth, and vigour (21).

Milk feeding equipment and utensils must be cleaned and sanitized after each use.

Automated milk feeders must be cleaned and sanitized as needed to maintain a sanitary feeding system.

RECOMMENDED PRACTICES

- pH value of acidified milk for goat kids should be in the range of 4.1 to 4.5 (46).
- Avoid “slug feeding” or too much milk in a single feeding (46).
- Follow the manufacturers’ instructions for mixing, scheduling, and feeding milk replacer.
- Feed kids at least 15% of body weight in milk (22) (i.e. 10 kg goat gets 1500 mL per day).
- Milk replacer should be formulated specifically for goats.

4.5 Preparing Kids for Weaning

Weaning should be a gradual process that allows a kid’s developing rumen to start functioning as it transition to adult diet. Gradual weaning is preferable to allow full development of the digestive capacity, frame, and internal organs (46). Weaning shock will be lower for kids that have become adjusted to solid feed prior to weaning.

Older kids can be safely weaned suddenly or “cold turkey.” However, the does need to significantly cut the energy in their ration in order to decrease milk production comfortably with no engorgement or udder health issues (46). Kids that have reached 14-15 kg (31-33 lb) are ready for weaning, regardless of age.

Additional information about colostrum management is provided in *Appendix A – Resources for Further Information*.

REQUIREMENTS

Starter or creep diet and access to water must be provided to nursery-raised kids by 1-2 weeks of age to promote rumen development.

Before weaning, kids must be consuming adequate amounts of forage, solid feed, and water daily.

Kids must not be weaned from milk before 6 weeks of age (70).

RECOMMENDED PRACTICES

- a. Introduce a very small amount of feed, forage, and water at 1-2 weeks, and kids will gradually begin to eat and drink.
- b. A creep area enables kids to access feed with less competition from adults in herd.
- c. Fine, higher-quality hay or forage should be accessible ‘free choice’.
- d. Pastured kids should start eating grass on rotated or lower parasite-pressure grazing areas, and be monitored for internal parasites.
- e. Consider using coccidiostats (oral or added to feed) to help prevent intestinal damage and malnutrition caused by coccidiosis, and improve overall kid nutrition and health.
- f. Stale or refused feed should be removed daily and before fresh feed is added.
- g. Monitor progress in consumption of hay, pellets, dry feed.
- h. Monitor body condition throughout the weaning process.
- i. Gradual weaning, by limiting the nursing frequency or feedings of milk or milk replacer over several days, is recommended to reduce weaning shock and stress (68).
- j. Avoid weaning kids who are sick (68).
- k. Do not wean kids before they grow to 2.5 times its birth weight (minimum 11 kg or 25 lb).

4.6 Grazing and Pasturing Areas

Goats are natural browsers, and will consume up to 50% of their diet by nibbling shrubs and trees, if available.

If forage is grazed too close to soil, goats have increased potential for ingesting parasite eggs (68). As they get older, goats increase their natural resistance and resilience against internal parasites.

Pasture rotation and strip or controlled grazing, can improve forage quality and availability, thus improving nutrition.

It can be challenging for late gestation does to derive adequate nutrition from low quality pasture. Adequate levels of calcium and magnesium through limestone and magnesium oxide will help prevent grass tetany in pregnant does (60).

REQUIREMENTS

Goats must have access to sufficient forage to maintain body condition.

The ration must be supplemented if there is insufficient forage available.

The ration must be supplemented if forage is inaccessible due to snow or ice cover.

Feed volumes / rations must be increased in extreme cold weather to allow for higher energy demands of goats.

Stockpersons must ensure that pregnant does are getting a high enough plane of nutrition to support late gestation needs.

Application of fertilizers, pesticides, and herbicides onto pasture must be timed to prevent risk to animals (8).

Access to poisonous or toxic weeds and shrubs must be prevented.

RECOMMENDED PRACTICES

- a. Pastures and grazing areas should be managed to optimize forage quality and quantity.
- b. Rotate pastures to reduce parasite loading.
- c. Internal parasites should be monitored in goats on pasture.
- d. Mineral and supplements should be formulated specifically for pastured goats based on season and production stage.
- e. Use forage test results to balance ration for winter feeding.

4.7 Feeding to Prevent Common Metabolic and Nutrition Related Diseases

Metabolic diseases are caused by productivity practices where the body reserves of certain nutrients such as calcium, magnesium or energy cannot meet physiological needs. Prevention requires pro-active planning and careful management. The herd veterinarian and nutritionist can be valuable resources.

Heavy milkers and fast-growing kids on high energy diets are prone to gastrointestinal disorders such as bloat, enterotoxemia and rumen acidosis. Care must be taken not to process grains for goats (70).

A poorly regulated intake of a high energy diet causes an upset in the rumen microflora with a temporary and prolonged drop in ruminal pH to acidic levels, and is known as sub-acute rumen acidosis (SARA). More severe cases of ruminal acidosis are often called “grain overload” and are usually a result of feeding accidents. Goats with SARA will have a drop in appetite and milk production. It is also likely associated with enterotoxemia due to overgrowth of *Clostridium perfringens* D in the digestive tract and toxin production. Laminitis is a possible outcome of SARA as well as other toxic conditions, and causes lameness in highly productive lactating does. For example, damage to the laminar tissue leads to abnormal hoof growth, poor or flaky quality of hoof keratin, foot abscesses, misaligned bones in feet, deformed swollen feet – all contributing to lameness (31).

Obese and thin does are prone to pregnancy toxemia and are more at risk when carrying multiple fetuses. Ketosis occurs after kidding and is related to insufficient dietary energy during peak milk production usually soon after kidding. It is worse in obese animals. Hypocalcaemia in pregnant goats is due to insufficient dietary calcium in late pregnancy when fetal skeletons are forming and can also occur after kidding related to high milk production and inadequate dietary calcium.

Young bucklings, breeding bucks and wethers are susceptible to developing urinary blockage due to calculi. The urethra becomes clogged with stones, preventing urination, which can cause a very painful and fatal rupture of the bladder or urethra.

REQUIREMENTS

Controlling risk of metabolic diseases must be considered when formulating and feeding rations.

Diet changes must be made gradually. High volumes of grain must not be introduced suddenly.

Grains must not be ground too fine.

Forage must not be over processed.

Diet must not exceed animal needs. Take care not to overfeed.

Detection of metabolic disease must be quick and accurate for early intervention.

RECOMMENDED PRACTICES

Enterotoxemia

- a. Prevent accidental gorging on grains and high energy feed.
- b. Feed whole grains which encourage chewing and take longer to digest. Provide forages free choice with fibre length and digestibility that encourages chewing.
- c. Vaccination program can reduce clostridial diseases causing enterotoxemia.

Ruminal acidosis / sub-acute ruminal acidosis (SARA)

- d. Balance the ration to meet and not exceed energy / protein needs of does.
- e. Feed smaller servings of grain more often.
- f. Provide access to high quality forage free choice will reduce the risk of digestive upset and overgrowth of bacteria that produce lactic acid.
- g. Monitor feet and legs for evidence of poor mobility, sensitivity, deformation, etc.

Urinary Calculi and Urolithiasis

- h. Balance calcium and phosphorus in diet to 1.5 to 2:1 to minimize formation of struvite (triple phosphate) crystals.
- i. Diet for young male kids should be formulated to increase acidity of urine to prevent crystal formation.
- j. Provide salt (at least 1%) to encourage water consumption.
- k. Water should be available at all times, palatable easily accessible and low competition for bucks.
- l. Observe male goats for signs of straining or pain when urinating.

4.8 Drinking Water

Drinking water consumption will vary depending on production system, breed, stage of lactation, milk production, diet, feed intake, salt intake, weather, and temperature conditions.

When water intake is reduced, feed intake also decreases, which can become a welfare issue.

Housed goats generally drink 3 to 5 times daily (22). Goats on pasture can consume a considerable amount of water by eating lush forages.

Water volumes required for maintenance of dry does may be as low as 2-4 L per day, and lactating goats may drink or consume 4-12 L per day depending on milk production. For each litre of milk produced, the doe must consume almost double that amount of water.

Snow is often consumed by pastured goats, but considerable volumes are needed to extract enough water to maintain nutrition. For example, to absorb the equivalent of 5 L of drinking water, the goat would have to eat roughly 50 L of snow. Consumable snow also has to be clean and untrampled, as goats will

refuse to consume dirty or soiled feedstuffs (CDC). Eating frozen feed, very cold water, or snow also increases energy requirements (22). The temperature of the rumen fluid may not return to normal until more than two hours after a cold drink.

Snow and ice are not acceptable as sole sources of water for goats. Fresh palatable water must always be provided.

REQUIREMENTS

All goats must always have access to sufficient quantities of palatable water.

All goats must be allowed to drink until thirst is satisfied.

Kids must have access to a palatable water source by 1 week of age.

All goats must be able to easily access water.

Water must be provided in addition to snow.

RECOMMENDED PRACTICES

- a. Provide water at a target temperature of 15C and not lower than 5C (water consumption decreases; 46).
- b. Check frequently to ensure that water is clean and unsoiled (46).
- c. Have municipal and well water tested at least once per year for coliform and E. coli levels (46).
- d. When using natural water sources for goats, try to maximize water quality by keeping access areas as free as possible of erosion, agitation, manure runoff (46).
- e. Plan for a backup source of water.

5 Husbandry Practices

Desired Outcome: To maintain content, productive, and healthy animals through good management practices.

5.1 Handling

Goats are subjected to different handling and management procedures within dairy, meat, and fibre production systems. Handling can be stressful to goats even when conducted for health and welfare reasons (e.g., medicating, hoof trimming).

Being aware of goat behaviours will facilitate handling and reduce stress and injury to both goats and handlers. Goats are very familiar with their environments and adapt quickly to routines. They are sensitive to changes and sudden movements. Stockpersons should perform their working routines on a regular schedule and move about with minimum disturbance.

Goats should be handled in a calm manner. Care should always be taken to avoid injury (20).

Catching

Goats should not be chased during catching. Instead, animals should first be herded into a smaller spaces such as a pen or handling system. Handlers can catch individual animals with the use of a crook, by holding onto a collar, with hand restraint under the jaw and over the poll of the head, or briefly by the back leg. Horned goats can be caught, held, and guided by the base of the horn but not pulled (71). Kids should not be handled by their horns as these can break. Goats are never to be lifted, dragged or pulled by the tail, legs, ears, neck or skin on their body. Suggested equipment for restraining in place includes a halter, stanchion/head gate, shearing headstall and/or goat handling chute (20). The objective is to choose an appropriate restraint technique that will cause minimum stress and discomfort. Goats should be always restrained for the least amount of time possible.

Handling during shearing

Angora goats may be caught by the horns or by the hair under the chin, but never by the hair on the rest of their body. During shearing, Angoras can also be acceptably controlled by sitting them between the shearer's legs.

Facility designs

Handling goats in groups reduces stress to individuals. Good handling facility designs should make use of goats' natural behaviours. Goats have a natural flight zone (see *Appendix H – Goat Flight Zone*) within which they try to distance themselves from handlers. An effective distance to follow behind a herd when trying to encourage calm forward movement, is 3 to 4 meters (21). Using positive reinforcement during handling (e.g., a food reward) and habituating goats to a handling areas by using familiar equipment can reduce stress during handling procedures (21). Unfamiliar humans, movement, shouting, and the presence of dogs – particularly if barking – can cause fear. Reducing fear in goats when handling can increase handling efficiency, reduce injuries, and create a calmer herd.

Goats learn from, and may remember, good and bad experiences. Previously learned aversion, related to a stressful handling procedure, may diminish over time if not repeated. Because goats have a strong

ability to recognize and remember individual humans, fostering positive human-goat interactions is important for animal welfare (31).

Herding dogs

It is essential that dogs used for herding goats be well trained. If canine instincts are not properly managed, dogs may cause harm by chasing goats erratically, running through the herd, or becoming overly aggressive and biting.

REQUIREMENTS

All handlers must understand goat behavior and be competent in goat handling techniques.

Handlers must work calmly and quietly with goats at all times using the minimum force necessary.

Goats must be handled at all times so as to minimize the risk of pain, injury, or distress (e.g., goats must not be dragged, lifted, grabbed by the tail, legs, ears, horns or skin (hair)).

Goats must not be subjected to mistreatment (including kicking, hitting, or tail twisting).

Electric prods must never be used.

Goats must not be left unattended while restrained for a procedure.

Herding and guard dogs must not stress goats (e.g., by chasing, playing with, or biting).

Dogs must not have access to goats unless under the control of a stockperson (with the exception of trained and acclimated livestock guardian dogs; 21).

RECOMMENDED PRACTICES

- a. Use a well-designed and maintained handling system and equipment (see *Section 2.6 – Handling Systems*).
- b. Goats should be familiarized with handling equipment and provided with positive reinforcement to encourage positive responses to future handling.
- c. Goats' natural behaviours should be used to encourage free movement to desired pens or other locations (see *Appendix H – Goat Flight Zone*).
- d. Supervise goats when crowded in races (alleyways), pens, or yards for prolonged periods.
- e. Minimize isolation of individual animals. Goats should be able to see, smell, and hear other goats whenever possible and be returned to their herds as soon as possible.
- f. Plan procedures to avoid extreme weather conditions and to minimize the frequency, duration, and degree of restraint.
- g. Avoid inverting or holding goats on their sides or backs for longer than necessary during procedures – especially if the rumen is full or the animal is heavily pregnant (21).

Social Environment

Goats are herd animals and must have both physical contact with other goats and enough space to permit natural behaviour (e.g., running, playing, mutual interaction). However, they will retreat from herd to kid.

Each time a group of goats changes members, animals try to re-establish social dominance (or pecking order; 72, 73). Some fighting is normal, but a tight space per animal adds to stress and negative behaviours from overcrowding. It is normal for a herd to have a queen, or dominating doe.

Goats can become stressed and depressed and refuse feed if kept alone in a pen (74, 75, 76, 77). This can become an issue for goats recovering from illness, or in isolation before joining a new herd.

REQUIREMENTS

Goats in individual pens must either see or hear other goats or companions.

Timid and lower social ranking goats must be monitored for bullying, injuries, and drop in feed intake and body condition score. Prompt action must be taken for animals showing signs of inadequate feed intake or injuries.

RECOMMENDED PRACTICES

- a. House goats in compatible groups.
- b. Add new goats to a pen before returning the main group.
- c. Add multiple goats (rather than a single goat) to an existing group.
- d. Provide extra space per goat when blending new groups.
- e. Monitor goats after moving.
- f. Sell breeding does with at least one companion.

5.1.1 Yokes and Tethering Devices

Yokes and tethering devices are occasionally used to control animal movement. Goats are naturally curious and will investigate gates, fences, and pens meant to keep them safely contained. At times, this can result in goats escaping or getting stuck. This is more common in horned goats.

Goats that are fitted with yokes or tethered may be less able to eat and drink normally, may get entangled or trapped, injure themselves, or be more vulnerable to predation (from dogs or wildlife). Temporary use of a yoke, horn bars, and tethering may be the last practical method of preventing a stubborn animal from repeatedly getting entrapped or injured. Risks must be carefully balanced when determining what is best for an individual goat's welfare.

Use of yokes, horn bars or tethers carry with them risks to the goat and should not be used instead of correcting housing and fencing deficiencies. If more than one goat needs to be fitted with a device to prevent escape or entrapment, this is a sign that housing/fencing is inadequate and must be repaired or upgraded.

Yokes and Horn Bars

Goats are sometimes fitted with yokes around the neck, or have a bar attached horizontally across their horns (horn bar) with the effect of making the goat's head wider in order to prevent them becoming entrapped in fences or penning. These devices should only be used as a temporary measure until fences/penning can be properly repaired. Devices should be removed at least daily. Yokes and horn bars should always allow goat to access food and water.

REQUIREMENTS

Yokes and horn bars must not cause pain, injury, or distress.

Animals must not wear a yoke or horn bar continuously.

RECOMMENDED PRACTICES

- a. A goat who is repeatedly rescued, becomes entrapped or escapes through fencing in good repair, could be considered for removal from the herd.

Tethering

Tethering usually involves a length of rope tied to the goat's collar and then anchored to another object. Goats may sometimes be tethered to keep them within a building or pen, or to graze areas where no fencing is present.

The agility and mobility of goats makes them prone to becoming entangled. Tethering should only be done for the shortest time possible and it is not an acceptable substitute for proper housing and fencing. Animals must always be supervised to be able to quickly correct issues of entanglement or entrapment and also to prevent predator attacks.

REQUIREMENTS

Tethering devices must not cause pain, injury, or distress.

Animals must not be tethered continuously.

Goats must be directly supervised when tethered.

All methods of restraint must allow for the quick release of goats.

Goats that are restrained by tethering must also be:

- *Calm and trained to the conditions*
- *Provided with constant access to palatable water, sufficient feed, and timely access to effective shelter*
- *Able to walk and move around without becoming entangled or entrapped.*

Goats must not be tethered if sick or compromised, pregnant, nursing (78).

RECOMMENDED PRACTICES

- a. Ensure that the minimum length of a tether is about 4 goat lengths.
- b. Observe goats to determine areas of housing that allow escape or entrapment and repair as needed.
- c. Ensure that goats are provided with adequate space, feed, water, enrichment, and are housed in compatible social groups to reduce time spent testing fences.

5.2 Predation Control

Predation of livestock by wild, feral, or domestic animals can have severe consequences on animal welfare by causing fear, stress, pain, injury, or death. Goats that are attacked, if not killed, are often left with serious injuries and often require euthanasia. Those that are chased but not injured, also experience considerable stress, e.g. pregnant does may abort, extreme exertion from running can cause muscle damage.

There are many management practices that producers can employ to try to reduce the threat of predation. Methods of predator control may include: supervision, fencing, housing indoors, livestock guardian

animals, and lethal control. Livestock guardians include dogs, llamas, and donkeys. Guardian animals are to be treated with the same care and consideration as the goats.

REQUIREMENTS

Producers must implement a strategy to minimize predation risk.

Producers must provide prompt and appropriate care for goats that have been attacked by predators (see Sections 6.0 – Health Management and 8.0 – Euthanasia).

RECOMMENDED PRACTICES

- a. Predation control strategies should be reviewed and improved as necessary following predation related injuries or deaths.

5.3 Identification

Animal identification is essential to many aspects of a successful goat operation including animal health. Animals should be uniquely and permanently identified with tattoos and/or approved tags and/or leg bands. Federal identification regulations must be followed.

While there is immediate short-term pain when a goat is tagged or tattooed, long term pain is unlikely provided the site is not damaged or becomes infected.

For tags and tattoos that pierce the skin, handlers should:

- Use proper handling and restraint practices to minimize the risk of ear or tail web damage during application.
- Ensure that tags are inserted in the correct location – avoiding significant blood vessels – and on days in which fly activity is not high (if possible).
- Avoid ear notching.

REQUIREMENTS

Producers must ensure all government identification requirements are met for all goats.

All goats must be uniquely and permanently identified.

Stockpeople must ensure that all identification materials are suitable for goats.

Goat identification must be performed or supervised by a competent stockperson in a way that causes minimum handling stress.

Proper restraint appropriate for the size of each goat must be used when identifying goats.

Handlers must use application equipment that is sharp, in good working order, and maintained according to manufacturer's instructions.

Handlers must employ proper hygiene practices to reduce potential infections (e.g., ensure that the applicators, tags, ears, tail web,

and the stockpersons' hands are clean and dry before the procedure) and ensure that infected tagging sites or tears are properly treated.

When using ear or tail web tags, stockpersons must:

- use a tag suitable for the age, size, and breed of goat,
- use 2 tags maximum per ear,
- ensure the tag is positioned correctly to avoid excess bleeding.

Branding goats must not be practiced.

RECOMMENDED PRACTICES

- a. Apply identification at times when fly activity is low.
- b. Consult a veterinarian if severe infection or other problems develop.
- c. If kids are not permanently identified at birth, use temporary identification until they are permanently identified.

5.4 Hoof Trimming

Proper attention to hooves is a key component of animal care. Hoof conditions affect animal health and welfare. Hooves should be checked regularly for excess growth and disease.

Hoof trimming is done:

- to promote proper hoof growth and prevent lameness (see *Section 6.2.1 - Lameness*).
- to create a flat sole surface, thus removing trapped dirt and feces and reducing the possibility of infection.

Hoof growth is influenced by animal characteristics (e.g., breed, structure, shape and colour of hoof) and environmental factors (e.g., soil type, moisture, diet, and housing). As a result, the need for and frequency of, hoof trimming will vary. For example, lactating does on high energy diets with straw bedding, will require more frequent trimming than pastured goats walking long distances on hard, dry soil. Kids reared indoors benefit from routine trimming and should start no later than 6 months of age.

REQUIREMENTS

Hooves must be inspected regularly and trimmed as required (minimum every 6 months) to maintain hoof health and goat well-being (see *Appendix I – Properly Trimmed and Overgrown Hooves*).

Hoof trimming must be performed by or under the supervision of competent stockpeople.

Stockpersons must have the ability to identify signs of overgrown hooves, foot rot and other diseases.

Trimming equipment must be clean and well maintained.

Equipment must be disinfected between animals within the herd where warranted due to the possible presence of disease.

RECOMMENDED PRACTICES

- a. Plan hoof trimming to minimize the need to trim during periods likely to increase stress (e.g. late gestation, hot weather).
- b. Hooves should be trimmed, if possible, when soft (e.g., following heavy dew or rain).
- c. Avoid trimming Angora hooves within a week prior to shearing to reduce the subsequent chance of injury to the goat and shearer.
- d. When trimming, goats may either be restrained in a standing position, sitting between the legs of person restraining the goat or in a trimming chute. The person trimming the feet must take care to avoid being injured by sharp hooves.

5.5 Castration

Producers should carefully consider whether castration is necessary within the herd. Castration is unlikely necessary where bucks will be finished and sent to slaughter before puberty. Bucklings can be sexually active as early as 3 months of age and should be separated from does to avoid unwanted pregnancies (21). The procedure should only be carried out where bucks have ready access to post-puberty does (e.g., pasture-managed meat herds), are not likely to be slaughtered before puberty, and breeding needs to be prevented.

All methods of castration, at any age, cause pain. Pain relief reduces the impact of castration on welfare and must be used.

Drugs effective for pain relief in food animals are available for goats but are “extra label” drug use (ELDU) and must be prescribed and dispensed by a veterinarian (see *Section 6.0 - Health Management*). Desensitization of the scrotum and its contents can be achieved by the use of an injectable local anesthetic. Post-operative pain control (analgesia) can be achieved when a non-steroidal anti-inflammatory drug (NSAID) is administered at the time of the procedure.

There are three main methods of castration: rubber ring (also called banding), clamp (e.g. Burdizzo), and surgical. However, with surgical castration, there are the additional risks of bleeding, possible evisceration, and infection (22). While clamp castration has the advantage of not creating an open wound, there is a higher risk of failed castration and ensuing tissue problems due to improper technique. All are acceptable methods with pain mitigation. The least painful method is to combine a rubber ring with a clamp while using pain control (79).

There are fewer adverse outcomes to castrating bucks at a young age (22). As bucks age, the size of the scrotum and associated structures increase, which can give rise to increased inflammation and pain until healing occurs. To avoid disruption of colostrum intake, it is recommended that bucks not be castrated during the first 24 hours after birth (80). However, castration should be carried out as soon as possible afterwards.

REQUIREMENTS

A decision to castrate must be based on a welfare risk-benefit analysis rather than routine.

Producers must work with their veterinarian to develop practical, safe, and effective protocols for reducing pain resulting from castration.

Castration must only be performed after training with a veterinarian and by a competent stockperson using proper technique and sanitary, well-maintained equipment.

Pain control must be provided in consultation with a veterinarian. All castrations must meet the method, age range, and pain control use requirements stipulated in the table below:

Method	Age range	Mode of pain control required
Rubber ring and clamp	24 hours - 10 days	analgesia
Rubber ring	24 hours - 10 days	analgesia
Clamp castration / Emasculator (e.g., Burdizzo)* Older than 12 weeks of age, to be completed by vet.	Age of the kid may vary by breed and animal when this procedure is suitable	Local anesthesia and analgesia required
Surgical- Cut and pull - over 24 hrs, no older than 7 days of age	24 hours - 7 days	Local anesthesia and analgesia required
Surgical - Emasculator - veterinary procedure only	Older than 7 days	Local anesthesia and analgesia required

* The size of the scrotum and testes must be large enough to allow proper clamp and crush of the spermatic cords without crossing the middle of the scrotal neck. Scrotum and clamp size must be appropriate to perform procedure correctly.

Producers must monitor for signs of post-operative complications, consult with their veterinarian, and take appropriate corrective action if needed.

Castration of bucks beyond 12 weeks of age must be performed by a veterinarian using anesthesia and perioperative analgesia.

RECOMMENDED PRACTICES

- Bucks should be left intact in management systems where they are reared separately and marketed prior to puberty.
- Discuss tetanus vaccination with your herd veterinarian when castration will leave an open wound.
- Bucks intended to be retained as adult wethers may benefit from delaying castration beyond 8 weeks of age to allow development of the urethra and reduce the risk of urinary calculi (81).
- Consult your veterinarian on the use of chemical sedation to reduce handling stress.

5.6 Disbudding/Dehorning

Disbudding is a procedure that removes the horn bud before it attaches to the skull (2, 3). Dehorning is the process of removing horn tissue after the horn bud attaches to the skull (2, 3).

The prevention of horn growth is a practice mostly used in dairy husbandry. It is not a common procedure in meat herds and is not permitted in registered Boer and Angora herds. Horned goats can cause serious injuries to herd mates and handlers. Horns may also become entrapped in fences and other equipment.

In Canada, the majority of dairy goats are disbudded as kids, likely due to large herd sizes and high stocking densities, as well as the need to avoid entrapment in housing and milking facilities that have been designed specifically for goats without horns (31). Dairy kids destined for prepubescent meat production are not disbudded.

Kids have very thin skulls compared to calves and are highly susceptible to improper disbudding procedures (84). Disbudding injuries, such as damage to the brain or infections can cause death in kids. High temperatures, holding the iron to the head too long – or with too much pressure – can lead to damage to the skull and brain, possibly leading to death (2, 3, 22, 80, 84, 85, 86, 87).

Only a competent person using proper equipment, technique, and pain control may conduct this procedure, while taking all precautions to avoid pain and distress to the animal. The term “competent person” refers to an individual who has acquired and demonstrated suitable skills, experience and proficiency to perform, or assist in performing, the removal of horn buds and trimming horns.

Optimal age for disbudding is between 7 and 14 days of age (always before the buds have attached to the skull) (84, 87, 88). Horn attachment may begin at different times based on the breed and sex of the goat but generally begins at 21 days.

Kids should be returned to their normal surroundings as soon as possible after the procedure.

For some horned goats, it may be necessary to trim the tips of the horns to prevent injury from ingrown scurs, interference with sight, or normal eating and drinking (22). The amount of horn trimmed should be kept to a minimum (21). To avoid damage to soft internal horn tissue, which is sensitive and bleeds easily, handlers should trim in 2.5cm increments. A veterinarian should be consulted regarding the choice of an appropriate tool.

In certain circumstances it may be necessary to trim a substantial portion of the horn, or completely dehorn a goat. A licensed veterinarian must perform such procedures.

Dehorning (removing horns after the horn bud has attached to the skull or horns have grown) is a highly invasive procedure and must be avoided unless necessary for the welfare of the goat. Alternatives to dehorning, such as regrouping aggressive animals or modifying housing or fencing to reduce entrapment, should be considered before dehorning (22).

Some goats are born polled but this is a very rare occurrence (naturally hornless). In European breeds, like the Toggenburg and Saanen, polled goats are often also infertile and have characteristics of both male and female goats (22, 89). Hence, breeding polled goats is not recommended.

REQUIREMENTS

Disbudding must only be done by a competent person after training with a veterinarian or other competent person.

Analgesia such as NSAIDS must be provided at the time of disbudding.

If using a local anesthetic, it must only be provided by a competent person after training by a veterinarian.

Disbudding must be performed on kids whose horn buds have not attached to the skull, usually between the ages of 7 to 14 days, and not more than 21 days.

After disbudding, kids must be observed for several days for signs of illness such as decreased milk intake, decreased activity, hunched posture, and a lack of interest in the environment.

Hot iron disbudding is the only acceptable method of disbudding goats. Caustic paste and clove oil must not be used.

Horned goats or goats with scurs must be inspected regularly to ensure that no part of the horn/scur is in contact with the body or face (21).

Minor horn trimming (“tipping”) must be performed by a competent person, making sure to avoid sensitive internal tissue.

Dehorning must not be performed unless necessary to protect the health and welfare of the goat and must be removed by a licensed veterinarian using a sedative, a general or local anesthesia, and perioperative analgesia regardless of age (31).

Dehorning using banding, gougers, Barnes dehorner, or Keystone dehorner is prohibited.

Dehorned goats must be observed several times a day in the first 24 hours for excessive bleeding and daily for infection until healed.

Broken horns with excessive bleeding or signs of infection must receive immediate veterinary attention.

Effective January 1, 2025:

- ***All disbudding must be performed by a competent person after training with a veterinarian and with a combination of sedative, local anesthetic, and NSAID.***

RECOMMENDED PRACTICES

- a. When disbudding, use a combination of sedative, local or general anesthetic, and NSAID to provide the most pain control.
- b. Remove the cauterized horn bud to improve effectiveness of disbudding and prevent scurs.
- c. Dehorning should be conducted outside of the fly season when possible.
- d. Discuss tetanus vaccination with your herd veterinarian when disbudding or dehorning.
- e. Dehorning must only be done using an obstetrical wire or saw.

5.7 Other Management Practices

Occasionally some goats are born with wattles on their neck. These appendages do not affect their health or welfare and should not be removed.

Multiple teats, depending on their position, can be a hindrance with milking machines or for suckling kids. Goats with webbed or dysfunctional teats should be culled as this trait can be passed on to offspring.

REQUIREMENTS

Removal of extra teats or de-wattling must be done at as early an age as possible and must only be performed after training with a veterinarian and by competent person using proper technique and well-maintained sanitary equipment. Pain control must be provided in consultation with a veterinarian.

5.7.1 Breeding

Goats are seasonal breeders. The length of the breeding season varies by breed, with photoperiod being the most important contributing factor (21). The natural breeding season generally ranges between late summer and mid winter, but some breeds may be considerably longer or even year-round. Out-of-season breeding can be achieved with photoperiod management (21).

Individual goat identification is important for managing breeding and keeping accurate records that are essential to support sound decision making.

Producers should plan mating periods to coincide with expected weather conditions, available shelter, and available labour at time of kidding.

Bucks

Bucks should be managed so that they have suitable body condition scores prior to the normal breeding season and before they are used for breeding (see *Section 4.0 – Feed and Water*). Some bucks will lose condition during the breeding season whether they are breeding or not. They should be fed a balanced diet to maintain adequate condition throughout and following the breeding season.

Bucks are fertile as early as 12 weeks of age. To avoid unplanned matings, bucks are often kept separate from does. Isolation, however, is stressful for goats (74, 75, 76, 77). Whenever possible, bucks should be kept in the company of compatible males. Aggressive large bucks should not be housed with smaller timid bucks, which could result in injuries and stress. When goats cannot be housed together, they should be able to see and hear other goats (See *Section 2.0 – Housing and Handling Facilities*).

When performing a breeding soundness evaluation and semen collection is needed, whenever possible, a less invasive procedure (e.g., an artificial vagina) should be used in preference to electroejaculation (90).

Where breeding bucks are fitted with a marking harness to confirm breeding dates, the harness should be checked regularly to ensure that it is adjusted properly to avoid injury or discomfort. It should not be left on for longer than necessary.

Due to the natural behaviour of establishing dominance, placing more than one buck at a time with does can result in serious injury caused by fighting. Their behaviours need to be closely monitored and action may be required to avoid injuries.

Does

Does and doe kids should be managed and fed so that they have suitable body condition scores at the times of breeding and kidding (see *Section 4.0 – Feed and Water*). Does may be fertile at a very young age and need to be kept separate from fertile males (including bucklings) until old and large enough to breed.

Where natural mating is conducted, attention must be given to the health status of the animals to prevent transmission of infectious diseases. The body weight and size of the bucks used in natural breeding must be appropriate to the size and physical development of the does or doelings in order to prevent injury or undue stress to mounted females.

REQUIREMENTS

Producers must plan breeding such that appropriate supervision and shelter at kidding will be available.

Bucks must be managed by taking into account the risk of aggressive behaviour to avoid possible injury to other bucks and handlers.

Bucks and does must have suitable body condition scores at time of breeding.

Doelings must be a minimum of 65% of their breed's expected adult weight at time of breeding.

At 3 months of age, and until the doelings reach the appropriate weight, they must be kept separate from bucks and bucklings to prevent unwanted, premature pregnancies.

The body size and weight of the bucks used in natural breeding must be appropriate to the size of the does.

Non laparoscopy semen collection and artificial insemination must be conducted by a competent stockperson.

Where there is no practical alternative, electroejaculation must be done by a licensed veterinarian in a manner that minimizes discomfort and with appropriate pain control (90).

Insemination, collection, and implantation of embryos via laparoscopy, are surgical procedures and must be done by a licensed veterinarian.

RECOMMENDED PRACTICES

- a. Producers should keep accurate breeding records.
- b. Bucks and does should be fed a balanced diet to maintain adequate condition throughout the breeding season.
- c. Marking harnesses for bucks should be properly fitted and checked daily.
- d. Electroejaculation should not be performed as a routine procedure.
- e. To limit fighting, avoid introducing unfamiliar bucks to one another during the breeding season.

Pregnancy and Kidding

Newborn kid survival is highly dependent on adequate nutrition throughout gestation to assure proper placental and fetal growth. Multiple fetuses are very common in most breeds and does should be fed accordingly. Additionally, proper nutrition during gestation is important to prevent nutritional disorders which can impact the health and performance of the doe and her kids, and influence milk production (91). To determine specific needs, see *Section 4.0 – Feed and Water*, and consult a qualified ruminant nutritionist or veterinarian.

Angora goats should be either sheared or crutched prior to kidding to expose the teats to the newborn and facilitate colostrum intake of the newborn (see *Appendix J – Hair Problems around Genitals*).

Does kidding under grazing conditions should be minimally disturbed. They should, however, be observed frequently enough to ensure that any problems are given prompt attention. A sheltered area should be available.

Does require a clean and dry area in which to give birth. Where kidding and claiming pens are used, every effort should be made to prevent build up and the spread of infection by providing clean, dry bedding which is regularly replaced (92). See *Section 2.0 – Housing and Handling Facilities*.

Dead kids and afterbirths should be removed and disposed of in such a way that other goats, dogs, predators, and other animals will not have access, and must comply with existing regulations.

Does should be allowed to kid without intervention, if possible. Stockpeople should become familiar with normal kidding behavior such that problems can be recognized early. When assistance is provided, it must be by a competent attendant using good standards of hygiene and accepted veterinary techniques.

Inexperienced stockpeople should seek guidance before the start of kidding and, in the event of a problem, should immediately obtain experienced help (93).

The welfare of both does and kids can be compromised through difficulty at birth, known as dystocia. Following a difficult birth, kids may be delayed in performing natural behaviours like raising their heads, standing, and suckling. After a long labour, does may have a delay in standing and cleaning the newborn (21).

Knowing when and how to provide assistance during kidding is an important management skill. Signs that a doe may require assistance include:

- doe has been straining for more than 30 minutes with no progress
- the water bag is visible and no progress has been made after 30 minutes
- a limb or tail appears alone and no progress is being made after several minutes of straining
- the kid appears to be stuck. There has been no progress for several minutes since the limbs have appeared
- the head is visible with no limbs present
- the doe is weak and exhausted (21)

Aborting does, does at risk of aborting, and kidding does may be infected with diseases potentially hazardous to people, i.e. zoonotic (in particular, pregnant women or people who are immune-compromised, or have heart problems). It is recommended that those at risk should be in consultation with their herd veterinarian and physician and inform themselves of those risks.

REQUIREMENTS

Body condition and health must be monitored on an ongoing basis during gestation (with adjustments made to feeding programs to maintain suitable body conditions as needed). A ruminant nutritionist or veterinarian must be sought if required (see Section 4.0 – Feed and Water).

Kidding must be frequently supervised, and timely action taken as required, while keeping disruptions and disturbances to a minimum.

All stockpersons must be able to recognize the signs of kidding difficulty and know when and how to provide appropriate assistance and when to seek assistance from an experienced producer or veterinarian.

Good hygiene and sanitation must be practiced when kidding assistance is required.

When goats are housed indoors, a clean dry bedded area for kidding must be provided.

A clean dry area must be provided for does kidding on pasture with food and water readily available so does will remain with the newborn kids.

RECOMMENDED PRACTICES

- a. Ensure that the doe is capable of producing high quality colostrum through management of nutrition and udder health during the final 6 weeks of gestation.
- b. Ensure that all stockpersons can palpate and identify udder problems such as mastitis.
- c. On dam-raised operations, identify and cull does with poor mothering instincts or milk supply.
- d. Should more than 10% of does require assistance delivering kids, a veterinarian should be consulted for possible causes and an action plan implemented to reduce the number of future incidences (21).

Neonatal Care

Diseases in kids from birth to weaning can be minimized through proper nutrition of the doe, and by providing a clean, sheltered environment which includes good air quality, and knowledge of normal goat behaviour.

Kids should be treated with a suitable navel disinfectant at birth to reduce infectious diseases, including joint ill.

Colostrum intake is essential for the health and well-being of all kids. Kids are born with very few body reserves and need high energy colostrum soon after they are born (94). Colostrum contains antibodies to help protect the newborn from various diseases. Kids that do not receive colostrum in a timely manner, usually die. The timing of the first colostrum is particularly important since the intestine's ability to absorb colostrum is substantially reduced six to eight hours after birth (22, 95). The kid's ability to defend itself against infectious diseases is directly related to the amount, quality and timing of colostrum intake (see *Section 4.0 – Feed and Water*).

When kids are dam raised, such as in meat and Angora operations, maternal bonding is very important to kid welfare and survival. Mis-mothering generally results in death of the newborn through starvation. A good understanding of normal goat behaviours and frequent observation of does, udders, and kids are important to assess any problems. The use of kidding and claiming pens can promote dam-kid bonding.

In herds with a disease control program for diseases such as caprine arthritis encephalitis (CAE) and Johne's disease, the kids should be removed from the mother immediately after birth and not be allowed to be cleaned off or to nurse (96). The kid can be hand raised on several recommended programs (see *Section 4.0 – Feed and Water*).

Artificial Rearing of Kids

See *Section 4.0 – Feed and Water*.

REQUIREMENTS

Newborns that do not nurse voluntarily within six hours of birth, must be provided with sufficient colostrum to help protect them from disease and raise their energy levels.

Newborn kids must be monitored no less than 4 times per day, for evidence that they have suckled and for signs of starvation, hypothermia and frostbite. Prompt appropriate corrective action must be taken if problems are observed (21).

Continual restraint of a doe for the purposes of fostering must not be practiced.

RECOMMENDED PRACTICES

- In cold conditions colostrum should be provided in the first hour.
- Ensure that all stockpeople can identify kids that have not suckled and early signs of hypothermia. Be prepared to implement corrective actions promptly. Have a warming box, stomach tube, and supplemental colostrum available. When unsure, seek expert advice.
- Treat navels with disinfectant at birth of kids to reduce risk of joint ill.
- On dam raised operations, use kidding and claiming pens in indoor systems to allow the maternal bond to be firmly established between doe and kids before they are returned to the herd.
- Keep mortality records to help identify possible causes and solutions. If mortality is high ($\geq 10\%$), conduct post mortems in consultation with the herd veterinarian.

5.7.2 Milking Procedures

Always provide a clean, low stress environment for the goats. The benefits of always providing adequate dry bedding for milking does should not be underestimated in reducing the incidence of udder infections.

Establish regular routines for milking times to avoid stressing the goats (20).

Access routes to the milking parlour should be safe and well illuminated. The floors should have good traction and be kept clean.

The pre-milking holding area on farms with milking parlours is the area of highest animal density and opportunity for injury. Pen and parlour gates must operate freely and quietly. Hinges should be lubricated and latches padded to reduce noise. Latch protrusions should be reduced to maintain the safety of the goats.

The interior of the milking parlour should provide the does with comfort. Gates and restraining devices of individual holding units must operate smoothly and safely. The holding unit itself must be free of protrusions that might cause injury.

Fans, sprinklers or other technology should be used to moderate temperature extremes and eliminate condensation in the milking parlour and collecting areas.

Adequate lighting should be provided. Milking parlour lighting at udder level must be sufficient to assure cleanliness and udder health.

When concerned about mastitis, check the udder by feeling for heat or hardness and using a strip cup to assess foremilk prior to each milking. The milk should not be milked into the hand as this spreads organisms from teat to teat and goat to goat.

Milking equipment should be appropriate for goats.

To reduce infection of the mammary glands, the teats should be treated with a teat dip solution as soon as milking is finished (97).

REQUIREMENTS

Producers must ensure that milking machines are functioning correctly by conducting proper maintenance and adjusting vacuum levels and pulsation rates and ratios in accordance with manufacturers' recommendations.

Pens, ramps, milking parlours, and milking machines must be suitable for goats and be inspected and maintained to prevent injury, disease, and distress.

Procedures must be in place to prevent mastitis.

Proper dairy hygiene must be practiced before, during, and after milking and must include facilities sanitation.

Milking must be frequent enough to ensure that the does are not left unrelieved with distended udders.

All stockpersons milking does must be competent or under direct supervision of a competent milker.

Handling of the does must be done in a calm, quiet manner to minimize fear.

Does must not be dried off by removing access to feed and water.

RECOMMENDED PRACTICES

- a. Develop good milking practices including:
 - maintaining high standards of hygiene,
 - following a regular routine,
 - examining the foremilk for signs of mastitis,
 - keeping records of udder health problems and treatment, abnormal milk, and milk production and quality,
 - including a mastitis control strategy in your herd health and welfare plan, and
 - ensuring annual inspections of milking equipment by a qualified person.
- b. Milk does with high somatic cell counts and/or mastitis last.
- c. Milk once per day for several days before dry off (i.e., to help reduce milk production, thus decreasing the doe's discomfort).
- d. Refer to Dairy Goat Udder Health Guide for further details on milking best practices and mastitis management (55).
- e. Milking parlours should only be used for milking. Avoid painful experiences from being associated with the place of milking.

5.7.3 Fibre Management

Fibre goats are raised for mohair or cashmere. Mohair, the product of a single breed – the Angora – must be sheared. Cashmere is the winter down on all other goat breeds. Cashmere is usually combed off the goat in the spring with the natural shedding cycle of the winter coat.

As Angoras are well covered and grow hair at the rate of 2.5 cm per month, they require tidying attention around the genitals (to prevent scalding) and face to prevent “wool blindness” where the hair can either irritate the eye and/or obstruct the ability of the animal to see. Every 3 months the vulva and pizzle areas must be clipped of urine-stained hair to maintain hygiene (see *Appendix J – Hair Problems around Genitals*). Mohair that has grown to obstruct vision must be removed.

Shearing

The working area for shearing should be well lit, ventilated and adequate in size. It should also be sufficiently clean to ensure the well-being of the goats, the safety and comfort of the shearer, and the cleanliness of the fleeces (21).

If pre-kidding shearing is not practiced, crutching is required for does in long fleece to facilitate early suckling.

When shearing goats, consideration should be given to the time of year, weather conditions, and the available shelter. Avoid sub-zero days for chills and the middle of the summer for sunburn.

A competent shearer should shear the goats in order to reduce the time a goat is restrained.

Although minor cuts will occasionally occur, steps must be taken to minimize shearing injuries. Shearers should be reminded that the goat's skin is looser and thinner than that of a sheep and extra care should be taken. Special goat combs with 16 or 20 teeth should be used to prevent cuts.

Stockpeople and shearers should be aware of the dangers of spreading certain diseases, such as caseous lymphadenitis, through the use of contaminated shearing equipment. Shearing equipment should be treated with a disinfectant between herds and between infected or suspect animals within the herd. A hired shearer should also arrive in clean clothes and footwear to prevent the introduction of external parasites and disease into the herd (21).

REQUIREMENTS

All Angora goats must be shorn at least once a year and more frequently around the genitals and face.

Shearing must be performed by, or under the supervision of, a competent experienced shearer.

Shearing of pregnant does in the last month of gestation must only be performed by a competent, experienced shearer.

All shearing related injuries must be attended to promptly. Major injuries, (i.e., severed milk vein) must receive first aid and be attended to by a veterinarian.

Farms must have a sheltered suitable area that can be used for shearing. Shearing areas must be adequate in size, clean, and well-lit to ensure the well-being of both the goat and the shearer.

All shearing equipment and any clothing that moves between farms with the shearer must be cleaned and disinfected between herds at a minimum. If there is a known disease transfer risk between animals, all equipment must be disinfected between animals within a herd.

When planning shearing, producers must consider the time of year, expected weather, and available shelter. Steps must be taken to prevent negative outcomes associated with shearing (e.g. hypothermia, sunburn).

Goats must not be sheared in cold weather unless appropriate shearing comb lifters are used to leave enough fleece on the body for thermal comfort. Housing must be provided for shearing and afterwards.

Provide feed, water, and shelter or shade for goats immediately after shearing.

RECOMMENDED PRACTICES

- a. Crutch full fleece does if they cannot be shorn prior to kidding.
- b. Feed should be withheld a maximum of 12 hours and minimum of 6 hours before shearing to reduce the animal's discomfort from a full rumen during shearing. Water should be available at all times.
- c. Shear infected or suspect animals last.

6 Health Management

Desired Outcome: To improve animal welfare through proactive disease prevention, monitoring herd health, and providing prompt, appropriate treatments.

Pain and suffering caused by injury, illness, and disease adversely affects a goat's well-being. Good care and good animal health are key components of good welfare.

Many factors affect an animal's ability to remain disease-free. These include:

- meeting nutritional requirements,
- good feeding management, preventing contamination and spoilage,
- preventing nutritional and metabolic diseases,
- good air quality,
- adequate shelter,
- strong immunity including passive transfer of immunoglobulins in newborn kids,
- low-stress environment,
- low risk of exposure to pathogens,
- husbandry and management practices that promote health (i.e., hoof care), and
- genetic susceptibility to disease.

“Herd health” in goat operations refers to proactive measures to reduce the number and scope of animals affected by disease and to ensure that fewer animals suffer from illness.

Herd health plans are a key management tool in the prevention and control of illness and disease. Plans should include measures that monitor levels of disease, productivity, and health plus a plan to investigate when disease issues arise. The following topics are all important elements of a herd health plan.

6.1 Preventing Injuries and Disease with Good Management Practices

Prevention and control is preferred over treatment when working toward optimal animal health and welfare.

The general health of goat herds relies on good management practices that are encompassed within good husbandry, housing, nutrition and health, and that lessen the risk of disease.

RECOMMENDED PRACTICES

- a. Develop, follow, communicate and provide training on protocols for disease prevention. These should include:
 - Biosecurity
 - Isolating and treating new animals when introducing to a herd
 - Vaccination programs for diseases that are present or may be introduced to the herd
 - Other programs that reduce disease (e.g. internal parasite control programmes, udder health programs, control of coccidiosis, and control of abortion diseases).
- b. Purchase breeding stock from a source with a known risk of disease.
- c. Purchase goats from herds with equal or greater health status than your herd (to avoid introducing new pathogens to the herd).

- d. Participate in continuing education activities related to goat health and welfare.
- e. Participate in goat health and welfare programs (e.g. CAE prevention programs).
- f. Develop a written herd health plan (ideally in partnership with the herd veterinarian).
- g. Use and share the herd health plan with all stockpersons involved in animal care.

6.1.1 Recognizing Injury and Disease in Animals

Those responsible for the daily care of goats need to be able to recognize signs of illness or injury and be familiar with normal behaviour. They must also be able to detect when a goat(s) is demonstrating signs of disease. Goats are prey animals and will often conceal signs of weakness or illness when a perceived predator (e.g., human) is near, making detection of disease more difficult.

Recognizing early signs of a disease allows for better welfare by improving treatment effectiveness, reducing disease spread, and enabling early culling decisions.

Stockpersons can become accustomed to seeing the same animals each day and not recognize the slow progression of illness. For example, a particular disease challenge (e.g., mastitis) may become more prevalent on a farm, but seem normal when viewed every day.

Regular visits from external consultants such as veterinarians, fellow producers, nutritionists, and other goat health and welfare experts can help provide a fresh perspective. Other approaches, such as visiting other farms, participating in goat health and welfare programs, using technology to monitor health and welfare, reviewing records, and taking the time to learn more through continuing education are also advisable (98).

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

- goat behaviour, especially at feeding;
- feed and water intake, including access to feed and water;
- signs of illness;
- injuries;
- signs of thermal discomfort; and
- respiratory comfort with regard to air quality.

REQUIREMENTS

Animals must be observed daily (if not more often) for early detection of health and management issues.

Stockpeople must be knowledgeable about normal goat behaviour and skilled at detecting signs of injury, illness, and disease.

Stockpeople must be able to identify animals needing immediate treatment.

RECOMMENDED PRACTICES

- a. Scan over goat pens, pastures, or milking parlours daily to observe and identify goats with:
 - injuries,
 - signs of illness and disease,
 - body condition changes,
 - lameness and evidence of poor mobility,

- changes in milk and udder, and
- changes in feed and water consumption.
- b. Observe goats multiple times a day when:
 - does are in late pregnancy and when kidding is imminent,
 - kids are under 2 months old,
 - goats are currently under treatment or have recently received treatment (i.e. in recovery),
 - herd mates of diseased or injured animals are at higher risk of developing illness, and
 - goats with changes in health or behaviour which were marked for further observation.
- c. Stockpeople should be trained to recognize signs of illness and injury, and understand when to call for assistance.

6.1.2 Managing Sick, Injured or Cull Animals

Goats that are ill or injured and require treatment, need to receive treatment as soon as possible.

Sick or injured goats will benefit from being separated from herd-mates so as to eliminate competition for feed and space, to allow for better observation and treatment, and to help prevent the spread of disease. Ideally, isolated goats should not be alone, and should be able to see or hear other goats (74, 75, 76, 77).

Stockpersons should work with the herd veterinarian to become familiar with common health problems and recommended treatment protocols. The herd veterinarian can assist with determining what conditions can be treated effectively and humanely. Prompt decision-making and action are vital to ensure the welfare of sick and injured goats.

Goats marked for culling due to disease or injury and that are reasonably healthy, should be removed from the herd in a timely manner before their condition deteriorates. Early identification of health issues is key to prevent subsequent suffering.

If treatment is not effective, cannot or will not be provided, an alternative decision must be made immediately. Appropriate action will depend on the goat's condition and applicable laws. Action may include euthanizing the animal, shipping to slaughter, or slaughtering on farm (see *Appendix K – Euthanasia Decision-Making Tree*). The herd veterinarian can assist in this decision-making process.

Finding a goat dead or dying is the least preferred health outcome. Unexpected, unexplained or sudden increases in mortalities need to be investigated to prevent more losses in the herd. The herd veterinarian is an important partner in this investigation.

REQUIREMENTS

When goats are sick, injured, or suffering one of the two following actions must be taken without delay:

- *Treatment as indicated, which may include:*
 - *pain control,*
 - *antibiotics,*
 - *nursing care, and*
 - *monitoring for response to treatment.*
- *No Treatment, and goats must be removed from the herd and not suffer while waiting to be:*
 - *culled or sold to slaughter (if suitable for human consumption and transport),*
 - *slaughtered on-farm (if suitable for human consumption),*
 - *and*

- o euthanized.

Written records of details of all disease events and treatments must be kept and communicated with all stockpersons.

Unexpected, unexplained, or sudden increases in illness or deaths must be investigated without delay.

RECOMMENDED PRACTICES

- a. Standard operating procedures and treatment protocols should be developed with the herd veterinarian to ensure that treatments are performed appropriately (correct dosage, & duration) to optimize response to treatment.
- b. Sick or injured goats should be segregated from healthy goats to:
 - reduce risk of transmission of disease,
 - enable treatment, and
 - reduce possible harm to the affected animal.
- c. A veterinarian should be consulted to address new, unknown, or suspicious illness or death losses (4).
- d. Postmortems and other diagnostic investigations (i.e., fecal egg counts, milk cultures, blood testing for CAE) should be performed routinely. This will identify issues and diseases in the herd.
- e. Records of adverse health events, diagnoses, treatments, reproductive success, body condition scoring, involuntary culls (e.g., culled because of reproductive failure, mastitis), deaths, or euthanasia should be kept to allow for analysis and identification of disease trends. These trends should be used to inform herd health programs.

6.1.3 Herd Health Management and Veterinary Care

Veterinarians are an important resource for helping producers establish and implement effective herd health and welfare plans. The herd veterinarian/veterinary practice can provide care of sick or injured animals as well as advice on control, prevention, and treatment of common diseases and conditions of goats.

Veterinarians performing services in a proactive manner (i.e., herd health checks, assessments, training for specific procedures, helping to develop farm protocols) are valuable for preventing health issues. They can also advise on disease and health trends in the herd.

Veterinary Client-Patient Relationship (VCPR)

A valid VCPR ensures that your veterinarian will be familiar with your herd and management practices. A VCPR is established and maintained through timely visits to the farm which can include scheduled herd health visits and emergency calls.

Continued communication between the producer and their vet is needed to support the VCPR. Periodic farm calls are the most common way for the herd veterinarian to diagnose and recommend treatment. However, telephone, texted photos and videos, email, or video calls (“telemedicine”) also work well, especially over longer distances. The goal is for quality; enough communication to provide the vet with an accurate picture of the health issue(s) involved so that the vet can recommend a course of treatment and follow up with confidence.

While the definition of a VCPR varies by province, all contain the same components (99):

- The veterinarian has assumed the responsibility for making clinical assessments and recommendations regarding the health of the animal(s) and the need for medical treatment.
- The veterinarian has sufficient knowledge of the animal(s) on which to base the assessment, diagnosis and treatment 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 client has agreed to follow the veterinarian's recommendations and prescription.
- The veterinarian is available or has arranged for follow-up evaluation, especially in the event of adverse reactions or failure of the treatment regimen.

Drug & Vaccine Use for Goats

Most livestock drugs and vaccines can only be prescribed and dispensed by a licensed veterinarian. A veterinarian is only allowed to prescribe and dispense drugs and vaccines to a client with which they have a valid VCPR.

In Canada, very few veterinary drugs and pesticides are licensed for use in goats. There are risks associated with using veterinary products in a species where there may be little to no information available to a producer on whether that product is safe and effective for the goat and the condition being treated. The VCPR ensures that the veterinarian provides proper guidance on the use of these products and reduces the risk of harmful and/or ineffective treatment of an animal.

Virtually all livestock drug use for goats must be considered extra label drug use (ELDU) and used under the guidance of the herd veterinarian. Correct dosage, administration, and length of treatment all contribute to more effective treatment and better outcomes.

Without a VCPR or access to prescribed drugs and vaccines, there will be limited options for treating many painful conditions and diseases.

REQUIREMENTS

All producers must establish and maintain a working relationship with a licensed veterinarian (i.e. a VCPR).

Extra Label Drug Use (ELDU) must be based on written instructions from the veterinarian.

Veterinary prescription drugs, including antimicrobials (Category I, II & III of Medically Important Antimicrobials) must be prescribed and/or dispensed by a licensed veterinarian.

All livestock drugs to be used in goats must be safe:

- *Drugs must have a DIN# (Drug Identification Number),*
- *must be stored according to label directions,*
- *must not be used after expired, and*
- *expired or deteriorated drugs must be disposed of safely.*

RECOMMENDED PRACTICES

- a. Work with the herd veterinarian to develop protocols for disease control and prevention, including vaccination, parasite control, udder health, and control of abortion diseases.
- b. Update protocols at least yearly and after significant health events or changes to housing or management. Protocols should be communicated to all stockpeople.

6.1.4 Record Keeping

Complete, accurate and reliable record keeping and analysis is a key tool in maintaining or improving the health of the herd; it is best accomplished when all animals have permanent, individually unique identification (See *Section 5.3 – Identification*). Records are also critical to assuring that animals are properly

treated, drugs are given appropriately, and that meat and milk withdrawals are followed. Records can take a number of forms ranging from a pocket notebook to a computerized system linked to an electronic tag system (e.g. RFID tags). These records need to be updated as soon as an event occurs by those responsible for care of the goats.

Analysis of farm records is important in tracking animal health and performance and flagging areas where disease may be emerging or performance is sub-optimal. For example, tracking milk quality issues (e.g. proportion of does with clinical mastitis cases annually, bacterial counts) and growth performance of kids (e.g. average daily gains) can all indicate udder health problems. Setting goals and developing herd health plans to meet those goals is an important part of this process.

RECOMMENDED PRACTICES

- a. All veterinary scripts and medical records should be kept in a manner that they can be readily accessed by all stockpersons, and protected from wear and damage.
- b. Written records kept of notable findings of illness and injury, including all treatments, vaccinations and nursing care, should reference animal ID(s); these events should be communicated to all stockpeople to assure that the health care of stock is optimized.
- c. Record keeping system should allow for continuous monitoring of measures of health, welfare, and productivity.

6.1.5 Managing Deadstock

Handling deadstock is a normal part of every livestock operation. Due to the high number of multiple births typical for goats, combined with goats' ability to hide or mask illness, mortality tends to be higher than with other farmed animals.

Deadstock attract scavengers such as rodents, carrion birds, and predators that may carry diseases. Additionally, deadstock can serve as a source of disease agents and contaminate water and feed sources. Scavenging predators, attracted to where livestock are housed or pastured, may also injure or kill animals.

Prompt removal of dead animals from barn or yard reduces the potential to spread disease. Composting, burial, incineration, and deadstock pickup are all management options to consider.

REQUIREMENTS

Deadstock must be removed promptly from areas where livestock are housed or pastured.

Disposal of deadstock must follow provincial regulations.

RECOMMENDED PRACTICES

- a. Deadstock should be managed to prevent scavenging by dogs or wildlife.
- b. Deadstock should be managed to prevent contamination of livestock rearing areas, feed, or water sources.
- c. Maintain records of reasons for culling, euthanasia, or deaths to identify problems.

6.2 Herd management programs

6.2.1 Lameness

Lameness in goats is a serious condition affecting welfare that should not be ignored. Lamé animals experience pain and have difficulty moving to find food and water. As a result, they quickly lose body condition and may be more susceptible to disease (i.e. pregnancy toxemia) (100, 101). Lameness can also reduce milk production, colostrum quality, and quantity (102, 103).

In order to treat effectively, it is critical to determine the cause of lameness in goats which most commonly include those listed in Table 6.1.

Table 6. 1. Common Causes of Lameness in Goats

Lameness from disease	Caused by
Laminitis (abnormal, poor quality hoof, inflammation, deformed bone)	Complication of infection e.g. metritis (uterine infection), pneumonia
Inflammation of joints and bursae	CAE (Caprine Arthritis Encephalitis)
Foot rot, digital dermatitis	Contagious bacteria
Poor foot and leg conformation (fallen pasterns, posty legs, misshapen toes)	Age / genetics
Lameness from housing/husbandry	Caused by
Hoof overgrowth	Infrequent or incorrect trimming
Foot scald or abscesses, hoof infections	Wet or dirty environment Trapped materials in hoof
Fractures, sprains, spinal injuries	Unsafe handling or housing facilities, bullying behaviours
Joint ill (swollen or infected knees and hips)	Bacteria from environment Poor colostrum management
Lameness from nutritional imbalances	Caused by
Laminitis	RA and SARA (sub-acute rumen acidosis)
Rickets (deformed joints, bow-legged)	Calcium or phosphorus imbalance
White Muscle Disease	Vitamin E – selenium deficiency

Adapted from Goat Code of Practice Scientific Committee (2020) *Code of practice for the care and handling of goats: Review of scientific committee*. Lacombe, AB: National Farm Animal Care Council.

Moderate lameness is defined as (104):

- moderate limp and
- affected limb(s) identifiable.

Severe lameness is defined as:

- severe limp,
- unable to bear weight on all four legs, and
- may walk on knees or walking with limbs stretched and not bending joints (i.e., goose-stepping).

For more information on lameness scoring (normal and abnormal locomotion scores) see *Appendix L – Lameness Scoring*.

REQUIREMENTS

Goats must be able to stand and walk correctly (square, straight, strong) on flat, level hooves.

Stockpeople must be able to recognize lameness.

Lame goats must be assessed and action taken without delay.

Cause must be investigated when moderate to severe lameness in herd exceeds 5%.

Lame goats that are unfit for transport or do not respond to treatment must be euthanized.

RECOMMENDED PRACTICES

- a. Develop and implement a farm-specific protocol for hoof care and treatment of common diseases that cause lameness.
- b. Records of date of hoof trimming should be kept for each animal and include any abnormal findings.
- c. Use hoof trimming as a tool to diagnose lameness.
- d. Animals with foot diseases or lameness should be examined more frequently.
- e. Lameness levels in the herd should be scored for benchmarking purposes.
- f. If the prevalence of moderate to severe lameness exceeds 5% for a management group, the herd veterinarian should be consulted to investigate cause(s) and recommend / perform treatments or preventive measures.

Disease Prevention and Control

Keeping goats healthy and thriving is an important cornerstone of animal welfare. To do so requires the use of proactive measures to prevent diseases from occurring or to control diseases that may be present in the herd. There are many tools that producers can use to do this.

There are two main approaches to controlling infectious disease. The first is eradicating the disease from a farm through approaches such as enhanced biosecurity and disease testing. The second is managing the disease to minimize impacts on health and welfare through measures such as proactive monitoring, treatment, and culling.

Table 6.2 includes some of the more common diseases that negatively impact goat welfare in Canada, along with some of the tools and recommended practices that can be used to control those diseases. To control or prevent these diseases, a herd health plan should be developed with guidance from the herd veterinarian as well as other experts to reduce or keep their incidence at a point where they are no longer a welfare concern.

REQUIREMENTS

When prevalence of acute disease (e.g. pneumonia or lameness) approaches 5%, the disease prevention or control strategy must be revisited and action taken.

When incidence of chronic disease (e.g. CAE) exceeds 5% annually, the disease prevention or control strategy must be revisited and action taken.

RECOMMENDED PRACTICES

- a. Action might include calling the herd veterinarian, culling, testing, treatment, vaccination, and/or changes to housing, management. The appropriate actions will depend on the disease.
- b. Where possible, implement a disease control or eradication program for infectious diseases that impact the health and welfare of the herd.
- c. Purchase stock from a source with known risk of disease. Purchased goats should be from herds with equal or greater health status than your herd to avoid the introduction of new pathogens.
- d. Regularly monitor the herd for infectious disease using appropriate diagnostic tests.
- e. Remove kids that will not be dam-reared immediately after birth to prevent transmission of diseases such as CAE and Johne's disease.

There are many diseases that can be better managed by a proactive approach. This approach will keep the disease level low (control) or in some cases eradicate the disease agent from the herd.

Table 6.2. Important infectious diseases of goats and tools that can be used to control.

Signs of Disease	Possible causes*	Recommended Health Management Practices*
Late term abortions, stillbirths, and weak newborn kids.	Chlamydiosis, Coxiellosis (Q fever), Toxoplasmosis, and others.	<ul style="list-style-type: none"> • Vaccination • Cat and rodent control • Clean and disinfect kidding area • Purchase breeding stock from healthy herds
Fever, off feed, depressed, coughing, nasal discharge, and death.	Pneumonia and various pathogens.	<ul style="list-style-type: none"> • Improve air quality • Lower stocking density • Reduce stresses and mixing • Prudent antibiotic treatment •
Swollen udder, abnormal milk, and reduced milk production.	Bacterial mastitis.	<ul style="list-style-type: none"> • Treatment of clinical cases • Dry period intramammary treatment • Proper milking practices (e.g., udder preparation, teat disinfectants) • Maintenance and cleaning of milking equipment
Severe depression, joint ill, neurological signs, and death in young kids.	Opportunistic infections	<ul style="list-style-type: none"> • Proper colostrum feeding management • Dip navels with a disinfectant • Clean and disinfect feeding & tagging equipment
Diarrhea and dehydration in first 2 – 3 weeks of life.	Various pathogens (e.g., E. coli, rota/coronavirus, cryptosporidia).	<ul style="list-style-type: none"> • Proper colostrum feeding management • Clean and disinfect environment • Biosecurity of workers to prevent transmission
Diarrhea, dysentery, and poor growth 3 – 24 weeks of age.	Coccidiosis	<ul style="list-style-type: none"> • Clean and disinfect environment • Prevent fecal contamination of feed and water • Use of anticoccidial agents in young kids
Severe diarrhea, dysentery, and dehydration in adults and older kids.	Enterotoxemia caused by <i>Clostridium perfringens</i> D	<ul style="list-style-type: none"> • Vaccination of goats • Reduce risk of ruminal acidosis
Anemia, diarrhea, and poor growth.	Gastrointestinal parasitism	<ul style="list-style-type: none"> • Manage pasture contamination • Strategic use of dewormers, i.e. targeted selective treatment
Arthritis of joints causing lameness, and hard udder in adult goats.	Caprine arthritis encephalitis (CAE)	<ul style="list-style-type: none"> • Remove kids at birth and use safe colostrum • Blood test and remove infected animals • Screen new introductions with a blood test • Join a CAE control / status program if available
Wasting and terminal diarrhea in adult goats.	Johne's disease (paratuberculosis)	<ul style="list-style-type: none"> • Remove kids at birth • Reduce fecal-oral contamination • Cull early clinical cases
Neurological signs (any age)	Scrapie, rabies, and listeriosis**.	<ul style="list-style-type: none"> • Call Canadian Food Inspection Agency if scrapie or rabies is suspected

* Diagnostic tests are a critical part of any herd health program. Knowing the cause of disease can improve the effectiveness of a control program. Diseases may be determined post-mortem, through culture samples, etc. Monitoring for presence of disease or health is critical to knowing the ongoing

success of a program. This can be done by monitoring clinical changes (e.g. anaemia using the FAMACHA card), use of blood tests (e.g. to determine successful passive transfer of antibodies), testing blood samples (e.g. CAE), culture (e.g. milk), fecal egg counts, milk somatic cell counts, etc.

****Goats dying with neurological signs should be checked for these diseases.**

7 Transportation

Desired Outcome: *For goats to experience minimal stress and pain, and to arrive at their destination in good health and condition.*

Transport is a stressful experience for goats (105). Even when done with care, issues with handling, mixing of groups, time off feed and water, unfamiliar environments, and weather can all negatively impact the goats. It is important to make transportation as stress-free as possible.

Each person involved in various stages of goat transportation in Canada has a role in ensuring that the transportation process (including loading, transport, and unloading) does not cause injury, suffering, or death of the animals (106, 107). This includes anyone who handles, loads and unloads goats (e.g. buyers and sellers of goats, stockpeople, drivers), and anyone else involved in shipping goats.

The federal requirements for animal transport are covered under the *Health of Animals Regulations* (HAR) - Part XII (106, 107). The Canadian Food Inspection Agency (CFIA) enforces them with the assistance of other federal, provincial and territorial authorities. Some provinces also have additional regulations related to animal transport. If you do not comply with the regulations, you may 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. **This code is not a comprehensive resource for the applicable provincial and federal regulations; they must be reviewed in their entirety.**

Transportation begins with the decision to ship an animal. The producer is responsible for ensuring animals are fit for transport, selecting the mode of transport if transporting the animals themselves, or otherwise selecting a carrier while ensuring they each follow Canada's animal transport requirements

The scope of the goat Code of Practice ends at the farm gate, but includes requirements and considerations that affect the transportation process. To avoid duplication, the current Code of Practice - Transportation should be used as a reference document for the actual transportation process (108).

7.1 Pre-Transport Decision Making

It is the responsibility of the party that is shipping, or causing to load, the animals to ensure that all animals are fit for the intended journey (106, 107). Those responsible for arranging transport need to be aware of how long the animals may be in transit. If unknown, assume the longest travel period that may occur (e.g. animals sent for slaughter may be in the marketing chain for multiple days prior to reaching an abattoir).

The transport process, or continuum, involves all aspects of transport related activities that animals experience and begins when feed and water are withdrawn, and when access to rest is no longer available (107). It includes mustering (assembly) for loading, loading, and confinement during the pre-transport, transport, and post-unloading periods. It also includes the time up until the animal is provided with access to feed, water and rest after it is unloaded. Those arranging shipping will also need to know whether additional services (e.g., feed, water, rest, milking, etc.) during transit are needed.

Proactive euthanasia or treatment decisions must be made on-farm so that animals are not loaded if they are not fit for transport. Having predetermined criteria for culling animals from the herd (see health section), is key to marketing goats while they are still fit to ship. Goats that are not fit to ship must be treated or humanely euthanized (see euthanasia section and *Appendix K – Euthanasia Decision-Making Tree*).

Assembly centres (e.g. auction markets, collection stations) are not considered final destinations (106, 107). Animals shipped off farm may travel through multiple stops, possibly for days, before reaching a slaughter plant or final destination. Producers need to consider, as part of the fitness assessment for transport, where the final destination may be and when goats will arrive there.

Fitness for Transport

Animals that are to be shipped must be deemed fit for transport (107, 108, 109). Fit animals are those in good health that are expected to reach their destination in the same condition. Animals not considered to be fit are either “compromised” or “unfit”. These terms are not interchangeable.

There are three categories for defining fitness for transport: (a) unfit, (b) fit and (c) compromised (107, 108, 109).

- a. An unfit animal is an animal that is likely to suffer during transport (or continued transport if they become unfit after transport begins). Unfit animals cannot be loaded or transported unless going directly for veterinary care on the advice of a veterinarian (e.g. an animal requiring setting and casting of a fractured limb, animal requiring a caesarian section), and with special provisions. This includes non-ambulatory animals or animals likely to become non-ambulatory. “Non-ambulatory” means unable or unwilling to rise, stand, or walk unassisted or unable to move without being dragged or carried (See *Appendix M – Transport Decision Tree for Goats*).

For animals that cannot be transported in their current state, transport must be delayed, and either appropriate health intervention provided until the animal is fit for the trip, or the animal is euthanized (See *Section 8 Euthanasia and On-farm Slaughter*).

- b. A fit animal is one that is deemed to be able to withstand the stress of the intended journey and can be transported without suffering.
- c. A compromised animal, generally, is one with a condition that impairs its ability to tolerate transport. However, with special provisions, it can be transported short distances to the nearest place (not an assembly centre), where it can receive care or be humanely killed without causing unnecessary suffering (see *Appendix M – Transport Decision Tree for Goats*).

Each person involved in shipping an animal must assess and be sure each animal is fit to withstand the stress of the intended journey. If there is any doubt about an animal’s fitness for transport, consult a veterinarian.

REQUIREMENTS

The fitness for transport of every animal must be evaluated within the context of each trip or journey (see Appendix M – Transport Decision Tree for Goats).

The right of the transporter to refuse to load goats that they deem compromised or unfit for transport must be respected. The reason for refusal must be addressed.

Unfit animals must not be transported, except for veterinary care, on the advice of a veterinarian.

Any sick and/or injured animal(s) must not be shipped off-farm unless under the advice of a veterinarian.

Compromised animals must not be sent to assembly centres (e.g. livestock auction markets or collection yards).

Compromised animals, if transported for slaughter, must go directly to the closest provincial or federal abattoir.

Only healthy, fit animals without injury or illness must be shipped to assembly centres, breeding stock sales and livestock sales.

RECOMMENDED PRACTICES

- a. Having in place criteria for culling that facilitates marketing of cull animals from the herd while they are fit, as goats shipped off farm may travel through multiple stops for days before reaching a slaughter plant or final destination.
- b. Clearly identify and provide documentation for animals showing signs of a previous infirmity/current health condition at time of loading (e.g. a veterinary note explaining the condition and treatment given, video on smartphone).
- c. Animals with conditions that could be considered contagious (e.g. positive for Johne's or CAE), should be shipped direct to slaughter if otherwise in compliance with federal and provincial regulations.
- d. Shipping compromised animals should not be routine. Aim to always ship fit animals, and work with your veterinarian to refine culling criteria to allow for early identification of cull animals.

7.2 Pre-Transport Preparation

Advance planning is a key factor affecting the welfare of animals during transport. Those responsible for arranging transportation need to know how long the goats are expected to be in transit, including intermediate stops (e.g. auction markets, feed/water/rest stops), the type of livestock conveyance being used (e.g. cattle liner, pots, stock trailer), and whether the transporter needs to provide additional services (e.g. feed appropriate for the age/stage of production, water, rest, etc.) during transit (106, 107, 108, 109, 110). Risk factors need to be assessed prior to transport and include, but are not limited to:

- animal compatibility (separate animals from others based on factors such as species, size, weight, age, production status, presence of horns, etc. for their safety);
- vulnerability such as lactating (require being milked at intervals to prevent engorgement) or heavily pregnant, compromised, and very young animals (e.g. less than 14 days of age);
- hot and humid weather:
 - adequate airflow must circulate throughout the conveyance or container to keep the goats comfortable including when stopped for longer than a few minutes. If parked, the conveyance should be parked in the shade or where there will be relief from the heat.
- cold weather:
 - goats must be protected from snow, rain, frostbite, and loss of body heat during transport (lactating does, young kids, and recently shorn/clipped goats are particularly susceptible).
 - goats must be protected from direct contact with the conveyance's cold metal surfaces by lining the floor with dry bedding or other suitable insulating material while ensuring adequate ventilation.
- wind-chill; and
- traffic congestion.

REQUIREMENTS

Persons handling or transporting goats must comply with Part XII of the Health of Animals Regulations and applicable provincial regulations.

Risk factors regarding the animals and the conditions of transport prior to loading must be assessed to prevent animal injury, suffering, or death.

The potential duration of a journey including stops prior to the final destination must be considered when evaluating fitness for transport.

People arranging transport must ensure that locations receiving goats are expecting them and be equipped with personnel and facilities required to meet the animals' needs upon arrival.

Animal identification must be in compliance with current government regulations.

Conveyances must be free of animal by-products such as manure, urine, or soiled bedding prior to loading.

Clean and dry bedding that is safe for goats must be used.

Animals must have at least 1 cm (or 2 weeks for fibre producing goats) hair growth to be transported during winter months.

Animals believed or suspected of being in late gestation (e.g. expected to give birth within 15 days) must not be transported (unless for short distances within farm limits to kidding area with veterinary recommendation and oversight), except under the advice of a veterinarian.

Animals must not be shipped within 48 hours after giving birth except under the advice of a veterinarian.

Kids 8 days of age or less must not be transported to assembly centres (e.g. livestock auction markets).

Compromised animals must be loaded and unloaded in a way that avoids suffering. Including but not limited to being loaded last and unloaded first.

Goats must be separated if they are incompatible by reason of breeding season, sourcing, temperament, sex, weight, age, horned or health status (with the exception of female animals and their nursing offspring).

Nursing kids accompanying their dams must be allowed an opportunity to nurse undisturbed at suitable intervals while waiting for loading or after loading.

Ensure that the required assessment of animal fitness and records (e.g. livestock manifests, emergency contact information, date/time of last fed/watered/rested) must be completed and provided to the transporter in advance of loading the goats (106).

RECOMMENDED PRACTICES

- a. Conveyances should be cleaned and disinfected after each use using national biosecurity standards and biosecurity principles.
- b. A system for early identification of compromised or unfit animals prior to loading, and an

- appropriate plan for handling them, should be in place and known to all stockpeople.
- c. Avoid shipping does in their last trimester (e.g. last 50 days).
- d. Schedule loading to avoid congested traffic conditions and/or long-distance transport in extremely hot, humid temperatures (e.g. evening or early morning) and so that animals can be unloaded promptly at destination.
- e. Avoid transporting kids before 15 days of age. Kids that are unweaned should be shipped with special precautions as they may not be able to withstand the same conditions as adult goats. It is recommended they be sent directly to buyers rather than shipped through assembly yards or auctions.
- f. Add weather boards (adjustable) on the outside of a vehicle to allow for repositioning without having to enter the vehicle.

7.3 Arranging Transport

It is essential that those involved in arranging transport for, or loading (or causing to load), goats (e.g. producers, transporter, farm hands, processing facility staff, etc.) have experience transporting goats, are trained and knowledgeable of goat behavior and care, and that animals to be transported are fit to withstand the entire journey (106, 107). Those producers/employers who have staff are responsible to ensure that the people they hire for transporting animals are trained and competent. Each person involved in the handling or transporting of goats should be properly instructed and be skilled in handling them.

REQUIREMENTS

Transporters must follow the most current federal and provincial animal transport regulatory requirements (See Appendix A – Resources for Further Information).

Goats must be transported by competent personnel (training, experience, or mentorship) using safe, well-maintained conveyances and equipment.

Conveyances and containers used to transport goats must be in full compliance with federal animal transport regulatory requirements and provincial highway traffic regulations.

Conveyances, containers and ramps must have secure footing and sides that are secure, strong and high enough to prevent goats from jumping over, falling off or being pushed from the conveyances.

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

Containers must be secured to conveyances to prevent movement during transit.

Conveyances and containers must be constructed to provide goats with adequate ventilation at all times, while avoiding drafts and accumulation of snow.

Ventilation and air temperature within the conveyances must be balanced to meet the animals' needs.

Suitable bedding (e.g. straw, wood shavings, peat moss) must be added to conveyances to assist in absorbing urine and to protect the animals during transport.

RECOMMENDED PRACTICES

- a. Select reputable transporters:
 - If you have never used a particular transporter before, ask for a list of references that provides information on goat/livestock shippers that have used that carrier.
 - Ensure that the carrier has appropriate experience to address specific needs (e.g. short vs. long distance hauls).
 - Inquire about training methods for their drivers in the care, handling and transportation of animals
- b. Train staff annually, or more frequently (as needed), in loading and unloading goats.
- c. Ensure loading facilities are compatible with the type of trailer being used by the transporter.
- d. Ensure there is protection for goats, especially young kids and freshly shorn goats, as appropriate for the weather conditions in the loading facility and on the conveyance.
- e. During extreme weather conditions, avoid or delay shipping
- f. During hot weather, avoid loading during the hottest part of the day

7.4 Loading and Receiving On-Farm

Loading and unloading are the most stressful aspects of transport. Any efforts by the person(s) involved to reduce stress during these times will improve welfare.

Properly designed handling systems and loading ramps help to improve the ease of loading and reduce stress and the chance of injury during loading or unloading (105). People involved with loading and unloading should have sound knowledge of goat behaviour and understand how those natural behaviours can be used to assist the low-stress loading/unloading process.

When loading goats, stockpeople should defer to the expertise of the transporter who has a general understanding of allowable weight and loading/stocking densities on each part of the trailer and can adjust densities to current weather conditions and weight restrictions (70). Transporters are also aware of variations between provincial/state requirements.

General principles of good goat handling apply to the loading and unloading of goats (see *Section 5.1 – Handling*). Their use will reduce stress and injury for both handlers and goats. Persons handling or transporting goats must comply with Part XII of the Health of Animals Regulations and applicable provincial regulations.

Goats have the following behavioral characteristics, which must be taken into consideration when they are being moved (70):

- They have a wide field of vision and can see moving objects even at long distances, so whenever possible their far vision should be restricted.
- They have acute hearing, so they must not be subjected to loud noise.
- Goats are sensitive to humans and take cues from people and their body language.
- They are gregarious animals and should be in the company of compatible animals while in transit (isolation is a stressful event).
- They are extremely agile, and frequently climb and jump out of enclosures, however will try to hide to escape aggressive behaviour.

See husbandry chapter 5 for more information.

REQUIREMENTS

All requirements in the Handling section (see Section 5.0 - Husbandry Practices) of this Code must be applied.

The most current federal and provincial animal transport regulatory requirements must be followed.

Instances of inhumane handling or transport must be immediately reported to proper authorities (e.g., Provincial Animal Welfare Authority, SPCA, etc.).

The right of the transporter to refuse to load goats that they deem unfit for transport must be respected. The reason for refusal must be addressed.

Personnel in charge of transporting goats must demonstrate knowledge and competence in low stress handling of goats when loading, unloading, and while in transit.

Trucks must be in good repair, clean, and adequately bedded.

Goats must be loaded calmly, quietly, and patiently using equipment suitable for goats.

Goats must never be handled by grabbing or pulling their hair to prevent or facilitate movement. Beards under their chin can be used to restrain and guide.

Goats must never be lifted or dragged by their legs or horns (see Section 5.1 - Handling).

Ramps used for loading/unloading must be able to bear the weight of the animals, have side rails that discourage jumping, have secure footing, are placed so there is no unprotected gap, and have a slope that does not exceed 35 degrees so that it is not likely to cause suffering, injury, or death.

Goats must be able to stand at all times with all feet on the floor, head elevated with sufficient space to permit a full range of head movement, and without any part of its body coming into contact with a deck, roof, or top of the conveyance or container.

When loading, goats must have a clear path to move forward and not be rushed.

Goats must be separated if they are incompatible by reason of breeding season, sourcing, temperament, sex, weight, age, horned or health status (with the exception of female animals and their nursing offspring).

Compromised animals must be transported with special provisions (such as being isolated, loaded last/unloaded first, extra bedding).

Lactating does must be milked out immediately before being transported unless they have suckling kids accompanying them. They otherwise must be transported as compromised animals to prevent udder engorgement.

Heavily lactating does must be dried off before shipping to assembly centres unless they have suckling kids accompanying them, or are intended for a production/replacement sale where the expectation is that they will be milked out within 12 hours of being milked on the farm of origin to prevent engorged and painful udders.

Goats must not be overcrowded in a conveyance so as to cause injury or avoidable suffering.

Shorn or clipped goats must not be transported in cold climatic conditions (i.e. must have at least 2 weeks, or 1 cm, hair growth) unless provided with extra protection (e.g. ample bedding, coats, conveyance tarps, etc.)

If euthanasia is required, goats must not be dragged from the conveyance while conscious; they must be humanely stunned or euthanized without being removed from the conveyance and confirmed unconscious before unloading. Actions to assure death after removal from the conveyance must be taken.

Goats must be provided feed, potable water and rest immediately upon arrival (see Section 4.0 - Feed and Water).

Prompt additional care must be provided to goats showing signs of heat or cold stress, illness, or injury on arrival (Table 7.1). Signs of illness are provided in the health management chapter (see Section 6.0 - Health Management).

RECOMMENDED PRACTICES

- ensure loading areas are uniformly lit or go from dimmer to brighter lighting without a drastic change; a light in the trailer can help encourage goats to enter.
- ensure loading facilities have non-slip flooring, are uniform in appearance, and free from puddles and ice.
- move goats in groups appropriately sized for the compartments on the conveyance.
- consider the appropriate loading densities and the factors that influence densities (e.g. weather, hair length, length of journey).
- when the conveyance is not full, goats should be safely partitioned into smaller areas to prevent excessive movement of the goats and to provide stability to the conveyance.
- ensure that the loading area promotes smooth flow of goats on or off the conveyance. Avoid significant changes in floor height or distractions.
- if goats fall during loading or unloading, this is an indication that either handling methods, management, or facilities need to be improved.
- goats waiting for loading or waiting for further actions after unloading should have access to well drained areas and protection from adverse conditions.
- check each load immediately before departure to ensure that the goats have been properly loaded.

Table 7.1. Signs of Animal Discomfort during Transport

Problem	Warning Signs
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Overcrowding	<p>Load will not 'settle', animals continue to scramble for footing and the load continues to be noisy for prolonged periods of time.</p> <p>Animals involuntarily lie down and are unable to get up.</p>
Overheating	All species will pant when overheated, animals standing with neck extended with open mouthed breathing is a dangerous situation and requires immediate intervention.
Cold exposure	Moisture frozen to the face, hair or nostrils. Shivering, dull or hunched appearance.

Source: Canadian Agri-Food Research Council (CARC) (2001) Recommended Code of Practice for the Care and Handling of Farm Animals – Transportation. Available at: www.nfacc.ca/codes-of-practice/transport

8 Euthanasia and On-farm Slaughter

Desired Outcome: When necessary, goats are euthanized promptly, humanely, and safely.

Euthanasia is necessary when care to alleviate pain and suffering is not feasible, an animal is not responding to treatment, or there is no reasonable prospect for recovery. Euthanasia may also be necessary to ensure human safety or regulatory requirements associated with disease control.

Goats, having evolved as prey animals, may hide signs of pain or suffering, affecting the accurate assessment of their condition. Because of this, an understanding of normal goat health and behaviour and signs of injury and disease is essential for all stockpeople.

Allowing a sick or injured animal to suffer unnecessarily is unacceptable. Euthanasia must be carried out by competent personnel without delay, using an acceptable method. Veterinarians play an important role in developing on-farm euthanasia protocols, providing training, and performing euthanasia.

8.1 On-Farm Euthanasia Plans

Having a written and communicated euthanasia action plan, which includes information to assist decision making, appropriate methods, and required timelines, will help ensure that euthanasia is carried out in a timely, effective, and consistent manner (see *Appendix N – Sample On-Farm Euthanasia Action Plan*).

The decision to euthanize a goat can be informed by many criteria (see *Appendix K – Euthanasia Decision-Making Tree*) but all must address the need for the immediate alleviation of pain and suffering when animal recovery is not expected and/or its pain and suffering cannot be mitigated.

If stockpeople do not want to perform euthanasia, the herd veterinarian or another trained person can provide these services.

REQUIREMENTS

Every farm must have a Euthanasia Action Plan developed in consultation with the herd veterinarian.

Every farm must always have at least one person available and responsible for making euthanasia decisions.

A decision to euthanize a goat must be made immediately when an animal is ill or injured and suffering pain or distress and

- The animal has no reasonable prospect of recovery,*
- Treatment cannot or will not be provided, or*
- The animal has been treated but the expected response to treatment has not occurred and further treatment is not warranted.*

Every farm must have access to personnel at all times who are responsible for performing euthanasia. This person can be a farm owner, staff, veterinarian, or another trained person.

Personnel performing or supervising euthanasia must have the relevant knowledge, experience, and skills to euthanize goats humanely.

Personnel and euthanasia equipment must be available such that an animal can be euthanized as soon as possible to prevent unnecessary pain and suffering.

If there is any doubt as to how to proceed, a veterinarian must be called at an early stage to advise whether treatment is possible or whether euthanasia is required to prevent suffering.

RECOMMENDED PRACTICES

- a. Participate in a training session with a veterinarian. Training should include anatomical euthanasia landmarks, methods, and required secondary steps, assessing loss of consciousness, signs of returning to sensibility, and confirming death. Training can be formal or informal (e.g. shadowing or mentorship).
- b. A written Euthanasia Action Plan should be completed as part of the herd health plan. See *Appendix N – Sample On-Farm Euthanasia Action Plan* for an example.
- c. Review training materials and Euthanasia Action Plan at least annually, and more frequently as needed.
- d. A decision tree should be developed with considerations to help determine if or when an animal should be euthanized. See *Appendix K – Euthanasia Decision-Making Tree* for an example.
- e. The euthanasia action plan should include who will be responsible for making the decision to euthanize, how euthanasia will be done, and who will perform the task.
- f. If there is a delay between making the euthanasia decision and euthanizing an animal, the reason for the delay should be assessed and efforts should be made to prevent future delays.

8.2 Acceptable Methods of Euthanasia

Euthanasia must be rapid, causing minimal to no stress and pain, and result in immediate loss of consciousness followed by death without the animal regaining consciousness. Humane handling and restraint (see *Section 5.1 - Handling*) are also important components of euthanasia.

When choosing a euthanasia method (see *Table 8.1 – Methods of Euthanasia*), consider:

- human safety and the safety of nearby animals (from either the equipment or animal);
- the ability to restrain the animal for proper application of the procedure;
- the mental well-being of the person performing the procedure and other stockpeople;
- the skill of the stockperson performing the procedure;
- biosecurity and potential spread of disease;
- carcass disposal;
- the potential need for brain tissue for diagnostic purposes, if necessary; and
- laws governing the use and possession of firearms.

Methods not listed in Table 8.1 are unacceptable (111).

Table 8.1. Acceptable methods of euthanasia and secondary steps

Method	Suitable for	Equipment and procedure
Firearm	All weight and age classes	Firearm caliber and bullet must be appropriate to the size of the animal. See <i>Appendix O – Acceptable Euthanasia Methods/Calibres for Goats</i> . Restrain the animal's head. Firearms must never be placed directly against the animal's head, but 10 to 30.5cm (four to 12 inches) away. Placement must be according to <i>Appendix P – Anatomical Landmarks for Euthanasia</i> .
Penetrating captive bolt and secondary step	All weight and age classes	Use appropriate cartridge, charge, and bolt length for the animal (See manufacturer's manual). A secondary step is required (see <i>Appendix Q – Secondary Steps to Cause Death</i>). Restrain the animal's head. The captive bolt must be placed directly in contact with the head. Placement must be according to <i>Appendix Q – Secondary Steps to Cause Death</i> . Captive bolt guns must be maintained according to manufacturer instruction to ensure proper function.
Non-penetrating (concussive) captive bolt and secondary step	Kids under 5 kg body weight and less than 48 hours of age	Use appropriate cartridge and charge for the animal (See manufacturer's manual). A secondary step is required (see <i>Appendix Q – Secondary Steps to Cause Death</i>). Restrain the animal's head. The captive bolt must be placed directly against the head. Placement must be according to <i>Appendix P – Anatomical Landmarks for Euthanasia</i> . Captive bolt guns must be maintained according to manufacturer instruction.
Drugs approved for euthanasia (e.g. barbiturates)	All weight and age classes	Must be administered by a veterinarian. Carcass contains hazardous drugs and cannot be consumed by people or animals. Extra precautions must be taken for safe disposal.
<p>Secondary steps can only be performed on an animal that is confirmed to be unconscious. It is inhumane to perform these steps on a conscious animal. Immediately after unconsciousness is confirmed, apply a secondary step. Secondary steps must be chosen in consultation with the herd veterinarian, outlined in the euthanasia protocol, and only performed following veterinary advice and training. Acceptable secondary steps include:</p> <ul style="list-style-type: none"> • exsanguination by severing a major artery (see <i>Appendix Q – Secondary Steps to Cause Death</i>), • pithing (destruction of the brain tissue using a tool) (see <i>Appendix Q – Secondary Steps to Cause Death</i>), and • rapid intravenous or intracardiac injection of a concentrated solution of potassium chloride or magnesium sulfate (see <i>Appendix Q – Secondary Steps to Cause Death</i>). 		

When euthanizing a pregnant doe, leaving a fetus(es) in the dam ensures that will also die. When fetuses are viable and the intent is to save them, the best approach is to perform a caesarian section using standard anaesthetic and surgical procedures before euthanizing the dam. Any non-viable kids delivered from a pregnant doe should be euthanized immediately using an approved method.

Manually applied blunt force trauma is not an acceptable method for euthanizing goats as it is difficult to apply consistently and effectively, even in young kids (111).

REQUIREMENTS

An acceptable method of euthanasia must be used. See Table 8.1 – Methods of Euthanasia.

Methods not listed in Table 8.1 are unacceptable.

Manually applied blunt force trauma is not an approved method of euthanasia for goats of any age or size and must not be used.

The selected euthanasia method must take into consideration the age and size of the goat to be euthanized, as well as the availability of proper equipment, appropriate restraint, and the comfort level and training of the person performing the procedure.

Before being euthanized, animals must not be dragged, prodded, or made to move if pain and suffering may occur.

The safest, least stressful method of restraint must be used.

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

RECOMMENDED PRACTICES

- a. Consider, in consultation with the herd veterinarian, sedation as a means of humane restraint as part of the euthanasia protocol.
- b. Work with your herd veterinarian on selecting the appropriate captive bolt device, cartridge, charge, and bolt length for goats on your farm.
- c. Do not manually restrain adult goats for euthanasia when using a firearm or captive penetrating or nonpenetrating bolt device. Techniques such as halters or headgates are better for human safety.

8.3 Confirmation of Loss of Consciousness and Death

Death does not occur immediately; it is the result of respiratory and cardiac failure, which can take several minutes, depending on the method of euthanasia used. Goats being euthanized must be rendered unconscious immediately and remain unconscious until death occurs. When the animal is unconscious, it cannot feel pain or experience distress (111).

An unconscious animal is insensible to stimuli, but may have involuntary movements (e.g. paddling or kicking of the legs, neck flexing). When successfully stunned, the muscles are soon limp, the corneal reflex is absent (no blink response when the eyeball (i.e. the cornea) is touched, there is no vocalization, head lifting, or attempts to rise, and rhythmic breathing has ceased, with

the possible exception of an occasional agonal breath (sudden gasp). Animals euthanized by a firearm or captive bolt device should immediately collapse upon the application of the euthanasia method as a further indicator of unconsciousness. Death is confirmed by a cessation of respiration and heartbeat for several minutes (22, 111).

The heartbeat is best monitored using a stethoscope placed over the location of the heart on either side of the chest wall, just under the elbow. A low-cost stethoscope is sufficient. Other less effective ways are to feel for the heartbeat or place an ear against the chest wall over the location of the heart. Feeling for a pulse elsewhere on the body is least effective and may miss a weak but present heartbeat.

The use of a strong flashlight can make checking the animal for fixed and dilated pupils easier when in an area of low ambient light. There should be no constriction of the pupil when a strong light is shone into the eye. Rigor Mortis usually occurs several hours after death.

REQUIREMENTS

Goats must be inspected for loss of consciousness immediately after stunning.

A goat is considered unconscious when there is:

- *a lack of rhythmic breathing,*
- *no blink response when the eyeball is touched (corneal reflex),*
- *a lack of vocalization, and*
- *the animal does not attempt to rise to its feet or lift its head.*

All of the above indicators must be absent before an animal can be considered unconscious.

If any sign of consciousness is observed, animals being euthanized by a firearm or captive bolt device must be shot again immediately. Be prepared to perform a repeat procedure (or an alternate) if the first attempt does not render the animal immediately unconscious or if there are signs that the animal is returning to consciousness.

Before moving or leaving the animal, death must be confirmed using all of the following indicators:

- *absence of a heartbeat within 5 minutes of the procedure,*
- *lack of eye movement when the eyeball is touched (corneal reflex),*
- *cessation of respiratory movement within 5 minutes of the procedure,*
- *pupils fixed and dilated.*

If death does not occur within 5 minutes after loss of consciousness, animals being euthanized by captive bolt device must have the secondary step repeated. Animals being

euthanized by gunshot must be shot again or a secondary step performed.

Re-check indicators of death 5 minutes after heartbeat and respiration have ceased.

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

RECOMMENDED PRACTICES

- a. Actively monitor heartbeat and respiration for a full 5 minutes after applying the euthanasia method.
- b. Discuss the normal process of dying (i.e. typical signs of impending death) including how to ensure death has occurred, so observers understand what to expect. The herd veterinarian can provide this information.

8.4 Mental Well-being

Not all people will be comfortable making euthanasia decisions or performing euthanasia. It is important to respect the aspects of mental stress associated with these tasks. For these reasons, a euthanasia plan should consider the mental well-being of the stockpeople (112).

RECOMMENDED PRACTICES

- a. Farm managers should discuss euthanasia decision making and the process of euthanasia with stockpeople to ensure that they understand and accept these duties.
- b. An animal care provider who has expressed that they are unwilling to accept these duties, should not be required to perform euthanasia or make euthanasia decisions.
- c. Those responsible for overseeing personnel performing euthanasia should be alert to changes in the mental wellness of that person/people and be prepared to make changes to the euthanasia plan in this event.

8.5 On-Farm Slaughter

Captive bolt devices and firearms can both be used for on-farm slaughter (as per euthanasia methods outlined in this chapter), when the animal is considered suitable for human consumption. Both are a humane method of slaughter.

Producers must ensure all applicable regulations are followed if slaughtering on the farm.

Emergency slaughter, or slaughtering an animal that needs to be euthanatized to prevent further suffering, is appropriate if a method of humane slaughter is available and there is someone competent to undertake the procedure following applicable regulations. Emergency slaughter should not be used if appropriate equipment or personnel are not immediately available.

When conducting on-farm slaughter, all other requirements of the Code must be followed.

REQUIREMENTS

All applicable federal, provincial, and territorial regulations and guidance must be followed if slaughtering on the farm.

Persons performing on-farm slaughter must have the relevant knowledge, experience and skills to slaughter the goat humanely, or be under the direct supervision of a person who has the relevant knowledge, experience and skills.

Goats must be monitored for loss of consciousness and death as in section 8.3 – Confirmation of Loss of Consciousness and Death.

Death must be confirmed (see section 8.3 – Confirmation of Loss of Consciousness and Death) before any dressing procedures are conducted.

Slaughter without stunning (exsanguination of conscious animals) may be requested by some customers for cultural or ritual purposes. There are considerable welfare risks associated with slaughter without stunning because it results in distress, pain, and potential aspiration of blood. It is recommended that if non-stun slaughter is to be done, the goats are sent to a licensed abattoir with personnel trained and equipped to do this method and with appropriate oversight, appropriate handling systems, appropriate equipment, and appropriate monitoring.

When non-stun slaughter is done, stunning immediately after the cut using a captive bolt or firearm can reduce time to insensibility, thus improving animal welfare.

Inverting or hanging goats while still conscious is prohibited.

REQUIREMENTS

All applicable federal, provincial, and territorial regulations and guidance must be followed if slaughtering without stunning on the farm.

Persons performing on-farm slaughter without stunning must have the relevant knowledge, experience and skills to slaughter the goat humanely, or be under the direct supervision of a person who has the relevant knowledge, experience and skills.

Requirements from Council of Chief Veterinary Officers, "Standards for Optimizing Animal Welfare Outcomes during Slaughter without Stunning" must be followed (See Appendix R – Standards for Optimizing Animal Welfare Outcomes during Slaughter without Stunning).

RECOMMENDED PRACTICES:

- a. Slaughter without stunning should be performed within properly equipped slaughtering facilities when possible.
- b. It is strongly recommended that animals that are slaughtered without stunning, be immediately stunned post-cut using captive bolt or firearm to reduce the potential for animal suffering.
- c. Recommendations from the Council of Chief Veterinary Officers, “Standards for Optimizing Animal Welfare Outcomes during Slaughter without Stunning” (2018) are strongly encouraged (*See Appendix R - Standards for Optimizing Animal Welfare Outcomes during Slaughter without Stunning*).

References

1. Humphrey M.L. (2015) *Annie's All About Goats: Essential Goat Care*. His Pasture Press.
2. Baker J.S. (1981) Dehorning goats. *Bovine Practice* 2(1):33–34,36–39.
3. Buttle H., Mowlem A. & Mews A. (1986) Disbudding and dehorning of goats. *In Practice* 8(2):63–65.
4. National Farm Animal Care Council (NFACC) (2017) Code of Practice for the Care and Handling of Veal Cattle. Available at: https://www.nfacc.ca/pdfs/codes/veal_cattle_code_of_practice.pdf. Accessed: August 17, 2020.
5. Statistics Canada (2020) Table 32-10-0427-01 Other Livestock on Census Day. Available at: <https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3210042701>
6. Agriculture and Agri-Food Canada (2006) Canadian Dairy Goat Industry Profile. Available at: http://cangoats.com/wp-content/uploads/2016/12/goatprofile_e.pdf
7. Government of Canada (2020) Canada's Red Meat and Livestock Industry at a Glance. Available: <https://www.agr.gc.ca/eng/animal-industry/red-meat-and-livestock-market-information/industry-profile/?id=1415860000002>
8. Canadian Agri-Food Research Council (CARC) (2003) Recommended Code of Practice for the Care and Handling of Farm Animals – Goats. Available at: https://www.nfacc.ca/pdfs/codes/goat_code_of_practice.pdf. Accessed: August 17, 2020.
9. Canadian Agri-Food Research Council (CARC) (2001) *Recommended Code of Practice for the Care and Handling of Farm Animals – Transportation*. Available at: www.nfacc.ca/codes-of-practice/transport
10. Shi J., Dunbar R.I.M., Buckland D. & Miller D. (2003) Daytime activity budgets of feral goats (*Capra hircus*) on the Isle of Rum: Influence of season, age, and sex. *Canadian Journal of Zoology* 81(5):803–815.
11. Shi J., Dunbar R.I.M., Buckland D. & Miller D. (2005) Dynamics of grouping patterns and social segregation in feral goats (*Capra hircus*) on the Isle of Rum, NW Scotland. *Mammalia* 69(2):185–199.
12. Stachowicz J., Lanter A., Gygax L., Hillmann E., Wechsler B. & Keil N.M. (2019) Under temperate weather conditions, dairy goats use an outdoor run more with increasing warmth and avoid light wind or rain. *Journal of Dairy Science* 102(2):1508–1521.
13. Zobel G., Neave H.W. & Webster J. (2019) Understanding natural behavior to improve dairy goat (*Capra hircus*) management systems. *Translational Animal Science* 3(1):212–224.
14. Pennington J. (2019) Care of Goats in Severe Winter Weather. Available at: <https://goats.extension.org/care-of-goats-in-severe-winter-weather/>
15. Ace D.A. (n.d.) Feeding and Housing Dairy Goats. Available at: <https://extension2.missouri.edu/g3990#:~:text=Temperature,temperatures%20than%20to%20rising%20temperatures>
16. Mendell M. (n.d.) Housing for Dairy Goats. Available at: <https://www.ansc.purdue.edu/goat/factsheet/housing.htm>
17. The Goat Spot (2017) How to Keep Kids Warm. Available at: <https://www.thegoatspot.net/threads/how-to-keep-kids-warm.194542/>

18. Sarangi S. (2018) Adaptability of goats to heat stress: A review. *The Pharma Innovation Journal* 7(4):1114-1126.
19. Ontario Goat (2014) *Best Management Practices for Commercial Goat Production*. Guelph ON: Ontario Goat.
20. Canadian Agri-Food Research Council (CARC) (2003) Recommended Code of Practice for the Care and Handling of Farm Animals – Goats. Available at: https://www.nfacc.ca/pdfs/codes/goat_code_of_practice.pdf. Accessed: August 17, 2020.
21. National Farm Animal Care Council (NFACC) (2013) Code of Practice for the Care and Handling of Sheep. Available at: https://www.nfacc.ca/pdfs/codes/sheep_code_of_practice.pdf. Accessed: August 17, 2020.
22. Smith M.C. & Sherman D.M. (2009) *Goat Medicine* (2nd ed.). Ames, IA: Wiley-Blackwell.
23. Robertson A. (2010) *Ventilation for Livestock and Poultry Facilities*. Toronto ON: Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).
24. Phillips C.J.C., Pines M.K., Latter M., Muller T., Petherick J.C., Norman S.T., & Gaughan J.B. (2012) The physiological and behavioral responses of sheep to gaseous ammonia. *Journal of Animal Science* 90: 1562–1569.
25. Luginbuhl J.M. (2015) *Housing and Facilities for Meat Goats*. Available at: <https://content.ces.ncsu.edu/housing-and-facilities-for-meat-goats>
26. National Institute for Occupational Safety and Health (NIOSH) (2016) Pocket Guide to Chemical Hazards: Ammonia. Available at: www.cdc.gov/niosh/npg/npgd0028.html
27. Canadian Council on Animal Care (CCAC) (2019). Implementation of Heating, ventilation, and air conditioning: Addendum to the CCAC guidelines on laboratory animal facilities – characteristics, design and development. Available at: https://www.ccac.ca/Documents/Standards/Guidelines/Implementation-of-heating-ventilation-and-air-conditioning_Addendum-laboratory-animal-facilities.pdf
28. L'Institut de recherche Robert-Sauvé en santé et en sécurité du travail (2007) Qualité de l'air dans les étables de vœux de lait. Rapport R-524.
29. British Goat Society. (n.d.). *Housing*. Available at: <https://www.britishgoatsociety.com/about-us/housing/>. Accessed August 25, 2020.
30. Zobel G., Neave H. & Webster J. (2017) Climbing behaviour in lactating dairy goats: The use of a raised platform. *Proceedings of the Fiftieth Annual Conference of the American Association of Bovine Practitioners*. Omaha, NE, September 14–16, 2017.
31. Goat Code of Practice Scientific Committee (2020) *Code of Practice for the Care and Handling of Goats: Review of Scientific Research on Priority Issues*. Lacombe, AB: National Farm Animal Care Council.
32. Toussaint G. (1997) The housing of milk goats. *Livestock Production Science* 49(2):151–164.
33. Vas J., Chojnacki R., Kjøren M.F., Lyngwa C. & Andersen I.L. (2013) Social interactions, cortisol and reproductive success of domestic goats (*Capra hircus*) subjected to different animal densities during pregnancy. *Applied Animal Behaviour Science* 147(1–2):117–126.
34. Andersen I.L. & Bøe K.E. (2007) Resting pattern and social interactions in goats—The impact of size and organisation of lying space. *Applied Animal Behaviour Science* 108(1–2):89–103.
35. The British Columbia Society for the Prevention of Cruelty to Animals (BC SPCA) (2018) Standards for the Raising and Handling of Sheep. Vancouver BC: BC SPCA. Available at: <https://spca.bc.ca/wp-content/uploads/SPCA-Certified-Sheep-Standards-2012-v.5.pdf>
36. Mattiello S. (2010) The importance of social behaviour for goat welfare in livestock farming. *Small Ruminant Research* 90:1-10.
37. eXtension Goat Community of Practice (2019) Care of Newborn Kids. Available at: <https://goats.extension.org/newborn-goat-kids/>

38. Bøe K.E., Andersen I.L., Buisson L., Simensen E. & Jeksrud W.K. (2007) Flooring preferences in dairy goats at moderate and low ambient temperature. *Applied Animal Behaviour Science* 108(1–2):45–57.
39. Sutherland M.A., Lowe G.L., Watson T.J., Ross C.M., Rapp D. & Zobel G.A. (2017) Dairy goats prefer to use different flooring types to perform different behaviours. *Applied Animal Behaviour Science* 197:24–31.
40. Leach K.A., Winckler C. & Whay H.R. (2009) Lameness in dairy and beef cattle and veal calves. In: *Assessment of animal welfare measures for dairy cattle, beef bulls and veal calves*. Welfare Quality Reports 11, eds. B.
41. Brscic M., Gottardo F., Leruste H., Lensink J., Van Reenen K.C.G. & Cozzi G. (2011) Prevalence of locomotory system disorders in veal calves and risk factors for occurrence of bursitis. *Agriculturae Conspectus Scientificus* 70(4):291–295.
42. Loretz C., Wechsler B., Hauser R. & Rusch P. (2004) A comparison of space requirements of horned and hornless goats at the feed barrier and in the lying area. *Applied Animal Behaviour Science* 87(3):275–283.
43. Jørgensen G.H.M., Andersen I.L. & Bøe K.E. (2007) Feed intake and social interactions in dairy goats—The effects of feeding space and type of roughage. *Applied Animal Behaviour Science* 107(3):239–251.
44. Aschwanden J., Gygax L., Wechsler B. & Keil N.M. (2009) Structural modifications at the feeding place: Effects of partitions and platforms on feeding and social behaviour of goats. *Applied Animal Behaviour Science* 119(3–4):180–192.
45. Neave H.W., von Keyserlingk M.A.G., Weary D.M. & Zobel G. (2018) Feed intake and behavior of dairy goats when offered an elevated feed bunk. *Journal of Dairy Science* 101(4):3303–3310.
46. Ontario Goat (2014) *Best Management Practices for Commercial Goat Production*. Guelph ON: Ontario Goat.
47. Flint M. & Murray P.J. (2001) Lot-fed goats—The advantages of using an enriched environment. *Australian Journal of Experimental Agriculture* 41(4):473–476.
48. Allan C.J., Holst P.J. & Hinch G.N. (1991). Behaviour of parturient Australian bush goats. I. Doe behaviour and kid vigour. *Applied Animal Behaviour Science* 32(1):55–64.
49. Smith C.K. (n.d.) Supplying and Maintaining Bedding for your Goats. Available at: <https://www.dummies.com/home-garden/hobby-farming/raising-goats/supplying-and-maintaining-bedding-for-your-goats/>
50. National Farm Animal Care Council (NFACC) (2009) Code of Practice for the Care and Handling of Dairy Cattle. Available at: http://www.nfacc.ca/pdfs/codes/dairy_code_of_practice.pdf
51. National Farm Animal Care Council (NFACC) (2017) Code of Practice for the Care and Handling of Bison. Available at: https://www.nfacc.ca/pdfs/codes/bison_code_of_practice.pdf Accessed: August 17, 2020.
52. Belanger J. & Bredesen S.T. (2018) *Storey's Guide to Raising Dairy Goats*, 5th Edition: Breed Selection, Feeding, Fencing, Health Care, Dairying, Marketing. Storey Publishing.
53. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) (2016) Is your Parlour Clean Enough? Foam Cleaning Can Help. Available at: <http://www.omafra.gov.on.ca/english/livestock/goat/news/dgg1408a4.htm>
54. Government of Ontario (2020) Planning and Building a Goat Milk House. Available at: <https://www.ontario.ca/page/planning-and-building-goat-milk-house>
55. Menzies P., Jansen J., Fitzpatrick C., Foran M., & Wilman P. (2016) A Guide to Udder Health for Dairy Goats. Available at: <https://www.iga-goatworld.com/blog/dairy-goat-udder-health-manual>

56. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) (2016) *Barn Fire Prevention*. Available at: <http://www.omafra.gov.on.ca/english/engineer/barnfire/fireprevention.htm>
57. Government of Canada (2020) *Workplace Hazardous Materials Information System (WHMIS)*. Available at: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/occupational-health-safety/workplace-hazardous-materials-information-system.html>
58. National Farm Animal Care Council (NFACC) (2014). Code of practice for the care and handling of pigs. Available at: https://www.nfacc.ca/pdfs/codes/pig_code_of_practice.pdf
59. Russel, A. (1984) Body condition scoring of sheep. *In Practice* 6:91-93.
60. Kleinschmidt J. (2009) *Sheep and Goat Management in Alberta: Nutrition*. Airdrie, AB: Alberta Lamb Producers. Hay Lakes, AB: Alberta Goat Breeders Association. Available at: https://www.ablamb.ca/images/documents/management-modules/sgma_nutrition_module.pdf
61. Dwyer C.M., Conington J., Corbiere F., Holmøy I.H., Muri K., Nowak R., Rooke J., Vipond J. & Gautier J.M. (2016) Invited review: Improving neonatal survival in small ruminants: Science into practice. *Animal* 10(3):449–459.
62. Caja G., Salama A.A.K. & Such X. (2006) Omitting the dry-off period negatively affects colostrum and milk yield in dairy goats. *Journal of Dairy Science* 89(11):4220–4228.
63. Argüello A., Castro N., Zamorano M.J., Castroalonso A. & Capote J. (2004) Passive transfer of immunity in kid goats fed refrigerated and frozen goat colostrum and commercial sheep colostrum. *Small Ruminant Research* 54(3):237–241.
64. Castro N., Capote J., Álvarez S. & Argüello A. (2005) Effects of lyophilized colostrum and different colostrum feeding regimens on passive transfer of immunoglobulin G in Majorera goat kids. *Journal of Dairy Science* 88(10):3650–3654.
65. Ontario Goat (n.d.) Summary: Colostrum Management for Commercial Goat Production. Available at: <https://ontariogoat.ca/goat-gazette/colostrum-management/>
66. Bernabé A., Contreras A., Gómez M.A., Sánchez A., Corrales J.C. & Gómez S. (1998) Polyarthritis in kids associated with *Klebsiella pneumoniae*. *Veterinary Record* 142(3):64–66.
67. Hailu D., Mieso G., Nigatu A., Fufa D. & Gamada D. (2006) The effect of environmental factors on preweaning survival rate of Borana and Arsi-Bale kids. *Small Ruminant Research* 66(1–3):291–294.
68. Ontario Goat (n.d.) Weaning. Available at: <https://ontariogoat.ca/goat-gazette/weaning/>
69. Barkley, M. (2017) Prevent Parasites through Grazing Management. PennState Extension. Available at: <https://extension.psu.edu/prevent-parasites-through-grazing-management>
70. Humane Farm Animal Care (HFAC) (2013) HFAC Standards for Production of Goats. Available at: http://certifiedhumane.org/wp-content/uploads/Std13.Goat_2A-2.pdf
71. New South Wales Department of Education (n.d.) Handling. Available at: <http://nswschoolanimals.com/goats/goats-handling/>
72. Fernández M.A., Alvarez L. & Zarco L. (2007) Regrouping in lactating goats increases aggression and decreases milk production. *Small Ruminant Research* 70(2–3):228–232.
73. Andersen I.L., Tønnesen H., Estevez I., Cronin G.M. & Bøe K.E. (2011) The relevance of group size on goats' social dynamics in a production environment. *Applied Animal Behaviour Science* 134(3–4):136–143.
74. Price E.O. & Thos J. (1980) Behavioral responses to short-term social isolation in sheep and goats. *Applied Animal Ethology* 6(4):331–339.
75. Kannan G., Terrill T.H., Kouakou B., Gelaye S. & Amoah E.A. (2002) Simulated preslaughter holding and isolation effects on stress responses and live weight shrinkage in meat goats. *Journal of Animal Science* 80(7):1771–1780.
76. Aschwanden J., Gygax L., Wechsler B. & Keil N.M. (2008) Cardiac activity in dairy goats whilst feeding side-by-side at two different distances and during social separation. *Physiology and Behavior* 95(5):641–648.

77. Patt A., Gygas L., Wechsler B., Hillmann E., Palme R. & Keil N.M. (2013) Factors influencing the welfare of goats in small established groups during the separation and reintegration of individuals. *Applied Animal Behaviour Science* 144(1/2):63–72.
78. Anonymous (n.d.) Goat Care. Available at: <https://www.farmsanctuary.org/content/uploads/2012/06/Animal-Care-Goats.pdf>
79. Kent J.E., Molony V. & Graham M.J. (2001) The effect of different bloodless castrators and different tail docking methods on the responses of lambs to the combined burdizzo rubber ring method of castration. *Veterinary Journal* 162(2):250–254
80. Williams C.S. (1990) Routine sheep and goat procedures. *The Veterinary Clinics Of North America: Food Animal Practice* 6(3):737–758.
81. Kibria A.G., Rahman M.L., Ahasan A.L., Uddin M.M. & Quasem M.A. (2016) Effects of castration on penile and urethral development in black Bengal Goat. *Pakistan Journal of Zoology* 48(2):501–506.
82. Alvarez L., De Luna J.B., Gamboa D., Reyes M., Sánchez A., Terrazas A., Rojas S. & Galindo F. (2015) Cortisol and pain-related behavior in disbudded goat kids with and without cornual nerve block. *Physiology & Behavior* 138:58–61.
83. Ulker H., Kucuk M., Ylmaz A., Yoruk M., Arslan L., deAvila D. & Reeves J. (2009) Changes in testicular development, ultrasonographic and histological appearance of the testis in buck kids immunized against LHRH using recombinant LHRH fusion protein. *Reproduction in Domestic Animals* 44(1):37–43.
84. Van den Brom R., Greijdanus-van der Putten S., Van der Heijden M., Lievaart-Peterson K., Vellema P. & De Grauw J. (2020) Thermal disbudding in goat kids in the Netherlands: Current practice, complications and considerations. *Small Ruminant Research* 183.
85. Gascoigne E. (2015) Disbudding of goat kids. *Livestock* 20(2):96–100.
86. Thompson K.G., Bateman R.S. & Morris P.J. (2005) Cerebral infarction and meningoencephalitis following hot-iron disbudding of goat kids. *New Zealand Veterinary Journal* 53(5):368–370.
87. Wright H.J., Adams D.S. & Trigo F.J. (1983) Meningoencephalitis after hot-iron disbudding of goat kids. *Veterinary Medicine & Small Animal Clinician* 78(4):599–601.
88. Hempstead M.N., Waas J.R., Stewart M., Cave V.M. & Sutherland M.A. (2018) Evaluation of alternatives to cautery disbudding of dairy goat kids using behavioural measures of post-treatment pain. *Applied Animal Behaviour Science* 206:32–38.
89. Soller M., Laor M., Barnea R., Weiss Y. & Ayalon N. (1963) Polledness and infertility in male Saanen goats. *Journal of Heredity* 54(5):237–240.
90. Canadian Veterinary Medical Association (CVMA) (2019) *Electroejaculation of Ruminants: Position Statement*. Available at: <https://www.canadianveterinarians.net/documents/electroejaculation-of-ruminants-position-statement>
91. Andrade I.M., Simões P.B.A., Lamas L.P., Carolino N. & Lima M.S. (2019) Blood lactate, pH, base excess and pCO₂ as prognostic indicators in caesarean-born kids from goats with pregnancy toxemia. *Irish Veterinary Journal* 72(1):1–5.
92. Todd C.G., Bruce B., Deeming L. & Zobel G. (2019) Short communication: Survival of replacement kids from birth to mating on commercial dairy goat farms in New Zealand. *Journal of Dairy Science* 102(10):9382–9388.
93. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) (2010) *Care of the Newborn Lamb*. Publication number 98-087. Available at: <http://www.omafra.gov.on.ca/english/livestock/sheep/facts/98-087.htm>
94. Nagyová V., Tóthová C. & Nagy O. (2017) The impact of colostrum intake on the serum protein electrophoretic pattern in newborn ruminants. *Journal of Applied Animal Research* 45(1):498–504.
95. O'Brien J.P. & Sherman D.M. (1993) Serum immunoglobulin concentrations of newborn goat kids and subsequent kid survival through weaning. *Small Ruminant Research* 11(1):71–77.

96. Balke J. & de With N. (n.d.) *Keeping Flocks Healthy: Sheep and Goats*. British Columbia Ministry of Agriculture. Available at: <https://www.bcgoat.ca/uploads/1/2/7/8/127820865/keepingflockshealthysheepgoats.pdf>
97. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) (2020) *Milking Procedure Tips - Good Practices Produce Good Results*. Available at: <http://www.omafra.gov.on.ca/english/livestock/goat/news/dgg1308a2.htm>
98. Schmitz A. (2019) *Barn blindness*. Progressive Dairy. Available at: <https://www.progressivedairy.com/blogs/from-the-editor/barn-blindness>
99. Canadian Veterinary Medical Association (CVMA) (n.d.) *Establishing a Valid Veterinarian-Client-Patient-Relationship*. Available at: <https://www.canadianveterinarians.net/valid-vcpr>
100. Hodgkinson O. (2010). The importance of feet examination in sheep health management. *Small Ruminant Research* 92(1):67–71.
101. Sharma A., Kaswan S., Kumar S.S. & Lamba J.S. (2018) Feeding dynamics and performance of Beetal does in relation to body condition score at the time of mating. *Turkish Journal of Veterinary and Animal Sciences* 42:649–657.
102. Christodouloupoulos G. (2009) Foot lameness in dairy goats. *Research in Veterinary Science* 86(2):281–284.
103. Warnick L.D., Janssen D., Guard C.L. & Gröhn Y.T. (2001) The effect of lameness on milk production in dairy cows. *Journal of Dairy Science* 84(9):1988–1997.
104. Deeming L.E., Beausoleil N.J., Stafford K.J., Webster J.R. & Zobel G. (2018) Technical note: The development of a reliable 5-point gait scoring system for use in dairy goats. *Journal of Dairy Science* 101(5):4491–4497.
105. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) (2015) Lowering stress in transported goats. Publication number 435/10. Available at: <http://www.omafra.gov.on.ca/english/livestock/goat/facts/15-013.htm>
106. Government of Canada (2020) *Health of Animals Regulations: SOR/2019-38*. Available at: https://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._296/index.html
107. Government of Canada (2020) *Health of Animals Regulations: Part XII: Transport of Animals-Regulatory Amendment - Interpretive Guidance for Regulated Parties*. Available at: <https://inspection.gc.ca/animal-health/humane-transport/health-of-animals-regulations-part-xii/eng/1582126008181/1582126616914#a9-2>
108. Canadian Agri-Food Research Council (CARC) (2001) *Recommended Code of Practice for the Care and Handling of Farm Animals – Transportation*. Available at: www.nfacc.ca/codes-of-practice/transport
109. Government of Canada (2020) *Transporting unfit or compromised animals*. Available at: <https://inspection.gc.ca/animal-health/humane-transport/transporting-unfit-or-compromised-animals/eng/1582045810428/1582045810850>
110. Government of Canada (2020) *Livestock Transport in Canada*. Available at: <https://inspection.gc.ca/animal-health/humane-transport/livestock-transport-in-canada/eng/1363748532198/1363748620219>
111. American Veterinary Medical Association (AVMA) (2020) *AVMA Guidelines for the Euthanasia of Animals: 2020 Edition*. Available at: <https://www.avma.org/sites/default/files/2020-02/Guidelines-on-Euthanasia-2020.pdf>. Accessed March 2, 2020.
112. Improving Animal Welfare: A Practical Approach (2015) (2nd Edition), Edited by Dr. Temple Grandin Colorado State University, USA ISBN: 978-1-78064-467-7, CABI

Appendix A – Resources for Further Information

More information on goat production and welfare is available through federal and provincial ministries of agriculture, national or provincial goat organizations, universities and colleges, animal welfare organizations, and veterinary organizations.

Producer Organizations

- Canadian National Goat Federation – www.cangoats.com
- Canadian Goat Society – www.goats.ca
- Canadian Meat Goat Society – www.canadianmeatgoat.com
- Alberta Goat Association – www.albertagoats.com
- Alberta Mohair Producers Association – (403) 728-3488
- British Columbia Goat Association – www.bcgoat.ca
- Manitoba Goat Association – www.manitobagoats.com
- Ontario Dairy Goat Co-operative – www.ontariodairygoat.com
- Ontario Goat – www.ontariogoat.com
- Saskatchewan Goat Breeders Association – www.saskgoatbreeders.com

Farm Animal Councils

- Farm and Food Care Canada - www.farmfoodcare.org
- Alberta Farm Animal Care - (403) 652-5111 www.afac.ab.ca
- BC Farm Animal Care Council - (604) 287-3276 www.bcfacc.ca
- Farm and Food Care Ontario - (519) 837-1326 www.farmfoodcareon.org
- Farm and Food Care Saskatchewan - (306) 477-3663 www.farmfoodcaresk.org
- Farm and Food Care Prince Edward Island – (902) 368-7289 www.farmfoodcarepei.org

Government

- Agriculture and Agri-Food Canada - www.agr.gc.ca
- Canadian Food Inspection Agency - www.inspection.ca
- Veterinary Drugs Directorate (Health Canada) - www.hc-sc.gc.ca/ahc-asc/branch-dirgen/hpfbdgpsa/vdd-dmv/index-eng.php
- Alberta Agriculture and Forestry - www.agric.gov.ab.ca
- British Columbia Ministry of Agriculture - www.gov.bc.ca/agri
- Manitoba Agriculture, Food and Rural Initiatives - www.gov.mb.ca/agriculture
- New Brunswick Ministry of Agriculture, Aquaculture and Fisheries - www.gnb.ca/0027

- Newfoundland and Labrador Department of Agrifoods - www.nr.gov.nl.ca/nr/agrifoods/index.html
- Nova Scotia Department of Agriculture and Marketing - www.gov.ns.ca/agri
- Ontario Ministry of Agriculture and Food - www.omafr.gov.on.ca
- Prince Edward Island Ministry of Agriculture and Forestry - www.gov.pe.ca/af
- Québec Agriculture, Pêcheries et Alimentation - www.mapaq.gouv.qc.ca
- Saskatchewan Ministry of Agriculture - www.saskatchewan.ca/agriculture

Agriculture Colleges and Universities

- Dalhousie University - Faculty of Agriculture - Bible Hill - NS
www.dal.ca/faculty/agriculture.html
- Lakeland College - Vermilion, AB - www.lakelandcollege.ca
- Laval University - Faculté des sciences de l'agriculture et de l'alimentation - Québec, QC
- www.fsaa.ulaval.ca
- McGill University - Faculty of Agricultural and Environmental Sciences - Montreal, QC
- www.mcgill.ca/macdonald
- Olds College - Olds, AB - www.oldscollege.ca
- Ontario Agricultural College, University of Guelph - Guelph, ON -
www.uoguelph.ca/oac
- University of Alberta - Faculty of Agricultural, Life and Environmental Sciences -
Edmonton, AB - www.ales.ualberta.ca
- University of British Columbia - Faculty of Land and Food Systems - Vancouver, BC -
www.landfood.ubc.ca
- University of Manitoba - Faculty of Agricultural and Food Sciences - Winnipeg, MB -
www.umanitoba.ca/afs/
- University of Saskatchewan Agriculture and Bioresources College, University of
Saskatchewan - Saskatoon, SK - www.agbio.usask.ca

Colleges of Veterinary Medicine

- Atlantic Veterinary College, University of Prince Edward Island – Charlottetown, PEI -
www.avc.upei.ca
- Faculté de médecine vétérinaire, Université de Montréal, Montreal, QC -
www.medvet.umontreal.ca
- Faculty of Veterinary Medicine, University of Calgary - Calgary, AB -
www.vet.ucalgary.ca
- Ontario Veterinary College, University of Guelph - Guelph, ON - www.ovc.uoguelph.ca
- Western College of Veterinary Medicine, University of Saskatchewan - Saskatoon, SK -
www.usask.ca/wcvm

Animal Welfare Organizations

- Canadian Federation of Humane Societies - (613) 224-8072 www.cfhs.ca
- Alberta Society for the Prevention of Cruelty to Animals - (780) 447-3600
www.albertaspca.org
- Animal Protection Services of Saskatchewan - (306) 382-0002
www.animalprotectionservices.ca

- British Columbia Society for the Prevention of Cruelty to Animals - (604) 681-7271
www.sPCA.bc.ca
- New Brunswick Society for the Prevention of Cruelty to Animals - (506) 458-8208
www.sPCA-nb.ca
- Nova Scotia Society for the Prevention of Cruelty to Animals - (902) 835-4798
www.spcans.ca
- Ontario Society for the Prevention of Cruelty to Animals - (905) 898-7122
www.ontariosPCA.ca

Veterinary Associations

- Canadian Veterinary Medical Association - (613) 236-1162 www.cvma-acmv.org
- Canadian Association of Bovine Veterinarians - (306) 956-3543 www.cabv.ca
- l'Association des Médecins Vétérinaires Praticiens du Québec - (418) 651-0477
www.amvpq.org
- Ontario Association of Bovine Practitioners - www.oabp.ca
- Western Canadian Association of Bovine Practitioners - (866) 269-8387
www.wcabp.com

Other

- Canadian Animal Health Coalition - (519) 829-2242 www.animalhealth.ca
- World Organization for Animal Health (OIE) - www.oie.int
- Canadian Cattle Identification Agency (CCIA) - (877) 909-2333 www.canadaid.com
- Canadian Livestock Transport - (519) 829-2242 www.livestocktransport.ca

Works Consulted

The following resources were consulted during the development of this Code. They may also be of interest to those seeking additional information:

- Alberta Agriculture and Rural Development (1995) *Poisonous Outdoor Plants*. Available at: [https://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/agdex13348/\\$FILE/666-2.pdf](https://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/agdex13348/$FILE/666-2.pdf)
- Alberta Goat Breeders Association and Alberta Lamb Producers. (2009) *Sheep and goat management in Alberta - Nutrition*. Available at: <https://www.ablamb.ca/images/documents/management-modules/Nutrition-module-2018-web.pdf>.
- Belanger, J. D., & Thomson, B. S. (2018) *Storey's guide to raising dairy goats: Breed selection, feeding, fencing, health care, dairying, marketing*. North Adams, MA : Storey Publishing.
- Childs, L. (2017) *The joy of keeping goats: The ultimate guide to dairy and meat goats*. 2nd Ed. New York, NY : Skyhorse Publishing.
- *Codes of Practice for the Care and Handling of Farm Animals*. Available at: www.nfacc.ca/codes-ofpractice.
- Council of Chief Veterinary Officers (2018) *Standards for Optimizing Animal Welfare Outcomes during Slaughter without Stunning*. Available at:

<https://www.ahwcouncil.ca/pdfs/Slaughter%20without%20Stunning%20Standards%20approved%20September%207%202018-2.pdf>

- Hedrich, C. (2008) *Best management practices for dairy goat farmers*. Available at: <http://www.milkproduction.com/Global/PDFs/Bestmanagementpracticesfordairygoatfarmers.pdf>.
- Humphrey, M. L. (2015). *Annie's all about goats: Essential goat care*. N.p.: His Pasture Press.
- McCullough, F. (2012) *Housing, bedding, fencing, exercise yards and pasture management guide*. Plymouth, England : My Lap Shop Publishers.
- McCullough, F. (2012) *Managing goat nutrition: What you need to know a simple guide*. Plymouth, England : My Lap Shop Publishers.
- Mulligan, G.A. (n.d.) *Plants of Canada and the Northern United States that are Poisonous to Livestock, or that have Tainted Animal Products*. Available at: https://weedscanada.ca/plants_poisonous_animals.htm#top1
- Niemann, D. (2018) *Raising goats naturally: The complete guide to milk, meat, and more*. 2nd Ed. Gabriola Island, BC, Canada : New Society Publishers.
- Smith, C. K. (2010) *Raising goats for dummies*. Hoboken, NJ: Wiley.
- Ontario Goat (n.d.) Weaning. Available at: <https://ontariogoat.ca/goat-gazette/weaning/>
- Ontario Goat (2014) *Best Management Practices for Commercial Goat Production*. Guelph ON: Ontario Goat.
- Ontario Goat (2014) *Hyperthermia and Hypoglycemia in Kids: Identification and Treatment*. Available at: <https://ontariogoat.ca/wp-content/uploads/2015/11/hypothermia-poster-final-approved.pdf>
- Ontario Goat (2015) *Success from the Start: Colostrum management for Commercial Goat Production*. Available at: <https://ontariogoat.ca/wp-content/uploads/2015/11/Colostrum-Management-Book-LR.pdf>
- Ontario Goat (2015) *Success from the Start: Management Practices for Raising Dairy Buck Kids for Meat*. Available at: <https://ontariogoat.ca/wp-content/uploads/2016/03/Buck-Kid-Booklet-LR8.pdf>
- Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) (2017) *Raising Dairy Goat Buck Kids*. Available at: <http://www.omafra.gov.on.ca/english/livestock/goat/facts/17-013.htm>
- Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) (2020) *Common Weeds Poisonous to Grazing Livestock*. Available at: <http://www.omafra.gov.on.ca/english/livestock/dairy/facts/poisonousweeds.htm>

Appendix B – Sample Goat Welfare Policy



Sample Goat Welfare Policy

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

Our commitment to our animals

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

Our commitment to our customers

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

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

Our commitment to our employees

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

Our employees' commitment to us

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

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

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

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

Signature of Employee

Date

Name (Please Print)

Signature of Employer

Date

Name

Title

Source: Adapted from the Code of Practice for the Care and Handling of Veal Cattle (2017): Available at <https://www.nfacc.ca/codes-of-practice/veal-cattle>

Appendix C - Emergency Telephone List

People to contact in case of emergency	Phone Number	Emergency Phone Number
Owner / manager		
Veterinary Clinic		
Police		
Fire Department		
Electrical Company		
Poison Control Centre		
Company performing maintenance and repair of ventilation and heating systems		
Company performing maintenance and repair of the gas heating system		
Company repairing the water pump		
Company performing maintenance and repair of the feeding system		
Plumber (water outage or broken pipe)		
Electrician		
Alarm system		
Feed Supplier		
Milking System Maintenance		

Appendix D - Mapping Barns and Surrounding Areas for Fire Services

A copy of the map should be sent to your local fire service and another one should be put in a sealed container near the road. The map should include:

- All buildings, including fan openings, windows, doors, floor drains and their outlets
- Location of animals on the site
- Supplies (e.g. fire extinguishers, first aid kits, tools, protective clothing, absorbent materials)
- Electrical service panels
- Hydro, gas, and water shutoffs
- Generator(s), hookups for generator
- All fixed outside equipment
- Compressed gas storages (e.g. oxygen, acetylene, and air tanks)
- Propane and fuel tanks
- Anhydrous ammonia storage
- Location of firearms, ammunitions and/or captive bolt cartridges
- Water well(s) location, including abandoned and unused wells
- Water source for firefighting (may be the nearest tank fill location)
- Possible contamination sources (e.g. pesticide storages, fertilizer storages, petroleum products storage, septic systems, manure storages, barnyards, pesticide mixing facilities)
- Expected pathways for water runoff (e.g. where will the water flow when you put out a fire?)
- Perimeter fences, gates, tile inlets, catch basins, surface water
- Access routes to outdoor containment areas where animals can be moved if evacuated (i.e. pastures or lots).

Appendix E - Assessing Farm Buildings for Fire Prevention

Use the checklist to identify fire risk in farm buildings.

Structure		Yes	No
1	The largest, separate fire compartment size is less than 4,800 m ² (51672 ft ²)?		
2	Buildings are located at least 30 m (100 ft) from each other or have properly constructed (1 hour) fire rated walls separating the individual fire compartments?		
3	Properly constructed fire stops exist in the attic at 30 m (100 ft) intervals?		
4	No unsealed gaps or passageways in attic fire stops?		
5	Interior sheathing materials have low Flame Spread Ratings and Smoke Developed Classifications?		
Electrical system			
6	Electrical inspection completed within the past year?		
7	Thermographic inspection of the entire electrical system, completed during the period when the barn is at its peak electrical demand, completed within the past year?		
8	Any wiring passing through concealed spaces is enclosed in conduit?		
9	All electrical connections are hard wired (no extension cords)?		
10	An electrical/mechanical room contains components, including the main electrical panel, and is separated from the livestock air space with properly constructed fire rated walls (1 hour minimum)?		
11	All electrical equipment used in the barn displays a Canadian electrical approval stamp (e.g. CSA, ULC)?		
12	Animals are kept from direct access to electrical wiring. Outlets should be above animal head height or where they can not be reached		
13	Electrical fixtures are properly protected and mounted?		
14	Fan motors are totally enclosed.		
15	Crop dryers are equipped with adequate controls that will automatically shut off blowers or dampers when temperatures get too high.		
Heating System			
16	Open flame box heaters or radiant tube heaters (that draw combustion air or exhaust directly into the barn space) are not used in a barn where methane gas can accumulate in significant concentrations?		
17	Sufficient space exists between all heating appliances and combustible building features (minimum clearance requirements maintained)?		
18	Heat shields for all heaters are in place (if required)?		
19	Maintenance checks of all heating devices have been completed as per the manufacturer's recommendations (minimum once per year)?		
20	Bollards are used to protect propane and liquid fuel tanks and gas valves from vehicle impact?		
21	Animals are kept from direct access to heat sources?		
Stored Products			
22	Less than a two-day supply of hay, straw, sawdust, feed or similar products are stored within barn?		

23	Separate buildings are used to store larger quantities of hay, straw, sawdust, feed or similar products.		
24	Buildings are separated by a minimum distance of 30 m (100 ft) or by using a fire separation with a minimum rating of 1 hour (i.e. providing exterior walls)?		
25	Clutter and combustible products are removed from the barn on a regular basis?		
26	Flammables (diesel, gas, propane) are stored in approved containers that are regularly inspected (minimum once per year)?		
27	Flammables (diesel, gas, propane) are stored in a separate storage room outside of the main building.		
28	Pesticides should be stored in a separate building and clearly identified by means of a warning sign.		
Laneway and Water Supply (verify these items with local fire department)			
29	An all-weather laneway provides adequate fire truck access to the required sides of the building?		
30	Roadway is regularly maintained (snow removed, adequately graded)?		
31	Adequate, year-round accessible water is available on-farm for fighting fires?		
32	A standard remote connector (hydrant) is installed adjacent to the water supply for direct connection by the local fire department?		
Safety, Exit and Lighting			
33	Sufficient number of exits is available to allow safe exit from all storeys and rooms?		
34	Emergency lighting and signage is available to mark the location of all exits?		
35	Proper ladders and stairs are used for exterior exit from upper storeys?		
36	Fire extinguishers are in place and all employees are trained for proper use?		
37	A clear path of travel to and through all exits is in place?		
38	The farm possesses fire alarm systems (smoke detectors) that can be heard and acted upon at any time of the day and night.		

Source: adapted from Ontario Ministry of Agriculture, Food and Rural Affairs. *Reducing the Risk of Fire on Your Farm*, Publication 837, 2011.

Appendix F - To Prepare in Case of Evacuation

To Do		Yes	No
1	Contact local emergency management authority to become familiar with at least two possible evacuation routes.		
2	Arrange for a place to shelter animals (fairgrounds, other farms, racetracks, exhibition centres, etc.). Accommodation will need to include milking equipment for dairy goats (as applicable).		
3	Ensure that feed and medical supplies are available at the destination for at least 72 hours.		
4	Set up safe transportation, contact potential carriers (may need access to a portable loading ramp).		
5	Make sure animals have identification (e.g., ear tags or tattoos) to be able to tell them apart from others.		
6	Make sure to have adequate and safe fencing or pens to separate and group animals appropriately.		
7	Prepare an emergency kit that will follow the animals. The kit should include: current list of all animals, basic first aid kit, handling equipment such as halters, water, feed and buckets, tools and supplies for sanitation, flashlights, portable radios (with weather radio band) and/or Weatheradio, and batteries, other safety and emergency items for your vehicles and trailers		
8	Plan food, water and emergency supplies for your family.		
9	Create a written order of evacuation that includes what animals or groups of animals will be evacuated first if not all animals can be transported at once.		

Source: adapted from Public Safety Canada. Emergency Preparedness for Farm Animals. 2011. <https://www.getprepared.gc.ca/cnt/rsrscs/pblctns/frm-nmls/frm-nmls-eng.pdf>.

Appendix G - Body Condition Scoring



Body Condition Scoring

How to body condition score (BCS):

The hair coat can often prevent you from seeing the true shape of a goat and therefore, it is important that the hands-on assessment is done. A visual assessment alone is not adequate to assess poor body condition.

If you cannot score all your goats, choose a subset of goats in your herd. Alternatively, combine body condition scoring with other routine husbandry procedures such as hoof trimming or vaccination. Recording BCS is important as it may help you identify changes in an individual animal that may indicate disease or inform breeding and culling decisions. With practice, body condition scoring should take only 10-15 seconds per animal.

The three main locations to assess when performing body condition scoring are the lumbar spine, ribs, and sternum/breast bone (see figure 1). You are feeling for the bones in the goat. The amount of fat and muscle the goat has will change your ability to feel the bones underneath. If it is easy to feel the bones, the goat doesn't have enough fat and muscle. If you have trouble feeling the bones, the goat may have too much fat.

Tip: Giving each goat a specific body condition score is not as important as being able to determine if your goat is under-conditioned (too thin), over-conditioned (too fat), or properly conditioned (healthy weight).

Ideal body condition (acceptable range):

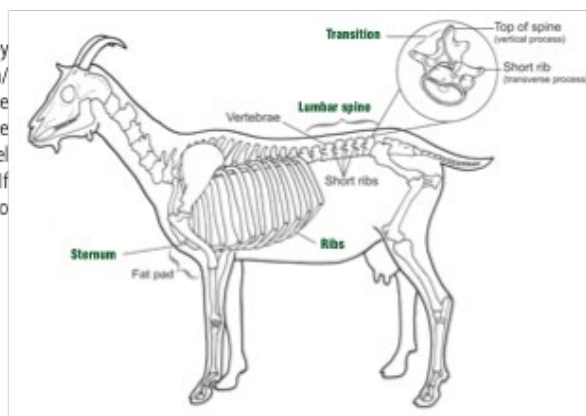
For most stages of production: **3.0** (2.5-4.0)

At kidding or before winter: **3.5** (3.0-3.5)

Does at breeding: **3.0** (2.5-3.5)

Bucks at breeding: **3.0** (3.0-3.5)

Does may lose up to one point during peak lactation, but should be allowed to regain this before kidding.












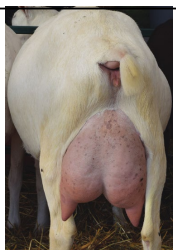
Lumbar Spine: This is the part of goat behind the ribcage and in front of the tail, also known as the loin. The spine is made up of many connected vertebrae. Vertebrae have three processes that stick out – one on each side (short ribs) and one straight up (top of spine). Move your fingers from one vertebrae to the next, noting the shape of the space between processes on the sides and top. See if you can slip your fingers under the short ribs or pinch the top of the spine. Feel the amount of fat or muscle in the space between the top of the spine and the short ribs (transition) (see figure 1).

Ribs: Assess the amount of muscle and fat cover over the ribs, behind the front leg. Try to push your fingers into the space between two ribs and note how much pressure it takes to feel for this space.

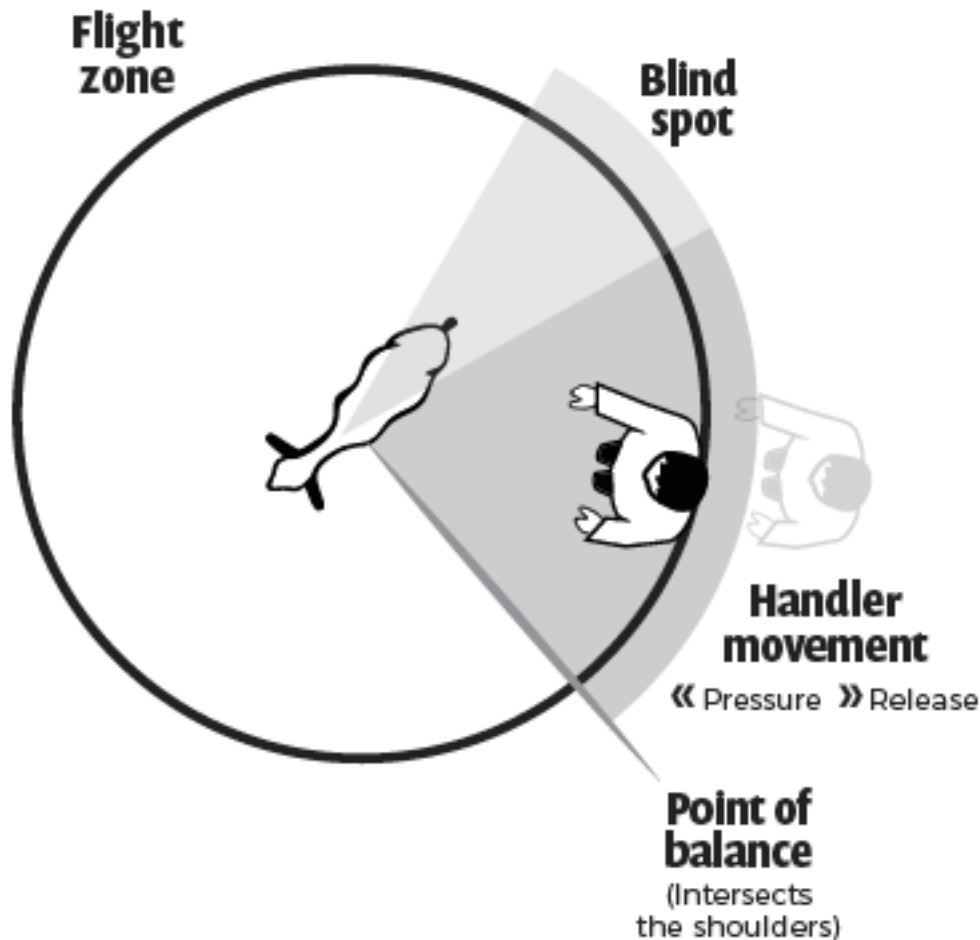
Tip: Having an independent person perform body condition scoring on your goats may be beneficial. If the majority of your goats are a little over- or under-conditioned, you may think that is normal. You can always ask your veterinarian or nutritionist to perform body condition scoring on your goats and compare your assessments.

Sternum: Assess the amount of muscle and fat over the sternum or breastbone, between the goat's front legs. This area has cartilage (slightly softer than bone) that connects the ribs to the breast bone. Note how easily the cartilage is felt. Grasp the fat pad on the sternum/breast bone to judge how large it is and whether you can move it.

Tip: Body condition scoring is not about ranking your goats, but comparing them to the scale. Do not pick a doe that you think has an ideal BCS and compare everyone to her. Each goat should be compared to the BCS chart.

Body Condition Score 1				
Emaciated		Lumbar spine	Ribs	Sternum
		<p>Top of spine: clearly visible, can easily be pinched. Deep depression between each vertebra.</p> <p>Short ribs: form a continuous shelf that fingers can grasp. Deep depression between each.</p> <p>Transition: no fat and little muscle is felt between the top of the spine and short ribs.</p>	<p>Ribs: Clearly visible. Fingers easily penetrate space between ribs.</p>	<p>Cartilage: easily felt</p> <p>Fat pad: can easily be grasped between thumb and forefinger and moved side to side.</p>
				
Body Condition Score 2				
Thin		Lumbar spine	Ribs	Sternum
		<p>Top of spine: visible, some muscle can be felt between skin and bone.</p> <p>Short ribs: form a shelf that fingers can grasp.</p> <p>Transition: deep depression from the top of the spine to the short ribs.</p>	<p>Ribs: some can be seen. Fingers easily penetrate space between ribs.</p>	<p>Cartilage: not easily felt.</p> <p>Fat pad: can be grasped and moved slightly from side to side.</p>
				
Body Condition Score 3				
Ideal		Lumbar spine	Ribs	Sternum
		<p>Top of spine: not prominent, slight hollow between each vertebrae. Cannot easily be grasped.</p> <p>Short ribs: shelf is slightly noticeable, cannot be grasped.</p> <p>Transition: smooth slope from top of the spine to short ribs</p>	<p>Ribs: difficult to see. Space between ribs felt with pressure.</p>	<p>Cartilage: barely felt.</p> <p>Fat pad: wide and thick. It can be grasped, but has very little movement.</p>
				
Body Condition Score 4				
Overweight		Lumbar spine	Ribs	Sternum
		<p>Top of spine: cannot be seen. No indent between vertebrae. Top of spine is flat and cannot be grasped.</p> <p>Short ribs: no ridge or shelf present.</p> <p>Transition: rounded from the top of the spine to the short ribs.</p>	<p>Ribs: cannot be seen. Side of the animal is flat in appearance. Space between ribs only felt with strong pressure.</p>	<p>Cartilage: cannot be felt.</p> <p>Fat pad: difficult to grasp, cannot be moved side to side.</p>
				
Body Condition Score 5				
Obese		Lumbar spine	Ribs	Sternum
		<p>Top of spine: buried in fat, slight indent surrounded by bulging fat. Rump looks like the top of a heart. Individual vertebrae cannot be felt.</p> <p>Short ribs: individual vertebrae cannot be felt.</p> <p>Transition: fat bulges out from the top of the spine to the short ribs.</p>	<p>Ribs: not visible. Space between ribs cannot be felt.</p>	<p>Cartilage: cannot be felt</p> <p>Fat pad: cannot be grasped or moved.</p>
				









Appendix H - Goat Flight Zone



FLIGHT ZONE: Goats, like all animals, have a 'flight zone'. This can be compared to the goat's personal space which, if entered, will cause the goat to move away. The flight zone for rangeland goats which are not used to humans will be different to that of farmed animals that have had more human contact. Understanding the impact of a handler entering (pressuring) or leaving (releasing) the flight zone will have on animal response will make handling goats less stressful. If a handler stands outside the 'flight zone' the animal will not move. If the handler moves into the flight zone, the animal will move in a direction to avoid the handler.

The point of balance in most livestock is at the shoulder. The animal will move forward if the handler stands behind the point of balance and backward if the handler is ahead of the point of balance.







Appendix I - Properly Trimmed and Overgrown Hooves

Hoof Aspect	Ordinal Score		
	0	1	2
Toe length	 <p>Toe is not overgrown Length of the toe is less than half of the length of rest of the hoof</p>	 <p>Toe is moderately overgrown Length of the toe is greater than half, but less than the full length of the rest of the hoof</p>	 <p>Toe is severely overgrown Length of the toe is greater than the full length of the rest of the hoof</p>
Heel shape	 <p>Heel is upright Not walking on heel, coronet band parallel to ground</p>	 <p>Heel is moderately dipped Not walking on heel, but coronet band is angled towards the ground</p>	 <p>Heel is severely dipped Walking on heel, coronet band angled sharply towards the ground</p>
Fetlock shape *	 <p>Fetlock is upright and straight</p>	 <p>Fetlock is dipped towards the ground Bony lump on pastern may be apparent</p>	

* Fetlock scored as binary 0 or 1.

Figure I.1a. Assessment of goat claw shape with the use of a 3-point ordinal scale (0, 1, and 2), except for fetlock shape, which was scored on a binary scale (0 or 1); 0 was 'normal' in all cases.

Deeming et al. (2019) The development of a hoof conformation assessment for use in dairy goats. *Animals* 9(11) doi: 10.3390/ani9110973

Hoof Aspect	Ordinal Score		
	0	1	2
Claw shape	 <p>Both claws are straight</p>	 <p>One claw is bent/twisted either away or towards the midline of the hoof</p>	 <p>Both claws are bent/twisted either away or towards the midline of the hoof</p>
Claw splay *	 <p>Claws are not splayed the distance between the axial edge of the distal tip of both claws are approximately <2 horizontal marks on the whiteboard</p>	 <p>Claws are moderately splayed the distance between the axial edge of the distal tip of both claws are approximately >2 and <3 marks on the whiteboard</p>	 <p>Claws are severely splayed the distance between the axial edge of the distal tip of both claws are >3 marks on the whiteboard</p>

* Claw splay only scored if claw shape scored as 0.

Figure I.1b. Continuation of assessment of goat claw shape with the use of a 3-point ordinal scale (0, 1, and 2), except for fetlock shape, which was scored on a binary scale (0 or 1); 0 was 'normal' in all cases.

Appendix J – Hair Problems around Genitals



Photo: Theresa Bergeron

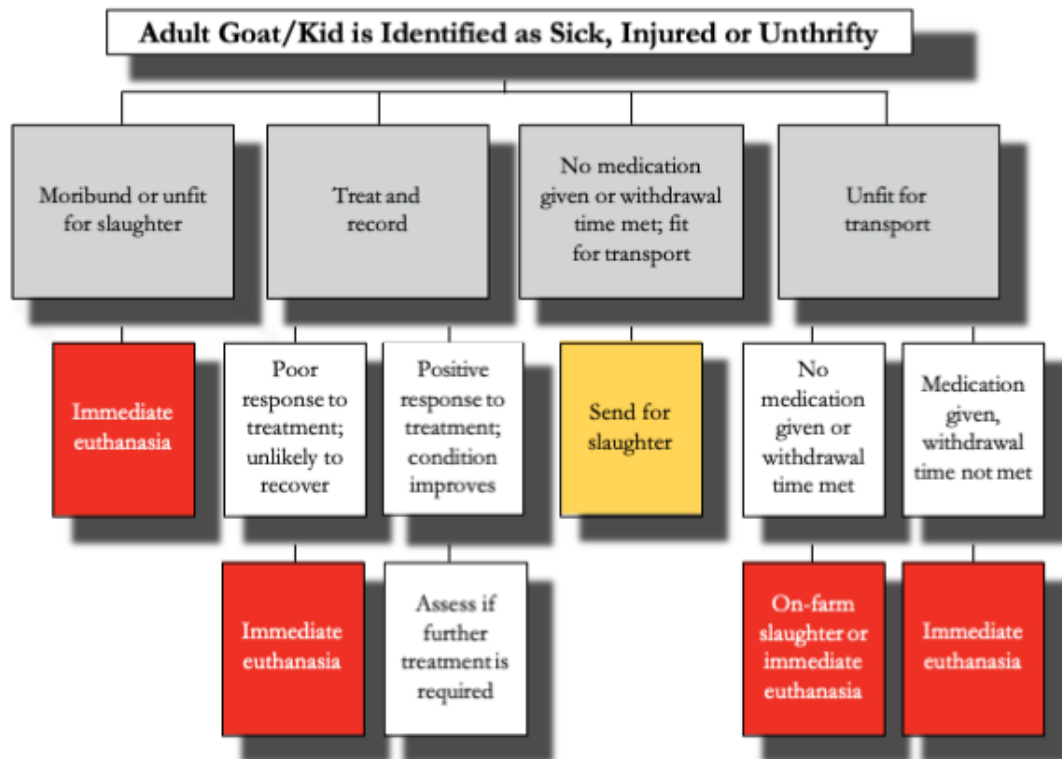
Every 3 months the vulva and pizzle areas in Angoras must be clipped of urine-stained hair to maintain hygiene and avoid pizzle rot (Meat and Livestock Australia (MLA) (n.d.) *Pizzle Rot* Available at: <http://veterinaryhandbook.com.au/Diseases.aspx?diseasenameid=207#:~:text=Pizzle%20rot%20is%20an%20infection,rams%2C%20bucks%20and%20wether%20goats>).

Appendix K - Euthanasia Decision-Making Tree

Appendix K



Example of Decision Tree for Euthanasia



Examples of criteria for euthanizing goats:

- Weak, unable to stand
- Unable to eat or drink
- Severe injury (e.g. from predator attack)
- Broken leg with exposed bone
- Exposed internal organs
- Moderate to severe lameness
- Rectal or vaginal prolapse (persistent or damaged)
- Severe body weight loss (20% or greater)

Refer to sections 7.0 Euthanasia, 4.4 Sick, Injured or Cull Animals and 6.1.1 Fitness for Transport.

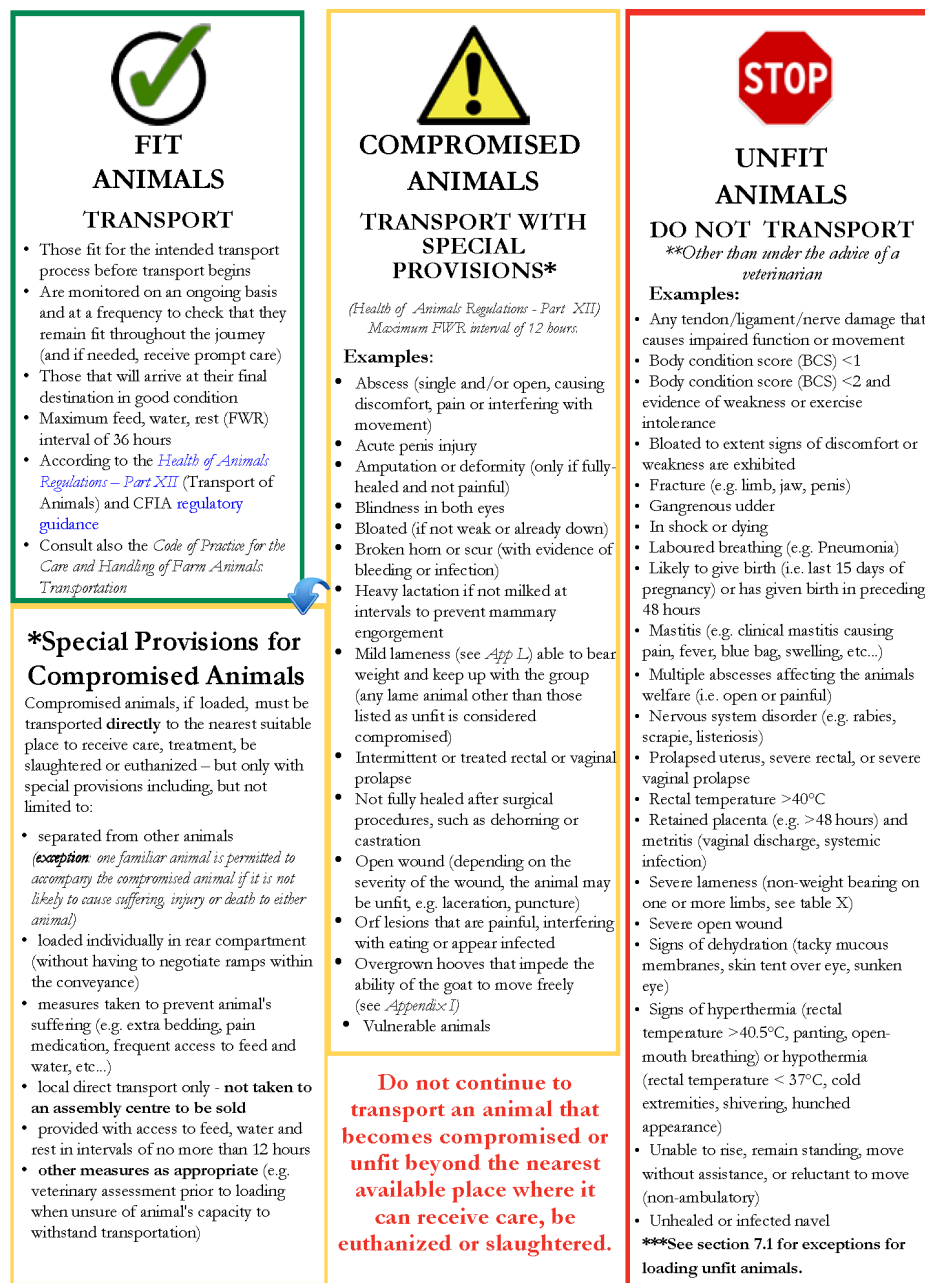
Appendix L - Lameness Scoring

Table L.1. Description of locomotion scoring systems available for goats

Category	Willing to move forward	Weight-bearing	Head nodding	Description
1. Normal gait	Yes	Yes	No	Even gait, walking unhalted.
2. Uneven gait	Yes	Yes	No	Short stride, stiff gait, or swinging of hoof.
3. Mild lameness	Yes	Yes	Maybe	Mild limp. Affected limb not readily identifiable.
4. Moderate lameness	Reluctant	Reluctant	Yes	Moderate limp. Affected limb(s) identifiable.
5. Severe lameness	Unwilling	Unable	Yes (severe)	Severe limp, unable to bear weight on all 4 legs. May walk on knees or walking with limbs stretched and not bending joints (i.e., goose-stepping).

Appendix M – Transport Decision Tree

Transport Decision Tree



Source: Adapted from the Code of Practice for the Care and Handling of Beef Cattle (2013): Available at <https://www.nfacc.ca/codes-of-practice/beef-cattle>

CODE OF PRACTICE FOR THE CARE AND HANDLING OF GOATS - 2021

Appendix N - Sample On-Farm Euthanasia Action Plan

Work with your veterinarian to further develop your Euthanasia Action Plan appropriate for each stage of production on your farm. This plan should be kept in an obvious location in the barn. Review the plan with any new stockpeople and annually with all stockpeople, family members, and your veterinarian.

Date: _____

Farm name: _____ Prepared by: _____

If anyone on this farm is concerned about an animal's condition, immediately bring it to the attention of a trained and authorized person to approve euthanasia, or contact the herd veterinarian. If the decision to euthanize is made, the procedure must be performed immediately.

Name of person(s) trained and authorized to approve euthanasia: _____

Name of person(s) trained and authorized to perform euthanasia: _____

Herd veterinarian: _____ Phone: _____

Emergency phone: _____

Deadstock collection service: _____ Phone: _____

On-farm disposal plan, following provincial regulations:

Contact for deadstock disposal (if applicable): _____ Phone: _____

	Primary euthanasia method	Secondary step (if using captive bolt)	Person(s) trained to perform primary method	Alternate euthanasia method	Person(s) trained to perform alternate method
Kids (< 5kg)					
Kids (>5 kg)					
Does					
Bucks					

Modified from Ontario Goat (2017) *Approved Methods of Euthanasia in Goats* In: On-Farm Welfare Producer Education Package Available at: <https://ontariogoat.ca/on-farm-welfare-producer-education-package/>

Appendix O - Acceptable Euthanasia Methods/Calibres for Goats

Table 8. Acceptable Euthanasia Methods for Goats

	Gun calibre	Bullet Cartridge	Notes
Kid	.22 short rifle (minimum)	.22 long rifle hollow-nose	Move kid to an area well away from hard surfaces such as concrete to ensure safety in case of over-penetration.
Adult hornless goat	.22 short rifle (minimum)	.22 long rifle hollow-nose .22 magnum	Birdshot spreads out in the brain, reducing the risk of over-penetration.
	.22 magnum	.22 magnum	
	.410 shotgun	#4/#6 bird shot	Birdshot is only safe at very close range (must hit animal before it spreads out) Slugs are recommended.
Mature buck, horned adult	.22 long rifle (minimum)	.22 magnum	Shotguns or higher-caliber firearms loaded with solid-point bullets are preferred.
	.410 shotgun	1/5 oz. slug #4/#6 birdshot	
	20 gauge	5/8 oz. slug #4/#6 birdshot	

Modified from Ontario Goat (2017) *Approved Methods of Euthanasia in Goats* In: On-Farm Welfare Producer Education Package Available at: <https://ontariogoat.ca/on-farm-welfare-producer-education-package/>

Appendix P - Anatomical Landmarks for Euthanasia

Firearms

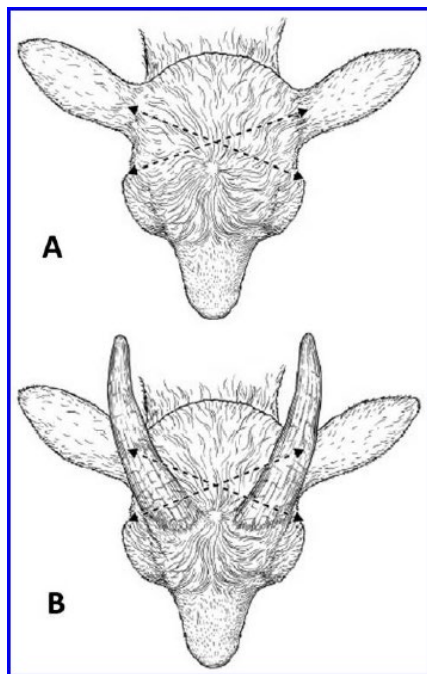
Poll position - preferred position

Firearms should be held 10-30 cm from the goat, never directly against the goat. In an adult goat, the firearm should be directed slightly behind the poll and aimed towards the lower chin. In kids, this site can be found at the intersection of two lines drawn from the outside corner of each eye to the horn bud (i.e. site of horn formation) on the opposite side (midline, behind the poll).

Frontal position - not preferred

For especially large-horned goats, where the poll position may be difficult to use, the firearm can be aimed high on the forehead toward and in line with the spinal column of the cervical vertebra. **This position is not preferred** and should only be used if the poll position is not accessible.

Penetrating Captive Bolt (PCB)



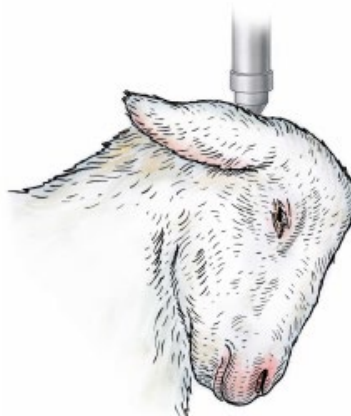
The ideal location for placement of a captive bolt is perpendicular to the skull at the intersection of 2 lines drawn from the outside corner of each eye to the middle of the base of the opposite ear. The captive bolt should be aimed towards the base of the tongue. This location is used for both horned and hornless goats and can be used on all ages. This position corresponds to slightly behind the poll. **A frontal position must not be used when euthanizing a goat with a captive bolt.**

Method for determining the proper anatomic site of a polled goat (A) and horned goat (B) by use of a firearm or captive bolt device.

Non-penetrating captive bolts (NPCB)

Poll position - kids < 8 days only

Captive bolts must be placed directly against the goat. Aiming the NPCB between the ears on the midline while tucking the kid's chin into the neck.



Source: JK Shearer, Iowa State University; adapted from the AVMA Guidelines for the Euthanasia of Animals: 2020 Edition.

Appendix Q - Secondary Steps to Cause Death

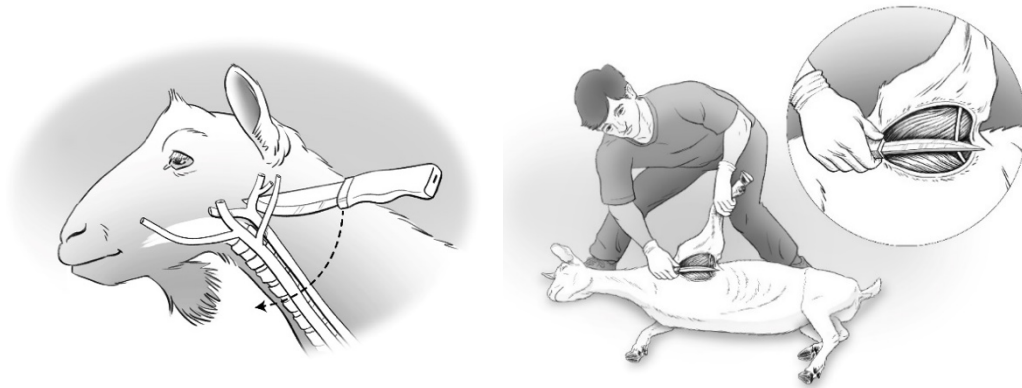
Required for captive bolt device euthanasia.

Receive proper training on secondary steps.

A goat must be unconscious before a secondary step is applied. See *Section 8.3 – Confirmation of loss of consciousness and death*.

Bleeding out (exsanguination)

Bleeding out of an unconscious animal (previously stunned with a captive bolt device or firearm): Insert a sharp, single-sided blade, into the neck below the cervical vertebrae (i.e. the bones of the neck) and behind the back of the jaw (figure X). Draw the blade forward to cut both jugular veins and carotid arteries, as well as the trachea. Blood should immediately flow freely, and death occurs within minutes. Alternatively, the large blood vessels located under a foreleg in the axilla region may be cut (figure X). Keep the leg elevated until the bleeding stops and the animal is dead.



Pithing

Pithing is the process of destroying the brain tissue of an unconscious animal to prevent a return to consciousness and assure death. Pithing is performed by inserting a rod through the hole in the skull created by the penetrating captive bolt device. The operator manipulates the pithing tool to destroy brainstem and spinal cord tissue. Ask your herd veterinarian to confirm that the pithing tool is appropriately sized for the size of goats on your farm. A disposable pithing rod is best for biosecurity but a reusable tool can also be used. The tool must be long enough to reach the brain where it connects to the spinal cord at the base of the skull. The rods must be carefully cleaned or disposed of after each use.

Source: Adapted from Iowa State University *Procedures for the Humane Euthanasia of Sick, Injured and/or Debilitated Livestock*
<https://vetmed.iastate.edu/sites/default/files/vdpam/Extension/Dairy/Programs/Humane%20Euthanasia/Download%20Files/EuthanasiaBrochure20130128.pdf>

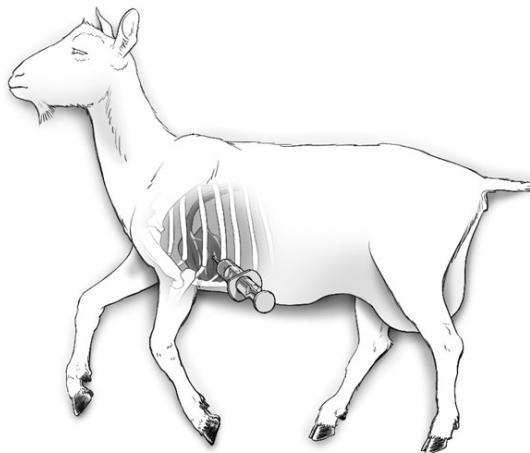
At first, pithing will cause involuntary muscle contractions such as uncoordinated kicking, but the muscles will gradually relax and movement will cease. Be sure to stand well away from the legs of the goat when pithing. This movement is not a sign of consciousness and the animal is not in pain. The carcass is no longer safe for consumption due to possible contamination. Producers are also advised to confirm that pithing will not affect dead stock removal.

Intravenous Injection

A solution of potassium chloride (KCl, also known as a sodium- free salt substitute) or magnesium sulfate (MgSO₄, also known as Epsom salts) is injected directly into an unconscious goat's vein or heart to make the heart stop beating. Proper intravenous injections of these substances can be challenging, especially in young, extremely ill, and/or dehydrated goats, that is why intracardiac is sometimes preferred. Contact your herd veterinarian to determine the appropriate concentration of powder to water. The solution will not work if injected perivascular (around the vein), intramuscular, or subcutaneously. Injection of these substances into a conscious goat is prohibited as it causes extreme pain. Do not inject any other substances.

Intracardiac Injection

Using a 60 mL syringe filled with a saturated solution of KCl (or MgSO₄), attach a 14-gauge 2-inch needle, and inject directly into the heart. The heart is found behind the point of the elbow and 5 to 10 cm from the bottom of the chest (depends on the size of the animal; Figure X). In addition, using 1-2 fingers pressed firmly in that location (between ribs), the exact injection site will be where you feel the maximum intensity of the animal's heartbeat. Insert the needle perpendicular to the body wall and draw back on the syringe. You know you are in the correct location when you draw back on the syringe and see blood. You may have to redirect the needle until blood is seen in the syringe. Inject the full 60 mL solution. Confirm death according to criteria described in *Section 8.3 – Confirmation of loss of consciousness and death*.



Source: Adapted from Iowa State University *Procedures for the Humane Euthanasia of Sick, Injured and/or Debilitated Livestock*
<https://vetmed.iastate.edu/sites/default/files/vdpam/Extension/Dairy/Programs/Humane%20Euthanasia/Download%20Files/EuthanasiaBrochure20130128.pdf>

Appendix R – Standards for Optimizing Animal Welfare Outcomes during Slaughter without Stunning

Standards for Optimizing Animal Welfare Outcomes during Slaughter without Stunning

Introduction

- These standards are science based and are intended to improve animal welfare.
- Pre-slaughter stunning (including reversible stunning) renders an animal insensible yet alive. This is the best method to control anxiety, pain and suffering throughout slaughter.
- Where slaughter without stunning is permitted by regulation, care must be taken to achieve effective control and reduction of anxiety, pain and suffering for all animals throughout slaughter.
- If pre-slaughter stunning is not performed, then immediate post-cut stunning is a best practice which will reduce the potential for animal suffering.
- These standards are based on best practices that should apply to all slaughter establishments.

Definitions

Agonal movements – the twitching and jerking reflex movements as an animal is dying

Back up stunning equipment and stunning methods – equipment that is kept ready and available for use if the primary method does not work properly

Coercion – forcing an animal using a painful or stressful procedure, so it has no option but to comply without enduring more pain or stress

Lairage – animal handling facilities at abattoirs, including loading ramps, laneways, weigh-scales, holding areas for animals in crates, pens, and feeding and watering facilities

Nystagmus – rapid movement of the eyeball in any direction (side to side, up and down, or in a circular pattern)

Rhythmic breathing – in and out breathing pattern of more than two movements, commonly accompanied by flaring of the nares and expansion of the chest wall

Sensibility – a state of awareness, able to feel pain and/or to respond to touch, sound and/or what is seen

Smooth, quiet operation of equipment – operation of equipment without jerky movements, hissing or loud noises

Stunning - rendering an animal insensible...There are two kinds of stunning, **reversible** (eg. gas inhalation, and some electric stunning) and **irreversible** (eg. captive bolt and head to cardiac electric stunning)

- **Post-cut stunning** – the process of stunning animals immediately after they have been cut; this action can reduce suffering in animals that are cut but not stunned
- **Pre-slaughter stunning** – the process of stunning animals immediately prior to the cut
- **Reversible stunning** – a stunning process whereby animals eventually have the potential to regain sensibility

Scope

This document includes guidance on restraint, neck cutting and post cutting management.

This document does not include changes to existing, applicable provincial/federal regulations or legislation.

If these words are used, they offer some flexibility:

Recommend/encourage/should: the practice is viewed as best practice, but other methods will be accepted as long as the goal of high welfare is not jeopardized.

If these words are used, strict adherence is required:

Prohibited: the practice described is banned.
Must: the standard has to be adhered to as directed.

Standards that apply to all slaughter facilities

1. Commitment to protecting animal welfare by taking the responsibility for the training, competency and validation of the skills and ability of everyone involved;
2. Develop, implement and review effective written standard operating procedures (SOPs) and training procedures. These are to include measurable criteria of success, regular monitoring of procedures and records of outcomes. Alternative solutions that achieve the same animal welfare outcomes may be considered for very small plants;
3. Training programs for people who handle, cut, or stun live animals include a knowledge of animal behaviour and physiology, handling and restraint, signs of stress and pain, and best practices for minimizing the time to loss of *sensibility* at slaughter, as well as equipment maintenance, including knife sharpening;
4. The operator/management provides assurance that employees have the ability to recognize when an animal is insensible, when an animal is possibly returning to *sensibility*, and when an animal is dead;
5. Ensure the welfare of animals at all times by the application of best practices and applicable regulations to the transport, unloading, *lairage*, restraining, *stunning* and slaughter of animals;
6. Animals that are not suitable for slaughter must be handled and killed humanely;
7. Apply a monitoring program to verify that animals are calm at the time of slaughter and are not subject to undue stress, pain or suffering during the handling, restraint, slaughter and bleed out until death is confirmed, validating that the animal was cut or stunned effectively and bled out rapidly;
8. Implement a system for rapid identification of failures to meet welfare standards and timely implementation of corrective actions that include documentation of issues and corrective actions taken to address specific and larger underlying problems.

Standards for mammalian slaughter without stunning

Based on temperament, suitability for appropriate restraint, availability of appropriate restraint equipment, and risk to worker safety, some species, such as horses, and bison, should not be considered for slaughter without stunning.

Rabbits should follow the *Standards for Slaughter without Stunning* for mammals and not birds.

1. Restraint

1. Each mammal must be individually restrained in a comfortable position, either manually or with the use of equipment;
2. All mammals must be restrained in an upright position;
3. Inverting mammals for slaughter without stunning is prohibited because it results in distress, pain and aspiration of stomach/rumen fluids;
4. Effective and humane commercial restraint equipment systems are available for cattle, sheep and goats. These must be used within the limits of the equipment (size, horns, etc.);
5. Rabbits must be restrained in a comfortable and upright position and must not be shackled while sensible. Proper restraint of rabbits must continue until there is loss of sensibility. Rabbits can retract heads and necks after cutting if proper restraint is not present. This can impede blood flow and unnecessarily prolong the time to loss of sensibility;
6. Restraining equipment, including both the body and head restrainers, must be designed, located and constructed to suit the size, species and type of animal being slaughtered. It must be functional, properly maintained and used correctly to enable:
 - secure footing for the animal,
 - smooth, quiet operation of equipment,
 - the animals to enter readily and without coercion (for example - no use of nose tongs),
 - the animals to be held forward by a pusher or a similar restraining device,
 - the animals to fit comfortably into the forehead bracket and chin lift, or similar device if being used, which:
 - provides proper access at the correct angle for effective neck cutting and bleeding out without overextension of the neck,
 - applies only moderate but firm pressure,
 - avoids excessive dorsal neck bend (backward bending);
 - requires no additional form of restraint (for example - no nose tongs);
 - adequate monitoring of the animal, including the head, for loss of sensibility, and
 - adequate access to the head and the neck for accurate neck cutting and bleeding, application of the stunning equipment when required;
7. Nothing in the design, location or use of the restraining device or manual restraint must obstruct the flow of blood, including:
 - the closing of the edges of the cut,
 - contact of the neck cut with the restraint device,
 - overextension of the neck,

- excessive restraint in the box,
 - ballooning (constrictions of the cut ends of the carotids), and
 - excessive agonal movements that hamper bleeding;
8. Mammals must remain calm during the slaughter process. Temperament of the animal should be considered in whether they are suitable for this process; and
 9. If an animal is agitated and cannot be restrained for a proper cut, it must be stunned immediately;
 10. The head must be supported after the cut to maximize blood loss, minimize mechanical impact on the surfaces of the wound, and permit proper monitoring until loss of sensibility;
 11. Manual restraint, when used, must suit the size, species and type of animal being slaughtered, and meet all other requirements noted above;
 12. Level of fatigue of the personnel on the effectiveness of manual restraint must be taken into consideration.

2. Neck cutting

1. A trained competent individual must carry out the cut;
2. The knife must be at least twice as long as the width of the animal's neck;
3. The knife must be sharp and undamaged for each animal so that the cut can be made with a minimum of pressure and the requirements in this section can be met. Knives must be checked before each cut for imperfections and sharpness. If requested, knives must be able to pass the paper test or any other comparable test for sharpness before a cut is made. To perform the paper test, dangle a piece of printer paper by one corner with thumb and forefinger. When the knife is held in the other hand, it should be able to slice through the edge of the paper;
4. The slaughter person must be proficient in how to sharpen a knife and keep it free of nicks;
5. The animal must not be restrained until the slaughter person is ready to perform the cut. Once the head is restrained, the neck cut must proceed with no more than a 10 second delay;
6. The cut must be a single pull stroke of the knife in all circumstances except if required with large ruminants where this can be extended into a total of a single pull and a push fluid stroke without interruption;
7. Based on the skin thickness, coat thickness, age and size of the animal an appropriate cut may not be possible and these points should be considered in the selection of animals;
8. At no time must the knife be removed and reinserted;
9. The knife point must not be used in a stabbing or poking motion;
10. Immediate post-cut stunning should be considered particularly for all large (over 800 lb)

bovines;

11. Both carotid arteries and jugular veins must be completely severed with the cut. Blood loss must be rapid enough to cause a rapid loss of sensibility meeting timelines stated elsewhere in this document;
12. Procedures that could cause distress or pain and suffering (including palpation, second neck cuts, tissue collection) must not be done until the animal is insensible;
13. Animal welfare and the loss of sensibility must be monitored for every animal through cutting and bleeding until death; and
14. Back up stunning equipment and methods must be readily available and suit the size, species and type of animal being slaughtered.

Bovines must be stunned immediately if they **do not lose sensibility within 30 seconds post cut.**
Small ruminants (goats and sheep) must be stunned immediately if they **do not lose sensibility within 15 seconds post cut.**
Rabbits must be stunned immediately if they **do not lose sensibility in 15 seconds post cut.**
Mammals must be stunned immediately if they are **showing vocalizing movements after the cut.**

3. Post-cut management

All mammals must be confirmed to be insensible before they are moved or manipulated.

Slaughter without stunning does not have a step that results in instantaneous insensibility, therefore:

1. In slaughter without stunning animals require a longer time to become insensible;
2. Animal welfare must never be compromised to increase speed of the line or productivity;
3. Animals must be monitored for loss of sensibility;
4. Back up stunning equipment and methods must suit the size, species and type of animal. They must be applied correctly, and must have proper maintenance as stunning must be performed safely and rapidly if required to protect animal welfare;
5. Back up stunning equipment must be readily available and prepared for immediate use, and in good working order at all times;
6. Mammals must be stunned immediately if they are showing vocalizing movements (see below for details) after the cut;

7. Bovines must be immediately stunned if they do not lose sensibility within 30 seconds. Small ruminants must be immediately stunned if they do not lose sensibility in 15 seconds. Rabbits must be stunned immediately if they do not lose sensibility in 15 seconds.
8. Mammals must be insensible before a hand or any object is placed in the wound. If bleeding is accidentally being prevented, stunning must be applied before correction measures are applied;
9. Mammals must be insensible before the restraining device is released, unless required to apply a post-cut stunning;
10. Mammals must not be wholly or partially lifted, inverted, shackled or suspended by any means until the animal has lost sensibility; and
11. Dressing procedures must not be performed on an animal that shows signs of a possible return to sensibility.

**Regardless of the choice of slaughter technique,
sensible animals are prohibited on the bleed line.**

4. Mammalian signs of loss of sensibility

The time to loss of sensibility varies between species and among individual animals. Therefore, slaughter persons need to identify when each animal has lost sensibility.

1. No rhythmic breathing;
2. No natural blinking, tracking of movement or other eye movements including nystagmus;
3. Permanent loss of muscle tone and righting reflex:
 - A righting reflex is seen when an animal attempts to retain or regain upright body posture;
4. No vocalization or vocalization movements:
 - For slaughter without stunning: the larynx (voice box) is severed from the trachea, so vocalization per se is not possible. However animals that show vocalizing movements after the cut (e.g., mouth open, neck extended, tongue rolled) must be stunned immediately even if no other signs of sensibility are observed;
5. Floppy head (“rag doll –like”):
 - Loose tongue and
 - No controlled tongue or lip movements.

The presence of any one of these: rhythmic breathing, natural blinking, righting reflex, vocalization movements, controlled tongue or lip movements, indicates the animal may return to sensibility and must be stunned immediately.