

Animal Care

REFERENCE MANUAL



The 2017 National Dairy FARM (Farmers Assuring Responsible Management) Animal Care Reference Manual is dedicated to Dr. Michael Johnson (1983 – 2016) in gratitude for his nearly three-year service to dairy farmers as an employee of Dairy Management, Inc. (DMI). Michael's proactive participation, astute observations and desire to inspire the dairy community to do better and be better were invaluable assets during the FARM Program revision process. Michael served as a trusted advisor and member of the FARM Program Technical Writing Group and on the National Milk Producers Federation Animal Health and Wellbeing Committee. His significant contributions to this manual can be found in almost every chapter. Michael, we will miss your keen mind, dedication to the dairy community and friendship.



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This manual is not a legal document and is intended for educational purposes only. Dairy farmers are individually responsible for determining and complying with all requirements of local, state and federal laws and regulations regarding animal care.

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A man in a green shirt is holding a glass of milk. The image is overlaid with a green tint. The man is smiling and looking towards the camera. He is wearing a name tag that reads "WILLIAM W. WILSON".

01

Introduction

The National Dairy FARM Program and Consumer Trust

Today's consumers expect – and deserve – safe, wholesome food from people who are producing it responsibly.

U.S. dairy farmers have a strong track record of providing excellent animal care. The National Dairy FARM Program: Farmers Assuring Responsible Management™ demonstrates dairy farmers' ongoing commitment to the highest standards and shows consumers that they're doing what's right for the cows, for customers – and for consumers who are more curious than ever before about how their food is raised and produced, but often are generations removed from the farm.

In a recent study conducted by the American Humane Association, 9 in 10 respondents (94.4 percent) indicated that they were “very concerned about farm animal welfare,” up from 87 percent a year ago. More than three-quarters of respondents (75.7 percent) said they were very willing to pay more for humanely raised eggs, meat and, most notably, dairy products. That's up from 73 percent in 2013. And, according to the same study, for the second year in a row, “humanely raised” scored highest among food label importance, beating out “antibiotic-free,” “organic” and “natural.”

Similarly, in a 2015 study conducted by The Center for Food Integrity, only 40 percent of respondents agreed with the statement: “The food system is on the right track.” Notably, 60 percent of respondents strongly agreed with the statement: “If farm animals were treated humanely, I would have no problem consuming meat, milk and eggs.” However, only 25 percent strongly agree that animals are treated humanely on U.S. farms. More than half would support a law in their state to ensure the humane treatment of animals.

Our customers and consumers give dairy farmers the social license, or freedom, to determine how best to raise their animals. In turn, the entire dairy industry needs to give them the permission to trust that the best decisions are being made when it comes to caring for cows.

The FARM Program, which began in 2009, helps build and maintain that trust, demonstrating that dairy farmers share consumer values and are committed to quality animal care and providing safe, wholesome milk. The FARM Program gives the public confidence that the dairy community is doing the right things for the right reasons.

Program Overview

Created by the National Milk Producers Federation (NMPF), with support from Dairy Management, Inc. (DMI), the FARM Program raises the bar for the entire industry – creating a culture of continuous improvement.

Voluntary and available to all dairy farmers, the FARM Program establishes on-farm best management practices, on-farm Second-Party Evaluations and a system for Third-Party Verification that guarantees the rigor and integrity of the program.

Second-Party Evaluations and Third-Party Verification are critical elements of the FARM Program. The Second-Party Evaluation, completed on every participating dairy at least once every three years, provides dairy farms with an external review of their animal care practices based on FARM Program guidelines. Once the Second-Party Evaluation is complete the dairy farmer is eligible to be randomly selected, through statistical sampling, to undergo Third-Party Verification, which ensures the integrity of the program. The results are published each year in FARM’s Year in Review report.

There are only two ways to be automatically removed from the FARM Program: (1) refusal to participate in Third-Party Verification, or (2) if willful mistreatment of animals is observed and the participating farm refuses to complete all necessary actions under the FARM Willful Mistreatment of Animals protocol.

The FARM Program Technical Writing Group, which includes representation from the veterinary community, co-ops, processors, dairy organizations and university animal care faculty, guides the program – ensuring that it fosters a culture of continuous improvement and that the best management practices, which are the cornerstone of the program, evolve with the latest research on animal welfare and humane handling (see Appendix A).

Additional information on the National Dairy FARM Program and program resources are available online at nationaldairyfarm.com.

ACRONYMS	AABP	American Association of Bovine Practitioners	MCAP	Mandatory Corrective Action Plan
	ADT	Animal Disease Traceability	NMPF	National Milk Producers Federation
	AVMA	American Veterinary Medical Association	SOP	Standard Operating Procedures
	BCS	Body Condition Scoring	TMR	Total Mixed Ration
	CIP	Continuous Improvement Plan	USDA	United States Department of Agriculture
	DMI	Dairy Management, Inc.	VCPR	Veterinarian-Client-Patient Relationship
	HAACP	Hazards Analysis and Critical Control Points	VOR	Veterinarian of Record

Animal Care Reference Manual

This Animal Care Reference Manual is an easy-to-use, comprehensive resource detailing animal care and management guidelines of the FARM Program. It's an educational tool for all participating dairy farmers, co-ops, proprietary processors, trained Second-Party Evaluators and Third-Party Verifiers.

Along with the guidelines, this document provides extensive information, resources and references that while thorough, are not exhaustive, nor prescriptive for singular approaches toward meeting the guidelines of the program. This reference manual is not a legal or regulatory requirement for the dairy industry. It is intended to serve as a wide-ranging educational resource for dairy farmers across the United States.

Best practices identified in the manual are not the only practices that can meet the identified guidelines. The application of some management practices may vary due to certain regional norms, weather or other conditions. Dairy farmers should work with their veterinarians and other trained professionals to develop appropriate management approaches to meet the identified guidelines.

All chapters provide guidelines for these key overarching areas: nutrition, animal health, environment and facilities, and handling, movement and transportation. Specifically, in each chapter you'll find:

- Management Checklist(s)
- Description of best practices
- Section for specific lifecycle considerations
- List of resources

Detailed explanations of Second-Party Evaluations and Third-Party Verification are provided in Chapter 2 and Chapter 11, respectively. A comprehensive list of references for each chapter can be found on page 81.

FARM Program materials are living documents. Guidelines are reviewed every three years by the Technical Writing Group and subject to updates based on new science-based animal care and well-being research. This is part of the FARM Program's commitment to continuous improvement.

Management Checklists

The Management Checklists detail key on-farm guidelines and best practices. Management Checklist points are listed at the beginning of each chapter and within the chapters under corresponding topics.



Documentation exists of training for all (new and existing) employees with animal care responsibilities for stockmanship as well as their assigned animal care responsibilities (such as calf care, euthanasia, non-ambulatory cow management, etc.) at least on an annual basis.

Also listed in some chapters are FARM evaluation form informational questions.



Informational: Does the dairy have copies on site and/or use the FARM Program Milk and Dairy Beef Drug Residue Prevention Manual?

DEFINITIONS

Animal Welfare: How an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behavior, and if it is not suffering from unpleasant states such as pain, fear and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management and nutrition, humane handling and humane slaughter/euthanasia. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry and humane treatment.*

Bandaging: The application of an elastic band to cut off blood supply to the scrotum and testicles, which eventually fall from the body.

Best Practice: An animal care guideline, protocol or practice that achieves the desired outcome described by the corresponding Management Checklist Point. More than one best practice may exist for a corresponding outcome. For example, a best practice for an “effective record keeping system,” which is a FARM Program guideline outlined in Chapter 3, may be individual written animal health logs or a computer record system such as DairyComp 305.

Body Condition Scoring (BCS): A common dairy practice used to determine the nutritional status of an individual heifer or cow, or to evaluate the average condition for a group. Animals are evaluated on a 5-point scale, with 1 being extremely thin and 5 being extremely fat (see Appendix B).

**See World Organisation for Animal Health, 2015 Chapter 7.1.*

Bred Heifer: A young, pregnant dairy animal that has not yet given birth to her first calf, typically 13-to-24 months of age.

Breeding Bull: A male bovine used for breeding.

Castration: The process of removal or destruction of the testicles.

Continuous Improvement Plan (CIP): A written proposal that identifies any area(s) for improvement in animal care. It specifies actions to make the improvement and a suggested timeline for completion.

Dairy Cattle Care Ethics and Training Agreement:

An agreement signed by all employees with animal care responsibilities indicating the following: (1) that they have received annual training at least in animal handling and stockmanship; (2) that they agree to care for all animals humanely and with respect and will not participate in animal abuse of any kind, and (3) that they will report any abuse to the farm owner or manager should they witness it. This document is signed annually.

Dehorning: Removal of the horn (using a hot iron, Barne’s dehorner or gouging) after it has attached to the skull (approximately 8 weeks of age).

Disbudding: A procedure to stop the growth of or removal of the horn tissue before the horn bud has attached to the calf’s skull (less than 8 weeks of age). Disbudding is recommended by the FARM Program as the best management practice (see Chapter 6: Animal Health).

Distress: Occurs when livestock are injured, sick or in pain.

For the purposes of the FARM Animal Care Reference Manual, the following words are defined as follows:

Dry Cows: Non-lactating pregnant cows from the end of lactation until next parturition. A pregnant cow is generally dry or non-lactating for a period of 40-to-60 days before the next calving.

Dystocia: Difficult birth typically requiring assistance from the animal caretaker.

Employee with Animal Care Responsibility: An employee on the farm responsible for the care of dairy animals.

End of Life: On-farm death due to illness, euthanasia or death at a packing house.

Failure of Passive Transfer (FPT): The condition when calves do not receive enough colostral immunity from the cow. The specific condition is defined in various ways by various professionals within species. In the cattle industry, a common criterion to define FPT is when calves have a serum (or plasma) IgG concentration less than 10 grams per liter at 24 hours of age.

Freemartin Heifer: A sexually imperfect, usually sterile, female calf twinborn to a male.

Growing Animals: The period of time between weaning and first parturition during which an animal grows through puberty and begins to

approach maturity, approximately from 6 weeks to 24 months of age. See also Bred Heifer, Open Heifer and Springing Heifer.

Herd Health Plan: An animal health management system developed with a veterinarian to prevent, diagnose, control and treat disease or injury of all dairy cattle on a farm.

Hock and Knee Scoring: An assessment for adequacy of bedding and stall comfort for an individual animal or the average condition for a group. Animals are evaluated on a 3-point scale, with 1 being no hair loss or swelling and 3 being severe swelling or lesion (*see Appendix E*).

ISO-Certified Company: A company that has gone through a certification process approved by the International Organization for Standardization (ISO). ISO is a worldwide federation of national standards bodies that creates consistent rules or guidelines of technical specifications.

Lactating Dairy Cow: Any bovine female that has had her first calf.*

Licensed Veterinarian: Licensed by one or more state boards of veterinary medical examiners to practice veterinary medicine within the respective state(s).

**This definition is written in such a way that allows FARM Program Second-Party Evaluators to easily separate different classes of animals for observation and analysis. It is important to note that this definition differs from that of the Food and Drug Administration classification of animals for approved drugs. The FDA classifies such animals as follows: "The term 'non-lactating dairy cattle' includes replacement dairy heifers, replacement dairy bulls, and dairy calves, according to current animal industry standards and a long-standing FDA practice. These classes of dairy cattle have not yet, or would never produce, milk for human consumption. The term non-lactating dairy cattle does not include dry dairy cows. Dry dairy cows have previously produced milk for human consumption and will again in the future after completion of the 'dry period' between lactations."*

Locomotion Scoring: An assessment of lameness for an individual animal or the average condition for a group. Animals are evaluated on a 3-point scale, with 1 being sound and 3 being severely lame (*see Appendix C*).

Mandatory Corrective Action Plan (MCAP):

Written plan agreed upon by both the dairy producer and the FARM Program Second-Party Evaluator and/or Veterinarian of Record (VOR) that outlines necessary steps to comply with Phase One Priority Areas for Animal Care Standards. MCAPs require re-evaluation in one year's time. Failure to complete the MCAP will result in a Notice of Suspension from the FARM Program.

Milk-Fed Dairy Calf: A calf being fed milk or milk replacer (and not suckling from the dam) from newborn through weaning.

Milking Cows: Cows that are lactating.

Newborn: The young of the domestic cow, from birth through colostrum feeding, typically the first 48 hours of life.

Nutrient Management: Management or handling of manure on the farm.

Open Heifer: A young bovine female that has not yet become pregnant.

Pain: An unpleasant physical sensation occurring in varying degrees of severity as consequence of injury, disease or from a medical or management procedure.

Patient: An animal that receives medical attention, care or treatment.

Protocols: Written processes that may include instructions provided by the Veterinarian of Record for the management of dairy cows in various situations and under various conditions.

Second-Party Evaluation: An external review and assessment of on-farm animal care practices on a participating farm based on the National Dairy FARM Program guidelines. Participating farms must undergo a Second-Party Evaluation at least once every three years.

Second-Party Evaluator: A trained dairy professional certified by the FARM Program to complete on-farm Second-Party Evaluations. Evaluators must recertify annually and complete all requisite training to maintain their certification and ability to conduct on-farm evaluations.

Special-Needs Animals: Sick, injured or non-ambulatory dairy cattle.

Springing Heifers: A heifer that is in the last few weeks of pregnancy.

Stockmanship: The knowledgeable and skillful handling of cattle, based on accepted animal behavior principles, in a safe, efficient, effective and low-stress manner.

Third-Party Verification: A process by which Third-Party Verifiers inspect a representative percentage of participating farms each year to provide statistically verified data regarding adherence to FARM Program guidelines.

Third-Party Verifier: A trained and qualified person who does not have a conflict of interest in the operation or the outcome of the verification process.

Transition Cows: Cows or heifers that are “transitioning” from the period of late gestation (pregnancy) through the period of early lactation, that is, about three weeks prior to and about three weeks after calving (periparturient period).

Veterinarian-Client-Patient-Relationship (VCPR): The FARM Program uses the AVMA (2013) definition of a VCPR. A VCPR exists when:

- The veterinarian has assumed the responsibility for making medical judgments regarding the health of the patient and the client has agreed to follow the veterinarian’s instructions.
- The veterinarian has sufficient knowledge of the patient to initiate at least a general or preliminary diagnosis of the medical condition of the patient. This means that the veterinarian is personally acquainted with the keeping and care of the patient by virtue of:
 - a. A timely examination of the patient by the veterinarian, or*
 - b. Medically appropriate and timely visits by the veterinarian to the operation where the patient is managed.*
- The veterinarian is readily available for follow-up evaluation or has arranged for the following:
 - a. Veterinary emergency coverage, and*
 - b. Continuing care and treatment.*
- The veterinarian provides oversight of treatment, compliance and outcome.
- Patient records are maintained.

Veterinarian of Record (VOR): The Veterinarian of Record is the responsible party for providing appropriate oversight of drug use on the farm operation. Such oversight is a critical component of establishing, maintaining and validating a VCPR. This oversight should include, but may not be limited to, establishment of treatment protocols, training of personnel, review of treatment records, monitoring drug inventories, and assuring appropriate labeling of drugs.

Weaned Animal: A young calf that is no longer being fed milk or milk replacer and has been transitioned to eating only dry feed.

Willful Mistreatment of Animals: Acts that maliciously cause pain, fear, injury or suffering including, but not limited to: needlessly applying any type of prod to a sensitive part of the animal (prods are only used when animal or human safety is in jeopardy, and as a last resort), malicious hitting or beating of an animal, movement of non-ambulatory cattle in a manner inconsistent with National Dairy FARM Program guidelines, prolonged lack of access to feed and water, and inappropriate on-farm slaughter or euthanasia.


Written Protocol: A document that provides specific instructions to cow-side personnel for performing a single, specific task. As a training tool, written protocols improve communication and work consistency.

Young Stock: Animals from weaning to 20 months of age.



02

On-Farm Second-Party Evaluations



The on-farm Second-Party Evaluation provides an external review of animal care practices based on FARM Program guidelines. The results of the initial Second-Party Evaluation provide dairy farmers with a status report and enable them to develop a Continuous Improvement Plan (CIP) (in consultation with trained professionals) if necessary. Subsequent Second-Party Evaluations are conducted at least once every three years, and allow dairy farmers given a Continuous Improvement Plan to track progress.

Only a veterinarian, extension educator, co-op field staff person, university personnel or otherwise qualified personnel who have completed the FARM Program training course can perform Second-Party Evaluations.

Continuous Improvement Plans

At the conclusion of a Second-Party Evaluation a CIP may be developed by the dairy farmer and the Second-Party Evaluator, herd veterinarian or other qualified professionals for those areas identified as needing improvement. A CIP identifies opportunity areas for improving animal care, specific actions to implement the improvement(s) and a suggested schedule for completion. A CIP may include a recommendation for a re-evaluation within a specified time to assess progress.

CIPs, previously known as action plans, have been a part of the FARM Program since its inception and may be implemented anytime the Second-Party Evaluator believes one is warranted.

Mandatory Corrective Action Plans

Several best management practices, described below as “Phase One Priority Areas” will now trigger a Mandatory Corrective Action Plan (MCAP). These Phase One Priority Areas have been identified by the experts of the FARM Program Technical Writing Group as **minimum criteria for FARM Program participation** and correspond to specific questions asked during the Second-Party Evaluation.

Phase One Priority Areas

Phase One Priority Areas, which are minimum criteria for FARM Program participation, include:

- The dairy has a current Veterinarian-Client-Patient Relationship form, signed by the farm owner/manager and Veterinarian of Record that is updated annually, or more often as needed.
- All employees with animal care responsibilities have signed a Dairy Cattle Care and Ethics Training Agreement annually.
- Tail docking stopped by January 1, 2017, with no new animals docked after that date entering the herd.

The above priority areas have been identified as minimum criteria for participation in the FARM Program. Farms that do not have a signed VCPR, signed Dairy Cattle Care and Ethics Training Agreement and/or are still tail docking will receive an MCAP. The MCAP will be created with their Second-Party Evaluator and/or Veterinarian of

Record (VOR) with a set timeframe for re-evaluation of progress toward completing all MCAPs, **not to exceed one year’s time.**

After such re-evaluation, a farm that is not meeting FARM Program criteria will be placed on probationary status and receive a formal notice that it will be suspended from the FARM Program if the deficiencies are not corrected within 60 days. A farm that is suspended may appeal such suspension, and the suspension determination will be reviewed on appeal through a Third-Party Verification process.

A farm that has been suspended may seek reinstatement in the FARM Program by filing a petition that provides sufficient evidence that the deficiencies leading to the suspension have been corrected, and a certification that the farm now meets all minimum participation criteria.

Each month, the FARM Program will publish on its website a list of those participating cooperatives and proprietary processors in good standing. To be in good standing, all participating organizations must affirm that no farms from which it currently receives milk have been suspended from the FARM Program. The FARM Program will provide to all participating organizations, on a monthly basis, a list of their supplying dairies that are participating in FARM but (1) have open MCAPs, or (2) are on probationary status. The FARM Program will also provide the names of any farms supplying milk to that organization that have been formally suspended.

Phase Two Priority Areas

Several best additional management practices, described below as “Phase Two Priority Areas,” will now trigger a Continuous Improvement Plan (CIP). These Phase Two Priority Areas have been identified by the experts of the FARM Program Technical Writing Group as areas requiring more immediate attention and correspond to specific questions asked during the Second-Party Evaluation.

Phase Two Priority Areas include:

- Herd Health Plan (written in consultation with a veterinarian)
 - o The dairy has, as part of its written Herd Health Plan:
 - + *Protocols for newborn and milk-fed dairy calves.*
 - + *Protocols for pain management.*
 - + *Protocols and training for non-ambulatory animal management.*
 - + *Protocols and training for euthanasia.*
 - o 95% of the lactating and dry dairy herd scores a 2 or less on the FARM Locomotion Scorecard.
 - o 95% or more of lactating and dry dairy herd score a 2 or less on the FARM Hock and Knee Scorecard.
 - o 99% of all classes of animals score a 2 or more on the FARM Body Condition Score Scorecard.

If, during an evaluation, a farm does not meet the requirements for these specific Herd Health Plan elements or animal observation benchmarks, that farm will receive a CIP developed with its Second-Party Evaluator and/or VOR. Upon the dairy farm’s next full, regularly scheduled Second-Party Evaluation, the farm must show progress toward completing its CIP or may be placed on probationary status.

A close-up photograph of a horse's head, focusing on its eye and the texture of its coat. The image is overlaid with a semi-transparent orange filter. The horse's eye is dark and looking slightly down and to the left. The coat is a light tan or cream color with fine hairs visible.

03

Management Procedures

MANAGEMENT CHECKLIST

- ✓ The dairy has a written Veterinarian-Client-Patient Relationship signed by the farm owner/manager and Veterinarian of Record that is updated annually or more often as needed.
- ✓ Documentation exists of training for all (new and existing) employees with animal care responsibilities in stockmanship, as well as their assigned animal care responsibilities (such as calf care, euthanasia, non-ambulatory cow management, etc.) at least on an annual basis.
- ✓ Written protocols exist for various aspects of animal care on the dairy. Written protocols should be readily available and translated, as needed, into the language(s) understood by employees assigned animal care responsibilities.
- ✓ The Herd Health Plan is reviewed and updated annually, or more often, as needed. This shall be documentable by having all protocols and procedures carry the date of review on them.
- ✓ The names and telephone numbers for emergency services, emergency contacts (e.g. the owner, veterinarian, milk handler, equipment dealers and power company), and the site address are posted in a prominent place on the farm in the language(s) that employees understand.
- ✓ Each animal is permanently identified.
- ✓ Permanent, easily accessible drug treatment records are maintained and denote how all drugs were used and disposed.
- ✓ A specific written protocol and routine for milking exists and is followed to ensure low-stress animal handling and well-being.

When addressing management, it is important to describe the procedure, train to the procedure, document the completion of the training and monitor it over time. Written Standard Operating Procedures (SOPs) are reviewed annually and considered a best practice. The written information benefits other employees stepping in to assist. Train and educate animal caretakers about animal care expectations and animal well-being policies.

The operation must have a written Herd Health Plan, as well as training and protocols for handling, transportation and movement, and euthanasia for cattle for all ages and health conditions. Much of the information in this chapter is interdependent on criteria in other sections and/or animal observations.

Veterinarian-Client-Patient Relationship

✓ ***The dairy has a written Veterinarian-Client-Patient Relationship signed by the farm owner/manager and Veterinarian of Record that is updated annually or more often as needed.***

A robust and intimate relationship with the farm's veterinarian is crucial to safeguarding animal care. The Veterinarian-Client-Patient Relationship (VCPR) is one of the cornerstones of the FARM Program and aligns with many other program requirements contained within the program.

To correctly diagnose, treat and prevent disease, dairy farmers must establish a VCPR with a licensed VOR. According to the American Veterinary Medical Association (2013), a VCPR means that all of the following requirements are met:

- The veterinarian has assumed the responsibility for making medical judgments regarding the health of the patient and the client has agreed to follow the veterinarian's instructions.

- The veterinarian has sufficient knowledge of the patient to initiate at least a general or preliminary diagnosis of the medical condition of the patient. This means that the veterinarian is personally acquainted with the keeping and care of the patient by virtue of:
 - a. A timely examination of the patient by the veterinarian, or*
 - b. Medically appropriate and timely visits by the veterinarian to the operation where the patient is managed.*
- The veterinarian is readily available for follow-up evaluation or has arranged for the following:
 - a. Veterinary emergency coverage, and*
 - b. Continuing care and treatment.*
- The veterinarian provides oversight of treatment, compliance and outcome.
- Patient records are maintained.

Dairy producers are encouraged to consult and review the treatment protocols and antibiotic stewardship principles or programs, including the American Association of Bovine Practitioners "Guidelines for Establishing and Maintaining the VCPR in Bovine Practice" and the National Dairy FARM Program Milk and Dairy Beef Drug Residue Prevention Manual, with their veterinarians (see Resources at end of this chapter).

It is understood that a veterinarian may develop an area of animal health management expertise and may serve as the primary veterinarian for one specific part of a dairy farm. For example, there may be one primary veterinarian for reproduction protocols and another primary veterinarian for metabolic issues. Dairy producers or farm managers should ensure that any veterinarian providing antibiotics or protocols for their use on a farm notify the VOR for that farm and/or record use in an accurate and timely fashion within a centralized database. The dairy farmer in consultation with the herd VOR must develop a Herd Health Plan.

Employee Training

✓ Documentation exists of training for all (new and existing) employees with animal care responsibilities in stockmanship, as well as their assigned animal care responsibilities (such as calf care, euthanasia, non-ambulatory cow management, etc.) at least on an annual basis.*

A best practice is to train all employees with animal care responsibilities in basic animal handling and stockmanship in their understood languages promptly after hiring, and ensure the basics of low-stress animal handling and a zero-tolerance for abuse are understood before starting any work with animals. All employees with animal care responsibilities should be retrained at least annually. Animal caretakers should be cross-trained for all situations they may encounter. Training encompasses care expectations for particular circumstances, such as how to move cattle or what to do in cases of emergencies, as well as general expectations, such as how to humanely handle animals. Animal caretakers must know and understand the negative consequences of deliberate disregard for animal care policies established by the dairy farmer.

Humane handling and animal care should be part of the daily culture on the dairy and not just an annual training. Humane animal handling and animal care expectations should be reinforced throughout job expectations and daily functions. Animal abuse is never tolerated.

A complete list of training resources can be found at the conclusion of this chapter and is also updated on the National Dairy FARM Program website.

Written Protocols

✓ Written protocols exist for various aspects of animal care on the dairy. Written protocols should be readily available and translated, as needed, into the language(s) understood by employees assigned animal care responsibilities.

✓ The Herd Health Plan is reviewed and updated annually, or more often, as needed. This shall be documentable by having all protocols and procedures carry the date of review on them.

Written protocols provide enough detail to ensure that all animal caretakers empowered with a specific animal care assignment (consistent with their job description and training) can routinely and consistently perform their animal care duties. As a best practice, written protocols are reviewed at least annually and updated as necessary. Written protocols are required for the following management areas on the farm:


- Newborn and Milk-Fed Dairy Calf Management
- Vaccinations
- Daily Observation
- Diseased and Injured Animal Management
- Treatment of Common Diseases
- Parasite, Pest and Fly Control
- Non-Ambulatory Animal Management
- Euthanasia
- Lameness Prevention
- Dystocia Management
- Minimization of Airborne Particles
- Culling and Transport
- Pain Management
- Milking Routine

Sample written protocols are available from the FARM Program. Other protocols that meet the

**Though they are encouraged to do so, immediate family members who are employees are exempt from signing the Dairy Cattle Care Ethics and Training Agreement. Immediate family members are defined as grandparent, parent, in-law, spouse, partner, sibling, or child of the legal owner(s) of the dairy operation. Note that this exemption only applies to signing the Agreement, not to training itself. All employees—including immediate family—are encouraged to be trained in basic stockmanship/animal handling and their assigned areas of responsibility at least on an annual basis.*

same content requirements as sample protocols are acceptable.

Emergency Preparedness

- 
- The names and telephone numbers for emergency services, emergency contacts (e.g. the owner, veterinarian, milk handler, equipment dealers and power company), and the site address are posted in a prominent place on the farm in the language(s) that employees understand.***

A best practice includes arrangements for animal caretakers or temporary help to cover emergencies, weekends, holidays and unexpected absences of assigned animal caretakers. Animal caretakers are informed of animal care expectations and qualified to perform assigned duties. Posting the names and telephone numbers of emergency contacts (e.g., herd manager, owner, veterinarian, site address, equipment dealers and power company) in a prominent place in the animal facility in employees' native languages is necessary to speed up communications in an emergency.

Identification and Record Keeping

- 
- Each animal is permanently identified.***
- 
- Permanent, easily accessible drug treatment records are maintained and denote how all drugs were used and disposed.***

Animal identification and record keeping are critical for making important management decisions about feeding, grouping, selecting, treating, breeding and culling an animal from the herd. In addition, food safety, foreign animal disease threats and bio/agro-terrorism concerns make premise and individual animal identification a necessity. In 2012, the U.S. Department of Agriculture (USDA) finalized the Animal Disease

Traceability (ADT) rules establishing general regulations for improving the traceability of U.S. livestock moving between states. Under the ADT final rule, all dairy cattle females, regardless of age, and all male dairy cattle (including dairy steers) that are born after March 11, 2013, will be required to be officially identified by a device or method approved by USDA* prior to interstate movement. Additionally, all dairy cattle moving between states (unless transporting to slaughter) must be accompanied by an Interstate Certificate of Veterinary Inspection or other documentation as agreed to by the receiving state. The FARM Program recommends using 840-RFID ear tags, which USDA recognizes as an official identification device for the lifetime of an animal. Effective record keeping shows compliance with training, inventory control, animal identification, disease prevention and control, residue withdrawal and avoidance, and disposal to help avoid liability from residue contamination or other animal health concerns. On a daily basis, it is necessary to identify animals treated with medications or healthcare products, and record the animal ID, dates, duration and dose for the entire treatment period. Records are important for animal traceability in the event of an animal disease outbreak. They may include such items as:

- Birth date
- Sex
- Origin
- Owner
- Location

Production and reproduction records help monitor an animal's performance and well-being. Important management information may include:

- Average daily weight gain for heifers and yearlings
- Milk production and composition

**Such devices could include, but are not limited to: dangle tags, RFID tags, neck chains and/or names above individual cow stalls.*

- Nutritional information and history where known
- Breeding dates
- Sire identification and calving dates
- Identification of the calf
- Ultimate disposition of the animal

Equally important animal health information that should be recorded:

- Vaccination dates
- Parasite control measures
- Blood tests and veterinary treatments, including:
 - Treatment date(s)
 - Name of medication(s)
 - Amount(s) and route(s) of administration
 - Surgical procedure(s) performed
 - Condition diagnosed and being treated
 - Veterinary clinic information

Milking Routine

✓ ***A specific written protocol and routine for milking exists and is followed to ensure low-stress animal handling and well-being.***

Ensuring appropriate animal handling at milking is important for both animal well-being and productivity. Numerous studies have found that farms with quiet, confident animal caretakers have higher milk production (**see Chapter 8: Animal Handling, Movement and Transportation**), thus all animal caretakers should behave in a calm and controlled manner. Milkers should be trained to load cows into the parlor in accordance with the stockmanship principles outlined in Chapter 8.

Specifically:

- Cows should be moved without excessive vocal or physical interaction, resulting in minimal vocalization from the cows and calm movement in the parlor.

- Animal handlers should walk against the flow of cows coming into the parlor, paying attention to the reaction of the cattle and adjust for balking or stopping. To return to their starting positions, animal handlers should use a path that does not impede the flow of cattle movement.
- Gates and restraining equipment operate smoothly, quietly and safely. Waiting time is minimized for each milking.

Ideally, the total time out of the pen for each milking should be less than one hour for the last cow milked. The pre-milking holding area on farms with a parlor is typically the place of highest animal density on the farm.. It is important that prevention of injury as well as cow comfort and movement be considered in the design of the holding area's flooring, space, sidewalls and entrance to the milking parlor.

Moderation of temperature extremes by use of fans, sprinklers or other technology ensures animal comfort in the holding areas and the milking parlor (**see Chapter 7: Environment and Facilities**).

The preparation routine that signals the beginning of milking is consistent and as low stress to the cow as possible. The routine includes checking for abnormal milk, and thorough cleaning and drying of the teats. Avoid medical examinations or unpleasant experiences from being associated with the place of milking. Teat ends are periodically inspected to facilitate timely identification of any problems.

Milking equipment is regularly maintained and checked for vacuum level, pulsation rate and pulsation ratio. Equipment is also checked for stray voltage if unusual behavior is exhibited or milk production drops. To prevent disease transmission, milking equipment is maintained, cleaned and sanitized.



RESOURCES

AABP Guidelines for Establishing and Maintaining the VCPR in Bovine Practice

Accessed by AABP members at aabp.org.

Dairy Care365® Animal Handling Video Training Series

1. Introduction to Dairy Stockmanship
2. Low-Stress Handling of Dairy Cows and Heifers
3. Moving Cows to the Parlor
4. Handling Non-Ambulatory Cows
5. Euthanasia
6. Calf Care: Birth to Two Weeks
7. Calf Care: Weaning to the Group Pens

Dairy C.A.R.E.™* Initiative

- Animal care commitment statements and Standard Operating Procedures (SOPs) templates
- Best practices on employee hiring, training, monitoring and measuring success
- Preparedness planning tools and templates
- Free workshops for farmers and their veterinarians

Contact your local Merck Animal Health representative for more information, visit www.dairycare365.com or email info@DairyCare365.com.

FARM Program and Merck Animal Health Animal Care Training Webinars for Version 3.0

Schedule and topics at nationaldairyfarm.com.

Good Dairy Health Records

Washington State University Extension, 2012.
Online at goodhealthrecords.com.

NYSCHAP Standard Operating Procedures

NYSCHAP. Online at nyschap.vet.cornell.edu.

Principles of Veterinary Medical Ethics of the AVMA

American Veterinary Medical Association, April 2008. Online at avma.org.

See It? Stop It!

The Center for Food Integrity, 2013.
Online at seeitstopit.org.

The National Dairy FARM Program Milk and Dairy Beef Drug Residue Manual

NMPF, 2016. Online at nationaldairyfarm.com.

Why Animal Identification?

IDairy, 2009. Online at idairy.org.

WVMA Food Armor™: HACCP for Proper Drug Use

Online at wvma.org.



Newborn and Milk-Fed Dairy Calves

MANAGEMENT CHECKLIST

- ✓ All calves receive colostrum or colostrum replacer soon after birth, even if immediately transported off the farm.
 - ✓ All calves receive a volume and quality of milk or milk replacer to maintain health, growth and vigor until weaned or marketed.
 - ✓ Identified animal caretakers are trained in calf care, nutritional requirements and feeding techniques, including the use of esophageal tube feeders and other feeding mechanisms.
 - ✓ Calves are offered fresh, palatable starter feed.
 - ✓ All age classes of animals (including milk-fed dairy calves) have access to clean, fresh water as necessary to maintain proper hydration.
-

ADDITIONAL CONSIDERATIONS FOR NEWBORN AND MILK-FED CALVES INCLUDE:

The dairy has written protocols for specific areas of newborn and milk-fed dairy calf management
See Chapter 6: Animal Health

Calves are moved by lifting, walking or using clean, properly designed mechanical transport devices
See Chapter 8: Handling, Movement and Transportation

Animal caretakers are trained to handle and restrain calves with minimum stress to the animal
See Chapter 8: Handling, Movement and Transportation

Calf health is maintained through preventive care programs augmented by rapid diagnosis and treatment when necessary. Animal caretakers are adequately trained to follow established protocols. Calves are provided space to stand, lie down, adopt normal resting postures and have visual contact with other calves, and are provided an environment that is clean, dry and minimizes exposure to drafts and seasonal weather extremes. Calves are handled, moved and transported in a manner that minimizes the risk of the potential for injury, distress or disease and promotes a positive human-animal bond.

Nutrition

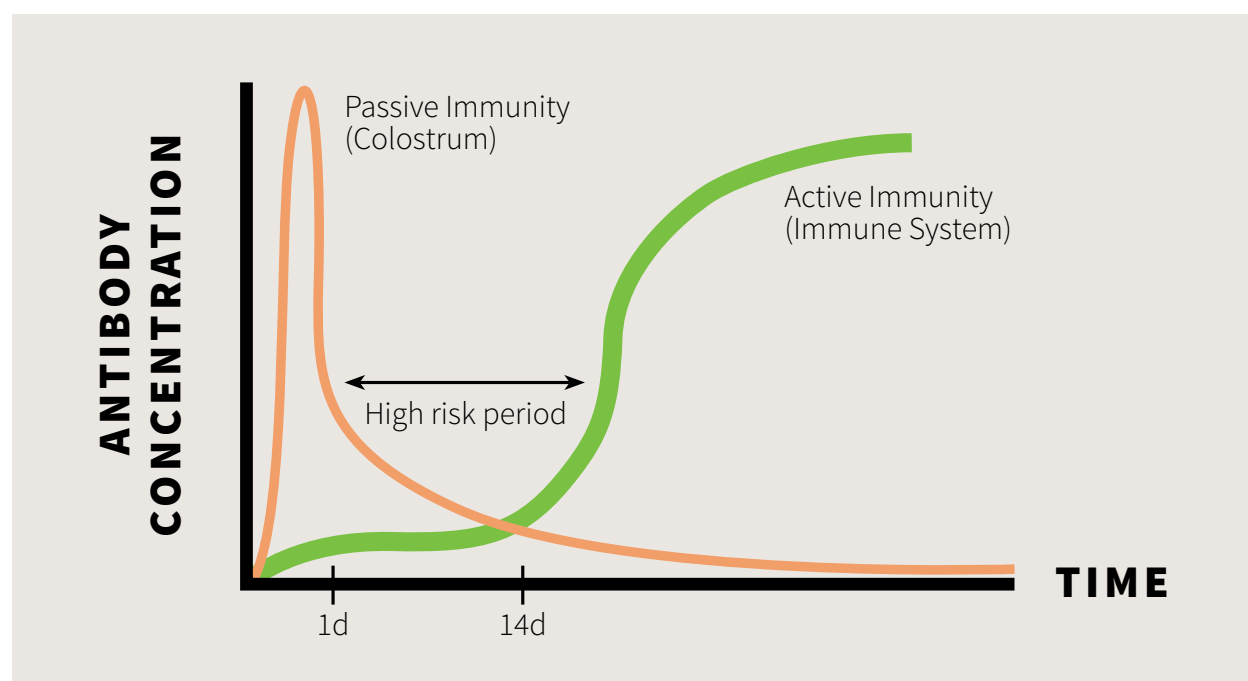
- ✓ **All calves receive colostrum or colostrum replacer soon after birth, even if immediately transported off the farm.**
- ✓ **All calves receive a volume and quality of milk or milk replacer to maintain health, growth and vigor until weaned or marketed.**

Identified animal caretakers are trained in calf care, nutritional requirements and feeding techniques, including the use of esophageal tube feeders and other feeding mechanisms. ✓

Calves are offered fresh, palatable starter feed. ✓

All age classes of animals (including milk-fed dairy calves) have access to clean, fresh water as necessary to maintain proper hydration. ✓

Colostrum feeding has an important influence on the health and well-being of calves.¹ Calf care and feeding should be based on the counsel of a qualified nutrition professional as well as the herd veterinarian. Calves should receive 4-to-5 quarts of colostrum (3-to-4 quarts for smaller dairy breeds) from a cow's first milking in one or two feedings within the first 6-to-8 hours of life. Blood-serum concentration of immunoglobulin G (IgG) less than 10.0 grams per liter (g/L)² or serum total protein less than 5.5 grams per deciliter (g/dL) have been equated with poor growth rates and increased prevalence of sickness and death.



Monitoring colostrum quality before feeding (e.g. using a Brix refractometer or colostrometer) is considered best practice.³ Effective colostrum replacements provide at least 100 grams, 150-to-200 grams preferred, of IgG. In addition, ensuring that Ig concentrations in the blood are sufficient is an effective way of evaluating colostrum management practices.

Inadequate colostrum intake results in “failure of passive transfer” (FPT), which influences the health and welfare of calves as well as the performance of female calves when they reach milk producing stage. Under best practice, all calves receive colostrum or colostrum replacer and are fed in a way that promotes health and reduces the risk of disease. Colostrum quality is highly dependent on early harvest (within two hours of calving).

An esophageal tube feeder may be used by trained animal caretakers to administer colostrum. Proper cleaning and sanitation of the feeder between calves is essential. After receiving immunity through feeding colostrum or colostrum replacer, calves are fed milk or milk replacer through weaning. The recommendations for colostrum feeding are:⁴

- The calf receives four quarts (or 10 percent body weight) of high quality colostrum or colostrum replacer within the first few hours of birth.
- The Ig content of the colostrum is of high quality (over 50mg/ml).⁵ This equates to a Brix value greater or equal to 22 percent.⁶

To ensure good colostrum management practices dairy farmers are encouraged to work with their veterinarian to assess failure of passive transfer.

Water

Calves should have access to clean, fresh water to maintain proper hydration from the first day of life.

Feeding milk or replacer should not be a substitute for water;⁷ best practice is to provide calves access to water beginning on the first day of life.

Water used with milk replacers needs to be fresh, palatable and free of contaminants.

Milk and Milk Replacer Feeding

The goal of calf nutrition is to promote healthy, efficient, rapid growth with milk or milk replacer and enhance rumen growth and function by initiating grain intake.

During the first weeks of life, solid feed intake is very low in calves, regardless of the amount of milk or starter provided. Calves benefit especially from higher milk/milk replacer intakes during the first four weeks of life when their ability to digest solid feed is limited. Benefits of improved growth and reduced hunger can be achieved by feeding calves more milk or milk replacer equivalent.⁸ Calves are motivated to consume large amounts of milk or milk replacer equivalent (for example, Holstein calves will drink in excess of eight quarts per day or more in two or more feedings per day). Feeding only four quarts per day of milk or milk replacer equivalent does not allow the calf to meet its nutritional requirements for maintenance, growth and development and is associated with hunger behavior.⁹ There are no known negative side effects of feeding more milk/milk replacer. There are long-term benefits such as earlier breeding ages and higher milk yield later in life when calves are provided higher planes of nutrition during the first four weeks of life.¹⁰

Higher milk intakes will result in looser feces but this is not associated with increased diarrhea or other health problems. Newborn calves are susceptible to neonatal calf diarrhea (calf scours), especially during their first 28 days of life. However, this must not be confused with looser feces

associated with feeding calves higher volumes of milk. Acquired immunity from colostrum is the first and most important control measure for diarrhea.

In addition, delivering larger amounts of milk (eight quarts per day or more in two or more feedings per day) via nipple feeding (rather than a bucket) is more natural and results in higher concentrations of digestive hormones such as cholecystokinin and insulin¹¹ and is considered a best practice. In group housing situations, provision of 20 percent body weight equivalent in milk from a nipple feeding system can reduce or in many cases eliminate cross sucking, depending on competition for access to nipples (**see Chapter 7: Environment and Facilities**).

The optimal amount of milk/milk replacer will vary with a number of factors. For example, the environment can have a substantial impact on calf growth. A clean environment will help limit the influence of infectious agents (bacteria, viruses and protozoa) on calf growth. Steps should be taken to limit calves' ingestion of manure and the infectious agents it may carry (but not at the expense of providing bedding). Special attention to cleaning all calf-feeding equipment is necessary for calf health.

Good milk replacer mixes easily in warm water and stays in solution after mixing. Animal caretakers take care to use the appropriate weight of powder, and volume and temperature of water to ensure consistency when mixing milk replacers, and use clean feeders and sanitary practices. Remember to start introducing small amounts of fresh, palatable, high-quality starter feed by day 3 and increase the amount offered as the calf consumes more over time based on the advice of a qualified nutritionist.

Caution is taken if calves destined for sale or slaughter are fed a medicated milk replacer or milk from cows treated with antibiotics. This will prevent problems associated with antibiotic residues in the meat of slaughtered calves. All withdrawal times for medicated feeds must be followed.

Weaning

Transition weaned calves with as little distress as possible, particularly through management of diet changes and humane handling. Do not abruptly wean, instead consider reducing milk allowance over a 5-day period leading up to weaning.

It is commonly thought that feeding less milk will encourage solid feed intake and thus facilitate weaning. Indeed, feeding calves less milk does increase starter consumption, but this practice also severely limits weight gains.¹² New work is showing that slowly reducing milk intake in the days before weaning can be helpful.¹³ Diluting the milk with water or slowly restricting the amount of milk can successfully achieve gradual weaning; this will increase starter intake and minimize the growth check at weaning.¹⁴ Gradual weaning over a 7-to-10 day period is preferred. From an animal welfare perspective abrupt weaning of calves from milk to solid feed can lead to harmful consequences, including increased cross-sucking, signs of hunger¹⁵ and reduced weight gains.¹⁶

Cold stress weakens the immune system, so avoiding stress is important to disease prevention. Adjust milk or milk replacer and ration to account for energy availability to environmental extremes as necessary. Calves will become cold stressed at 50- 60 degrees Fahrenheit, requiring extra energy for growth and maintenance.

RESOURCES

A Guide to Modern Milk Replacers: A Bovine Alliance on Management & Nutrition (BAMN)

AFIA Publications, 2008. Online at afia.org

Body Condition Scoring for Dairy Replacement Heifers

Elanco Animal Health, 2004.

Online at nyschap.vet.cornell.edu.

Castration and Dehorning of Cattle

American Veterinary Medical Association, November 2012. Online at avma.org.

Code of Practice for Care and Handling of Dairy Cattle: Review of Scientific Research on Priority Issues

NFACC. 2009. Canadian Dairy Codes of Practice Scientists' Committee, 2009. National Farm Animal Care Council of Canada. Online at nfacc.ca.

Dairy Care365® Animal Handling Video Training Series

- Calf Care: Birth to Two Weeks
- Calf Care: Weaning to the Group Pens

Contact your local Merck Animal Health representative for more information, visit www.dairycares365.com or email info@DairyCare365.com.

Gold Standards (Dairy Calf & Heifer Association)

Online at calfandheifer.org

Herd-Based Problem Solving: Failure of Passive Transfer

McGuirk, S. 2010. Online at vetmed.wisc.edu.

Is Colostrum the Key to Lifetime Profitability?

Eibergen, C. 2013. Online at agrinutrition.com.

Managing the Young Calf – Keep It Simple!

McGuirk, S. 2007. Online at vetmed.wisc.edu.

NYSCHAP Standard Operating Procedures

Online at nyschap.vet.cornell.edu.

Recommended Vaccination Schedules

Waldner, Dan. Oklahoma State Program, 2002. Online at pods.dasnr.okstate.edu.

Welfare Implications of Tail Docking of Dairy Cattle

American Veterinary Medical Association, March 2012. Online at avma.org.



05

Nutrition

MANAGEMENT CHECKLIST

- ✓ All age classes of animals (including milk-fed dairy calves) have access to clean, fresh water as necessary to maintain proper hydration.
 - ✓ Rations provide the required nutrients for maintenance, growth, health and lactation for the appropriate physiological life stage.
 - ✓ Feed equipment is washed and disinfected after being used for non-feed purposes.
 - ✓ Sufficient feed bunk space is provided that allows all animals to feed at the same time or sufficient quantities of feed are available for all animals during a 24-hour period.
-

ADDITIONAL CONSIDERATIONS FOR NUTRITION INCLUDE:

Non-ambulatory animals have access to feed and water at all times.
See Chapter 9: Injured and Non-Ambulatory Animals

Nutritional management is greatly improved when dairy farmers take the time to observe their animals to maintain uniform groupings, and give attention to animals that are underperforming. All animals have access to adequate feed and water on a daily basis, in a consistent manner, on a regular schedule and according to their specific requirements. Rations provide the required nutrients for maintenance, growth, lactation, health and pregnancy (based on an animal's life stage). In best practice, body condition scoring is used to monitor the energy balance and nutritional condition of the herd.

Water



All age classes of animals (including milk-fed dairy calves) have access to clean, fresh water as necessary to maintain proper hydration.

Fresh, clean water is essential for the health and well-being of the animals. For calves, feeding milk or replacer should not be a substitute for water.¹ Best practice is to provide calves access to water beginning on the first day of life. Access to waterers – large tanks, troughs, buckets or fountains – is essential for cattle to satisfy their need for water. Under best practice, waterers are convenient for the animals to reach on demand, and there are sufficient waterers (number, size and capacity) to accommodate the number of animals in the group. When continuous access is impossible for other classes of animals besides lactating cows and non-lactating cows, water must be made available to allow animals to drink to

satiation at least twice per day (and more often under heat stress conditions). In best practice, water is prevented from freezing in cold weather or animals are provided access to fresh water as soon as possible (see Table 1 for the estimated water consumption of dairy cattle).

Always provide multiple sources of plentiful drinking water located in accessible areas with sufficient drinking space. Other considerations include:

- Compare measured water intake to predicted requirements for the level of productivity
- Locate drinking water troughs near feed troughs and near stalls
- Monitor water cleanliness and clean water troughs as necessary
- Provide access to water in return alleys from the milking parlor to promote consumption immediately after milking

TABLE 1. ESTIMATED WATER CONSUMPTION OF DAIRY CATTLE

ESTIMATED DAILY WATER CONSUMPTION FOR A 1,500-POUND LACTATING COW PRODUCING 40 TO 100 POUNDS OF MILK DAILY.^a						
Milk Production (lbs/day)	Estimated DM Intake (lbs/day)	Mean Minimum Temperature^b				
		GALLONS PER DAY ^c				
		40°F	50°F	60°F	70°F	80°F
40	42	18.4	20.2	22.0	23.7	25.5
60	48	21.8	23.5	25.3	27.1	28.9
80	54	25.1	26.9	28.7	30.4	32.2
100	60	28.5	30.3	32.1	33.8	35.6

^aSodium intake = 0.18% of DM intake • ^bMean minimum temperature typically is 10 to 15°F lower than the mean daytime temperature • ^c1 gallon of water weighs 8.32 pounds.

Feed

- ✓ *Rations provide the required nutrients for maintenance, growth, health and lactation for the appropriate physiological life stage.*
- ✓ *Feed equipment is washed and disinfected after being used for non-feed purposes.*
- ✓ *Sufficient feed bunk space is provided that allows all animals to feed at the same time or sufficient quantities of feed are available for all animals during a 24-hour period.*

Feed considerations include nutritional quality and quantity, feed bunk design and proper feed storage. Advances in ruminant nutrition and feeding behavior science have greatly improved our understanding of dairy cattle production.

As a best practice, dairy farmers monitor feed quality and nutrient content of feed components and provide adequate bunk space to allow all animals to feed simultaneously. Feed for other species is never mixed with dairy animal feed. As a best practice, the dairy farmer evaluates protocols to assure that feeding programs meet the basic nutritional requirements for the animals' maintenance, growth, production, health and reproduction. Qualified nutritional consultants normally assist in formulating rations that economically meet nutritional requirements of animals. Managers:

- Check that feed and feed ingredients are carefully mixed and formulated according to the animals' dietary needs based on the counsel of a qualified nutrition professional using dairy nutrition models
- Adjust rations and water availability conditions
- Periodically assess dry matter intake
- Adjust rations to assure the correct content of protein, energy, fiber, macro-minerals and micronutrients in feed whenever forages are changed

- If conditions warrant, check homegrown or purchased feed ingredients and commodities for nitrates, mycotoxins and other soil- or climate-induced problems, adjust diets to provide for production level and check feed quality to see if it matches the manufacturer's statement
- Check dry matter of wet feeds such as silages often and whenever large variations are noticed or anticipated
- Adjust diets to provide for production levels
- Check feed quality to see if it matches the manufacturer's statement

The daily removal of feeds not consumed will ensure freshness of feed, prevent mold and spoilage, and aid in insect control. This is a particularly important practice when high-moisture feeds such as silage are used. In best practice, feeders are far enough from any water source to minimize contamination of water. For example, sprinklers point away from the feed bunk to avoid adding moisture to the total mixed ration (TMR). Feed is pushed up several times daily (see special considerations for milking cows below for details about feed access). A smooth feeding surface will facilitate cleaning. Sanitation of eating areas will improve if animal caretakers check them several times each day and remove any feed not eaten daily.

Safely store bulk supplies of feed in appropriately designed areas to avoid moisture, vermin and bacterial or fungal contamination. Proper labeling of storage containers or areas, controlling moisture and using an effective program of vermin control help assure maintenance of feed quality and safety. As a best practice, medicated feeds are stored separately and are properly labeled. Store toxic compounds outside of the feed storage area and outside of the animals' resting area.

Mycotoxins

Mycotoxins are secondary fungal metabolites that are toxic to animals and humans. Mycotoxin producing molds are ubiquitous in nature and thus mycotoxin contamination of feeds is a potential consequence of normal mold plant interactions. Economic losses associated with mycotoxicoses include:

- Reduced milk production
- Poor fertility
- Reduced longevity
- Potential for contaminated/adulterated milk (aflatoxin)
- Increased somatic cell count (SCC)
- Increased disease susceptibility

Mycotoxin	Fungal species producing toxin	Symptoms observed for ruminants consuming the toxin
Aflatoxin	<i>Aspergillus flavus</i> <i>A. parasiticus</i>	Clinical signs of acute aflatoxicosis include anorexia, lethargy, ascites, icterus tenesmus and bloody diarrhea. Liver damage is a constant finding. Subacute signs include decreased performance related to anorexia, deranged hepatic protein and lipid metabolism, altered hormone metabolism and immunosuppression.
Deoxynivalenol (DON, vomitoxin)	<i>Fusarium graminearum</i>	To date, naturally occurring concentrations of DON have failed to cause any discernible effects in cattle or sheep.
Fumonisin	<i>F. moniliforme</i>	A recently discovered mycotoxin, which affects horses more than ruminant animals.
Ochratoxin A	<i>A. Ochraceus</i> <i>Penicillium verrucosum</i>	Domestic ruminants can detoxify this compound in the rumen. However, this ability may be reduced for animals on high concentrate diets. Ochratoxin A is a nephrotoxin (causes kidney damage).
T-2	<i>F. sporotrichioides</i>	A few field reports have attributed anorexia, bleeding and diarrhea to T-2 consumption in cattle. Young ruminants are more susceptible than adults.
Zearalenone	<i>F. graminearum</i>	Cattle and sheep are less susceptible than swine due to rumen degradation and rapid conversion in the liver. May interfere with reproductive function in some animals.

**Advanced Silage Corn Management: A Production guide for coastal British Columbia and the Pacific Northwest. Shabtai Bittman and C. Grant Kowalenko Pacific Field Corn Association. 2004.*

Specific Lifecycle Nutritional Considerations

Newborn and Milk-Fed Dairy Calves

Newborn and milk-fed dairy calves health monitoring during the first 12 weeks of life is especially important as this is a period when calves are particularly vulnerable. Providing a solid foundation will ensure that the calves will grow, develop and eventually mature into healthy productive lactating dairy cows. Providing adequate nutrition early in life has been shown to provide long-term benefits for heifers, such as earlier breeding ages and higher milk yield later in life² (*see Chapter 4: Newborn and Milk-Fed Dairy Calves*).

Growing Animals

Providing appropriate nutrition to the growing dairy heifer is key to ensuring a successful dairy replacement strategy for dairy operations. Provide adequate bunk space that allows all heifers access to a nutritionally balanced diet at the same time. The recommended space at the feed bunk is 18 inches/head for heifers 6-to-12 months of age, 20 inches for heifers 12-to-18 months, and 24 inches for heifers over 18 months of age. These recommendations are believed, without direct empirical evidence, to allow heifers to feed simultaneously and, thus, reduce feed bunk competition. Competition for feed reduces feeding time³ across feeding strategies. Changes in feeding patterns associated with competition also increase the risk of heifers experiencing low rumen pH and associated effects on rumen health. Finally, competition for feed in dairy heifers also increases variability in weight gain between heifers.

Milking Cows

There are several aspects of the feeding environment that affect the cow's ability to access feed, including the amount of available feed bunk space per animal and the physical design of the feeding area.^{4,5} Competition is significantly reduced when cows are fed using a headlock barrier compared to a post and rail barrier. As well, regardless of barrier type, stocking density affects feeding time. Cows spend less time feeding and fight more when overstocked. These effects are greatest for the subordinate cow, particularly at high stocking densities at the feed bunk. Fighting for access to feed has also been shown to increase dramatically when cows are fed to an empty bunk.⁶ Adequate space and time to access feed is essential to minimize feed bunk competition in group housing systems. There is considerable scientific evidence indicating that the provision of adequate feed bunk space during the transition period (three weeks before to three weeks after calving) is particularly important.⁷ Highly competitive feeding areas can significantly reduce feed intake before calving, which has been associated with increased risk for postpartum disease (e.g. metritis, sub-clinical ketosis).⁸

Dry Cows

A substantial body of evidence now exists indicating that overcrowding during the prepartum period can have detrimental effects in terms of postpartum health.⁹ In best practice, dry cows, particularly in the three weeks before calving, have at least 30 inches of bunk space per cow. Provide sufficient and plentiful water located in easily accessible areas with sufficient space. Monitor water cleanliness and clean water troughs as necessary.

Transition Cows

Management of transition cows requires special consideration of the environmental and social factors that influence behaviors.

Changes of the transition period often begin at drying-off and last until 30 days in milk, or from approximately 60 days before calving until 30 days after, although the transition period has traditionally limited its focus to the 3 weeks before to 3 weeks after calving. The extension of the transition period to include more of the dry-off period is based on evidence that nutritional management of far-off dry cows affects her ability to successfully respond to challenges closer to calving.^{10,11,12} Closer to calving, the cow naturally faces a decline in her immune function in preparation for giving birth.^{13,14,15} She will also experience a degree of negative energy balance due to differences between her feed intake and energy requirements.^{16,17,18,19}

Appropriate nutrition should be provided in a manner that is easily accessible to all cows,^{20,21} avoiding highly competitive feeding areas,²² over-feeding,^{23,24,25} and should support minimizing the decline in feed intake prior to calving.^{26,27} In best practice, transition cows have at least 30 inches of bunk space per cow.

RESOURCES

A to Z Mycotoxins

Diaz, D. 2012. Online at mycotoxin.net.

Advanced Silage Corn Management: A Production guide for coastal British Columbia and the Pacific Northwest

Bittman, S. and C. Grant Kowalenko, 2004.
Pacific Field Corn Association.

Dairy Calf & Heifer Association Gold Standards II

Dairy Calf & Heifer Association (DCHA), 2010.
Web September 5, 2012.

Fresh Water Needs for Dairy Cows

University of Idaho, 2009. Online at oneplan.org.

Nutrient Requirements of Dairy Cattle

National Research Council, 2001.
Online at nap.edu.

Unique Aspects of Dairy Cattle Nutrition

Nutrient Requirements of Dairy Cattle, Seventh Revised Edition (pp. 184–213), 2001.
Online at nap.edu.



Animal Health

MANAGEMENT CHECKLIST

- ✓ The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, to prevent, treat and monitor incidence of common diseases.
- ✓ The Herd Health Plan is reviewed and updated annually, or more often, as needed. This shall be documentable by having all protocols and procedures carry the date of review on them.
- ✓ The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, that includes written protocols for specific areas of newborn and milk-fed dairy calf management.
- ✓ Ninety percent or more of all animals in all pens score 2 or less on the FARM Hygiene Scorecard (1 is clean, 4 is dirty). (See Appendix B).
- ✓ Ninety-five percent of the lactating and dry dairy herd scores a 2 or less on the FARM Locomotion Scorecard (1 is sound, 2 is moderately lame, 3 is severely lame). (See Appendix C).
- ✓ The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, that includes a written protocol for lameness prevention and treatment.
- ✓ Ninety-nine percent of all classes of animals score a body condition score of 2 or more on the FARM Body Condition Score Scorecard (1 is thin, 5 is fat). (See Appendix D).
- ✓ Ninety-five percent or more of lactating and dry dairy herd score a 2 or less on the FARM Hock and Knee Lesion Scorecard (1 is no hair loss/swelling, 2 is some hair loss; no swelling, 3 is visible swelling and/or abrasion through hide). (See Appendix E).
- ✓ The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, that includes a written protocol for parasite, pest and fly control.

ADDITIONAL CONSIDERATIONS FOR ANIMAL HEALTH INCLUDE:

The dairy has a written Veterinarian Client Patient Relationship signed by the farm owner/manager and Veterinarian of Record, that is updated annually, or more often as needed.

See Chapter 3: Management Procedures

A specific written protocol and routine for milking exists and is followed to ensure low-stress animal handling and well-being.

See Chapter 3: Management Procedures

Written protocols and training for Non-Ambulatory animal management

See Chapter 9: Injured and Non-Ambulatory Animals

Written protocols and training for Euthanasia that aligns with approved AABP and/or AVMA recommendations

See Chapter 9: Injured and Non-Ambulatory Animals

Written protocols for culling and transporting to slaughter dairy animals, developed in consultation with the herd veterinarian

See Chapter 10: Dairy Beef

Animal health on dairy farms is essential to the welfare of cattle, with the foundation of good health being prevention and appropriate treatment, as well as humane euthanasia if warranted. Disease is minimized by adherence to herd health, nutrition and management programs that enhance well-being. If disease is present, rapid diagnosis and treatment is instituted. A dairy maintains the health of the cattle by providing appropriate nutrition, housing, and disease prevention and detection, along with well-designed treatment programs. These programs are developed through consultation with a licensed veterinarian.

Herd Health Plan

An effective written Herd Health Plan emphasizes prevention, rapid diagnosis and quick decision making on necessary treatment of all sick or injured dairy cattle on the farm. A licensed veterinarian can help dairy farmers develop and implement a routine Herd Health Plan. A sample Herd Health Plan is available at nationaldairyfarm.com. Even with the best management and prevention programs, animals can become sick or injured. Identification is key to detecting health issues early in order to provide effective treatment.

✓ **The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, to prevent, treat and monitor incidence of common diseases (which may include mastitis, metritis, metabolic diseases like milk fever and ketosis, displaced abomasum, pneumonia or infectious diarrhea) and includes all of the following elements:**

- Veterinarian-Client-Patient Relationship (**see Chapter 3: Management – Protocols, Training and Record Keeping**).
- A specific written protocol and routine for milking exists and is followed to ensure low-stress animal handling and well-being.
- Vaccination protocols that specify age, class, product and route of administration;
- Daily observation of all cattle for injury or signs of disease by trained employees;
- Written protocols for specific areas of newborn and milk-fed dairy calf management including:
 - Disbudding/dehorning before 8 weeks of age with pain mitigation provided in

accordance with the recommendations of the herd veterinarian; and

◦ Other planned medical procedures, including castration and extra teat removal, are performed at the earliest age possible with pain mitigation provided in accordance with the recommendation of the herd veterinarian.

◦ Dairy is no longer practicing tail docking.

- Written protocols for management of cattle that develop disease or become injured that specify procedures for managing pain in all applicable age classes (**see Chapter 9: Injured and Non-Ambulatory Animals**).
- Treatment protocol that specifies age, class, product and route of administration to ensure food safety, including proper milk and meat residue withholding times as well as definitions of what cattle are eligible to be marketed (**see Chapter 10: Dairy Beef**).
- Protocol for parasite, pest and fly control.
- Protocol and training for non-ambulatory animal management including (**see Chapter 9: Injured and Non-Ambulatory Animals**):
 - Proper movement, including use of special equipment;
 - Access to feed, water, shelter/shade, isolation from other animals and protection from predators;
 - Prompt medical care; and
 - Euthanasia in a timely manner, if warranted.
- Protocol and training for euthanasia that aligns with approved AABP and/or AVMA recommendations including (**see Chapter 9: Injured and Non-Ambulatory Animals**):
 - Designated employees trained to recognize animals to be euthanized and

trained on proper technique;
o Carcass disposal in compliance with
local regulations; and
o A record of mortalities and causes.

- Written protocol for lameness prevention and treatment.
- Written protocol for managing dystocia.
- Written protocols for culling and transporting to slaughter dairy animals (**see Chapter 10: Dairy Beef**).

✓ ***The Herd Health Plan is reviewed and updated annually, or more often, as needed. This shall be documentable by having all protocols and procedures carry the date of review on them.***

Newborn and Milk-Fed Dairy Calves

✓ ***The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, that includes written protocols for specific areas of newborn and milk-fed dairy calf management.***

- Disbudding/dehorning before 8 weeks of age with pain mitigation provided in accordance with the recommendations of the herd veterinarian; and
- All other planned medical procedures, including castration and extra teat removal, are performed at the earliest age possible with pain mitigation provided in accordance with the recommendation of the herd veterinarian.
- Dairy is no longer practicing tail docking.

Topics in the Herd Health Plan relevant to newborn and milk-fed dairy calves include colostrum management, navel dipping, identification and record keeping, and protocols for vaccination, dehorning, supernumerary teat removal, castration, tail docking (to be phased out by January 1, 2017) and euthanasia, as well as documented protocols of handling practices for calves.

Navel Dipping

Dip navels in disinfectant as soon as possible after birth. Wet cords are entry points for pathogens into the calf's body. In best practice, calves designated for slaughter or sale should not be shipped without first dipping navels. Calf navel dipping should be addressed in the farm's protocols for newborn and milk-fed dairy calves.

Painful Medical Procedures

Certain painful procedures are necessary to ensure the safety of both the animals, and their trained handlers, on the farm. Dairy farmers should work with their licensed veterinarian to develop protocols that minimize any negative effects associated with the procedure including pain and stress resulting from the procedure or animal handling. In addition, any animal caretaker responsible for performing the procedure should receive adequate training to maximize safety for the animal and the caretaker.

A summary of currently available research on pain assessment and management can be found in the 2013 edition of *Veterinary Clinics of North America: Food Animal Practice*.

Is the farm incorporating polled genetics into its' breeding program?



Disbudding and Dehorning

Horned cattle are a major management problem on farms, causing significant risks for both animal handlers and other animals. Removing the horns has benefits for both humans and cattle.

These procedures are performed for the safety of cattle and their caregivers. The term "disbudding" refers to the destruction or excision of horn-producing cells before skull attachment, while "dehorning" involves the excision of the horn after skull attachment. Time of attachment varies, but is thought to occur around 8 weeks of age.¹

Best practice is to conduct disbudding at the earliest age possible, before 8 weeks of age. There is scientific evidence that both disbudding and dehorning are painful procedures. Administration of local anesthesia,^{2,3} non-steroidal anti-inflammatory drugs (NSAID)^{4,5} and sedatives^{6,7} all have been shown to provide benefit to calf welfare. We recommend developing an effective pain management protocol with your veterinarian.

Caustic paste can also be used to perform disbudding.⁸ This method also causes pain, but less is known about the degree of pain or how long it lasts. Additional management for paste disbudding, such as protecting treated calves from rain and limiting social interactions to ensure paste only affects the horn bud area, are considered best practice.

Cows that have either been missed or have developed scurs are monitored and, if deemed necessary, are dehorned. In best practice, the bulk of the horn is removed to prevent horns from growing into the skull and to prevent a growing horn from injuring other cows. Any attempt to permanently remove the horn at greater than 8 weeks of age is considered a surgical procedure and should be performed by a licensed veterinarian.

The use of polled genetics may be an option for some producers depending on the breed of cattle on the dairy and/or the genetic diversity of polled genetics. Currently there are challenges in the diversity of polled genetics available.

Castration

Castration is performed to stop the production of male hormones and semen to prevent unwanted mating. In addition, castration produces cattle that are less aggressive and easier to handle, which promotes animal and human safety. There is scientific evidence that castration is acutely painful regardless of the method used⁹ and some form of pain management in accordance with the

recommendations of the herd veterinarian is required.

The most common methods of castration are surgical, banding and Burdizzo (physical crushing of the cord). Consult with your veterinarian to determine the best choice of castration procedures for your cattle.

Although banding results in minor discomfort at the time of castration, numerous studies have found that cattle show signs of pain for up to several weeks following the application of the band or ring. Surgical and Burdizzo castration may be better options from an animal care perspective. There are anecdotal concerns that have been voiced for each of these methods. Some surgical incision sites can become infected and require medical intervention, including antibiotics. Castration with Burdizzo is highly dependent on the skill of the operator and thus not always successful. When these two approaches have been compared under controlled studies, the results are mixed and are dependent in part on the age of the animal. The advantage of these two methods is that pain can be minimized by providing immediate pain mitigation at the time of surgery as well as post-operative analgesia.

Castration should occur at the youngest age possible and, regardless of the age of the calf or the procedure performed, the immediate pain must be managed following pain control protocols agreed on by the dairy farmer and the herd veterinarian. There is scientific evidence that castration is acutely painful regardless of the method used.¹⁰ Although obstacles to immediate implementation exist, research suggests that application of local analgesics have the potential to minimize or eliminate pain and stress associated with castration.

Branding

In some cases branding is required by state law or is used to prevent theft and assure ownership. Little is known about how to alleviate the pain associated with hot-iron and freeze branding,

although freeze branding has been shown to be less painful.¹¹

Recent research has shown that wounds incurred from branding are immediately painful regardless of anesthetics or non-steroidal anti-inflammatory drugs (NSAIDS) used at the time of procedure, and remain painful for at least eight weeks afterwards. Under best practice, farms work with their veterinarian to evaluate the necessity of branding, opting to use other forms of ID such as tamper-proof RFID if at all possible. Brands must never be applied to the face.

Extra Teat Removal

In best practice, extra teats are removed at the youngest age possible to minimize the amount of tissue damage and the vascularization of the area. The removal of extra teats can also be addressed concurrently with disbudding so the animals benefit from the pain relief provided at that time. Ideally, a dedicated set of sharp scissors or scalpels are used when performing this procedure. This procedure is performed using pain mitigation in accordance with the recommendations of the herd veterinarian.

Tail Docking

The National Dairy FARM Program opposes the routine tail docking of dairy animals, except in the extraordinary case of traumatic injury to an animal. This practice is to be phased out by January 1, 2017.

Current scientific literature indicates that routine tail docking provides no benefit to the animal or quality of the milk.¹² The AVMA, the American Association of Bovine Practitioners (AABP) and the National Mastitis Council all oppose the routine tail docking of cattle*. Switch trimming is the recommended alternative.

Euthanasia

At times, euthanasia may be necessary to humanely deal with complications from birth or other health conditions. Euthanasia protocols should be consistent with recommendations from the AABP and the AVMA (*see Appendix I*).

Animal Observations

The animal observations recorded during the Second-Party Evaluation are a key component of the FARM Program. Viewing the animals is the best way to evaluate outcomes from animal care practices on the farm. Second-Party Evaluators are trained to score animals in four areas: hygiene, locomotion, body condition and hock and knee lesions. These guidelines that follow are based on review of extensive data obtained by analyzing the Second-Party evaluations in all areas of observation and the opinion of experts in dairy cattle care. Thresholds are set based on consensus among a group of experts and available research data. These thresholds are revisited every three years.

**AVMA Tail Docking Policy: The AVMA opposes routine tail docking of cattle. Current scientific literature indicates that routine tail docking provides no benefit to the animal, and that tail docking can lead to distress during fly seasons. When medically necessary, amputation of tails must be performed by a licensed veterinarian. <https://www.avma.org/KB/Policies/Pages/Tail-Docking-of-Cattle.aspx>.*

AABP Tail Docking Position Statement: The AABP opposes the routine tail docking of cattle. Current scientific literature indicates that routine tail docking provides no benefit to the animal. http://www.aabp.org/resources/aabp_position_statements/aabp_tail_docking-3.13.10.pdf

National Mastitis Council Statement: The National Mastitis Council (NMC) knows of no evidence that tail docking improves cow welfare, cow hygiene, or milk quality. NMC, in agreement with other professional organizations, opposes the routine use of tail docking in dairy cattle. <https://www.nmcconline.org/docs/taildocking.pdf>

Hygiene

✓ **Ninety percent or more of all animals in all pens score 2 or less on the FARM Hygiene Scorecard (1 is clean, 4 is dirty). (See Appendix B).**

Proper sanitation and waste management keep animals dry, clean and free of manure and provide them with comfortable surroundings. The goals of sanitation for animal facilities are to:

- Minimize animal disease through clean facilities
- Minimize generation of odors and dust
- Minimize pests and parasites
- Minimize spread of pathogens

Basic sanitation practices include keeping the interiors, corridors and storage spaces of animal facilities clean, and emptying waste containers. Facilities are free of standing water, excess manure, unnecessary farm items and clutter. Feed and bedding is clean and dry, even in areas with minimal housing and rainfall. Animal caretakers maintain a level of cleanliness to minimize the spread of pathogens. If a serious, specific pathogen has been identified, it is best to consult with the veterinarian on the most appropriate sanitation process to use. This is likely to include disinfection of the animals' immediate environment and thorough cleaning of enclosed housing facilities, followed by chemical disinfecting. Open-lot facilities may need to be scraped and refilled with uncontaminated materials. Removal of cattle for a short time may be a means of eliminating muddy areas in pastures. Manure is removed regularly from facilities and freestalls, and walkways are clean and have good traction. In addition to affected udder and leg cleanliness, manure in the alleyway contributes to lameness problems described below. In best practice, all lying areas are clean, dry and groomed.

Locomotion

✓ **Ninety-five percent of the lactating and dry dairy herd scores a 2 or less on the FARM Locomotion Scorecard (1 is sound, 2 is moderately lame, 3 is severely lame). (See Appendix C).**

✓ **The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, that includes a written protocol for lameness prevention and treatment.**

? **What percentage of the lactating and dry herd scores a 2 on the FARM Locomotion Scale?**

Lameness, caused by painful lesions to the limb or foot, seriously compromises animal welfare and continues to be a major area of concern. Because of this, lameness should be a management priority for all dairy herds. Foot lesions most commonly associated with lameness in dairy cattle include infectious hoof diseases such as digital dermatitis (hairy heel wart) and foot rot, as well as non-infectious claw horn diseases that include white line lesions and sole ulcers. Lameness interferes with normal resting behavior, movement to and from the milking area, and feeding activity, limits the exhibition of estrus and influences general health.

Lameness may be reduced, improving cow comfort,¹³ by preventive hoof trimming performed to both balance weight bearing between the claws and restore a more upright foot angle, and by surveillance for lame cows coupled with prompt, effective treatment. Routine use of foot baths assists in the control of infectious hoof disease, while improved flooring reduces trauma, slipping and wear, which lowers the risk for white line lesions.

Sole ulceration may be reduced by providing adequate time for daily rest. This involves strategies such as minimizing time out of the pen milking to less than 3 hours per day, avoiding overstocking and providing an appropriate thermal environment. Other steps include providing adequate heat abatement in hot weather, shelter in cold weather and ample dry, comfortable bedding (see Chapter 7: Environment and Facilities).

Body Condition Scoring (BCS)

✓ **Ninety-nine percent of all classes of animals score a body condition score of 2 or more on the FARM Body Condition Score Scorecard (1 is thin, 5 is fat). (See Appendix D).**

Achieving growth targets for heifers and monitoring change in body condition during gestation and lactation are very important. Body condition can change rapidly at and after calving and is used to guide ration changes. Body condition scoring for dairy cattle is an important management tool for optimizing milk production and reproductive efficiency, while reducing the incidence of metabolic and other peripartum diseases. Over-conditioning at the time of calving (BCS > 4) often results in lower feed intake and increased incidence of peripartum problems. BCS loss of more than 1 during early lactation is excessive. Cows with a BCS less than 2 should be evaluated for fitness to transport.

Hock and Knee Lesions

✓ ***Ninety-five percent or more of lactating and dry dairy herd score a 2 or less on the FARM Hock and Knee Lesion Scorecard (1 is no hair loss/swelling, 2 is some hair loss; no swelling, 3 is visible swelling and/or abrasion through hide). (See Appendix E).***

Skin injuries on cattle tend to occur on areas that are in contact with elements of housing, with the most common injuries observed on the knees and hocks. These injuries range from a small area of hair loss to open wounds, and are sometimes accompanied by infection and swelling of the joint. Unlike lameness, hock lesions can be easily assessed in the milking parlor.¹⁴ A healthy hock is free from hair loss (the hair coat is smooth and continuous with the rest of the leg) and swelling. Skin breakage provides an opportunity for infection to occur, which can lead to swelling, pain and lameness. A series of studies, including work on U.S. farms shows that the risk of hock injuries can be greatly reduced by using deep bedding and that lesions are more common on farms using poorly bedded surfaces like mats and mattresses.^{15,16}

The scoring for the FARM Program focuses on animals afflicted by significant hock and/or knee injury involving swelling of the joint and/or ulceration of the skin. The target is 5 percent or less of animals in the herd with these types of injuries.

Body Abrasions and Injuries

Under best practice, cattle are housed in environments that prevent body abrasions and injury. Often, the location of a given injury can provide insight into where the problem lies. For example, obvious swelling on the neck can be caused by inappropriate feeder design where the overhead rail traumatizes the tissue and causes severe swelling. The tail must not be used to move or restrain a cow in such a way that the tail becomes injured or broken, as this is a sign of inhumane handling. In best practice, fences and gates are made of strong, smooth material and are devoid of sharp objects that can cut, puncture or bruise an animal. Additionally, the latching mechanism on a stationary post should not create a sharp point when the gate is open, because this may injure passing animals.

Abrasions can also be the result of aggressive interactions with other animals and, even in some cases, from health measures such as injection-site abscesses. Specifically, horned animals can cause body abrasions and severe injuries to other cows and farm employees. By monitoring the location and prevalence of these injuries across the entire herd, management will be able to identify and address specific problems, in consultation with their veterinarian. Best practices require that information is known about the importance and meaning of injuries to the legs, specifically hock and knee injuries, thus, these injuries are given a dedicated sub-section.

The FARM Program has reviewed the data collected over the last three years and has determined that no benchmark for body abrasions needs to be developed at this time. All producers, however, should continue to be vigilant and monitor cows for body abrasions.

Pest Control

The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, that includes a written protocol for parasite, pest and fly control.



Pest control is part of a herd health program because vermin transmit diseases and interfere with the animals' comfort. Under best practice, dairy farmers adopt procedures to control flies, mosquitoes, lice, mites, ticks, grubs, fleas, rodents, skunks and pest birds (e.g., starlings, pigeons and sparrows). Exercise particular caution to avoid contaminating feedstuffs, as contaminants may pass into the animals' bodies and milk. A certified pesticide applicator or a pesticide service may be used. Read and follow label directions for all pesticide products. In some regions, rabies and other diseases are spread to dairy animals by skunks, raccoons, foxes, bats and other wildlife. If cats and dogs are kept on the facility, be certain that their rabies immunization status is current and protocols are in place to minimize flea infestation, as fleas can kill baby calves.

Specific Lifecycle Considerations

Transition Cows

Animal welfare is important throughout the entire life of dairy animals. A critical period within a cow's life is the transition from being pregnant and non-lactating to having recently given birth and lactating. This period requires her to respond to multiple physiological and behavioral changes associated with gestation and lactation, as well as changes in her management, nutrition and environment. Well-managed transitions through these changes lead to improved lactation performance and reductions in risk of disease, culling and reproductive issues, all of which influence the cow's welfare and efficiency.^{17,18,19,20,21}

Changes of the transition period often begin at drying-off and last until 30 days in milk, or from approximately 60 days before calving until 30 days after, although the transition period has traditionally limited its focus to the 3 weeks before to 3 weeks after calving. The extension of the transition period to include more of the dry-off period is based on evidence that nutritional management of far-off dry cows affects their

ability to successfully respond to challenges closer to calving.^{22,23,24} Closer to calving, the cow naturally faces a decline in her immune function in preparation for giving birth.^{25,26,27} She will also experience a degree of negative energy balance due to differences between her feed intake and energy requirements.^{28,29,30,31}

Management of the transition period must begin with the end goal in mind; a healthy animal is able to express her genetic potential. Best practices include comprehensive evaluation of the risks and opportunities on individual operations, in consultation with a veterinarian and other dairy professionals, for the housing, management and nutrition of far-off dry cows, close-up cows and fresh cows. During each of the changes in the transition period, animals should be humanely handled and provided comfortable housing that fits their body size and meets their social needs.^{32,33,34} Appropriate nutrition should be provided in a manner that is easily accessible to all cows,^{35,36} avoiding highly competitive feeding areas,³⁷ over-feeding,^{38,39} and minimizing the decline in feed intake prior to calving.^{40,41} Sources of infection should be limited and, in consultation with a veterinarian, appropriate preventative measures should be taken to reduce the risk of disease. It is important that the cow enters this transition period prepared to cope with the challenges she will inherently face to reduce negative consequences on the cow's welfare, as well as improve efficiency.

Breeding Bulls

Breeding bulls require the same level of care and management as any other class of animals on the dairy. If the dairy elects to keep bulls for breeding purposes, they need to be included in the dairies' procedures/protocols and there should be specific guidelines for bulls included in the documentable stockmanship training for employees. Consult with your veterinarian for further specific details on breeding bull management.

RESOURCES

Biosecurity and On-Farm Food Safety

Penn State University, 2012. Online at vbs.psu.edu.

Castration and Dehorning of Cattle

American Veterinary Medical Association, 2012.
Online at avma.org.

Johne's Disease Risk Assessment

University of Wisconsin, 2012.
Online at vetmed.wisc.edu.

Milk and Dairy Beef Drug Residue Prevention Manual

National Dairy FARM Program, 2016.
Online at nationaldairyfarm.com.

Pest Management Recommendations for Dairy Cattle

Cornell and Penn State University, 2010.
Online at extension.psu.edu.

Top Considerations for Culling and Transporting Dairy Animals to a Packing or Processing Facility

NMPF, NCBA, 2016.
Online at nationaldairyfarm.com.

Veterinary Clinics of North America: Food Animal Practice

2013. Online at vetfood.theclinics.com.



07

Environment and Facilities

MANAGEMENT CHECKLIST

- ✓ All age classes of animals are provided all reasonable means of protection from heat and cold.
 - ✓ Protocols are in place to minimize airborne particles as a way to reduce odors, dust and/or noxious gases.
 - ✓ Housing allows all age classes of cattle to easily stand up, lie down, adopt normal resting postures and have visual contact with other cattle, without risk of injury.
 - ✓ All age classes of cattle have a resting area that provides cushion, insulation, warmth, dryness and traction at all times when away from the milking facility.
 - ✓ The dairy farmer monitors and takes action to reduce the risk of slips and falls.
 - ✓ The calving area is soft, cushioned, dry, well-lit and well-ventilated.
-

ADDITIONAL CONSIDERATIONS FOR ENVIRONMENT AND FACILITIES INCLUDE:

Facilities are provided to segregate sick or injured animals
See Chapter 9: Injured and Non-Ambulatory Animals

Hospital area provides protection from heat and cold through use of shade, fans, water, cooling and windbreaks
See Chapter 9: Injured and Non-Ambulatory Animals

Proper management of the housing environment has been linked to improved animal performance and overall well-being. Facilities include all housing structures, handling structures, lots, pens, stalls, alleys and pastures that are inhabited by cattle of any age and health status. Facilities provide sufficient protection from temperature extremes and ensure the safety and care of the animals.

Animal Environment

Temperature and Humidity

✓ **All age classes of animals are provided all reasonable means of protection from heat and cold.**

Environmental temperature affects an animal's thermal comfort, which, in turn, affects an animal's behavior, metabolism and performance. The temperature that the animal experiences and the effect on the animal is the net result of air temperature, humidity, air movement, shade, insulating effects of the surroundings, and the animal's age, sex, weight, adaptation status, activity level, posture, stage of lactation, body condition and diet.

The Thermoneutral Zone (the range of temperatures between which the animal does not need to expend energy to stay warm or to cool) for newborn calves is 50-78° F, while for a month-old calf and for adult cattle it is typically 32-73° F. Except for newborn calves, cattle are therefore quite cold tolerant. However, compared to humans, cattle become heat stressed at lower temperatures. In order to account for the impact of both temperature and relative humidity (the water carrying capacity of air), the best practice is to utilize the Temperature Humidity Index (THI) and begin heat abatement measures at a THI of 65-72.^{1,2}

Monitor cows' respiratory rates to determine if they are under heat stress. If 8 of 10 cows have respiratory rates of 80 or above, the group is suffering from heat stress. Under conditions of heat stress, at above a THI of 65, producers should provide heat stress mitigation strategies

that function automatically. These strategies may include:

Shade Cattle prefer and appear motivated to use shade³ and will readily do so when solar radiation increases.⁴ Shade is the first step in heat abatement. A best practice is for all animals to have access to shade that allows simultaneous use by the entire group to minimize competition.

Drinking water Cattle must have sufficient access to water to meet their intake needs under conditions of heat stress (which may exceed 30 gallons per cow per day for high-yielding cattle).⁵ Little research exists on this topic. Recommendations based on practical experience suggest that under housed conditions at least 2 waterers are recommended per group with at least 2 inches of accessible trough perimeter per adult cow. Water troughs must also refill quickly enough for animals to be able to drink. To be sufficient, the water flow should be at least 2.6 gallons/min in case of a bowl and 5 to 7 gallons/min in case of a trough.

Air movement Air movement speeds of 200-400 ft. per minute are required for optimal cooling⁶. Mechanical ventilation systems (tunnel and cross ventilation) and use of supplemental recirculation fans in parlor holding areas, in pens in naturally ventilated barns and under shades in dry-lot dairy corrals are recommended to supply this fast moving air.

Soaking and misting Water may be used to cool the air before it reaches the cow, such as in evaporative cooling pad systems, or cool-type systems in dry lots, or be used to enhance

evaporative cooling of the cow by soaking the cow herself, often coupled with the application of fast moving air over her skin. The parlor holding area is a priority area for cooling on the majority of dairy farms.

When facing cold conditions, cattle (including calves) are provided with adequate feed to maintain body condition and protection from wind and moisture. In the case of the newborn calf, under one month of age, it is important to shield the calf from drafts—typically defined as air speeds of more than 50 feet per minute. Provisions of dry bedding are preferred by the milk-fed calf⁷ and are essential in cold weather climates. Higher milk feeding rates are required to supplement calories for growing calves⁸ and a deep bed of straw is recommended for “nesting.” Clean calf jackets may also be used as a supplement to these strategies. Any loss of body condition pre-weaning would be an indication of a failure to provide sufficient warmth and calories for this important group.

Air Quality

✓ ***Protocols are in place to minimize airborne particles as a way to reduce odors, dust and/or noxious gases.***

Adequate ventilation, be it natural or mechanical, helps prevent respiratory and other diseases by removing heat, microbes, water vapor, air pollutants and odors from an enclosed animal facility and replacing the contaminated air with fresh air. Ways to improve air quality are with manure management, husbandry practices and good air movement provided by well-designed natural or mechanical ventilation systems.

The risk of infectivity from airborne pathogens may be minimized by segregating or isolating animals with highly contagious diseases from the air space occupied by the rest of the group/herd, and by ensuring adequate ventilation rates. As a best practice, care is taken to ensure that the ventilation

system does not move air from infected animals to an area occupied by healthy animals.

Ventilation also modifies the indoor air temperature, but supplemental heating and cooling may be needed when temperature control is critical. Barns may be effectively designed to ventilate naturally or mechanically, with the aim of providing a minimum of 4 air changes per hour in the winter and 40-80 air changes per hour in the heat of the summer.

Lying Area

Housing allows all age classes of cattle to easily stand up, lie down, adopt normal resting postures and have visual contact with other cattle, without risk of injury. ✓

All age classes of cattle have a resting area that provides cushion, insulation, warmth, dryness and traction at all times when away from the milking facility. ✓

During their life, dairy animals make use of a variety of resting, feeding and exercise areas. At all ages, in best practice, cattle are able to stand up, lie down and adopt normal resting postures within a given system. Factors that can affect these behaviors include the surface, size and configuration of the freestall or tie stall and the space provided to calves.

Dairy cattle are highly motivated to spend time lying down and have been shown to reduce feeding time in order to secure a lying space.^{9,10} It is therefore important to provide a resting area that provides cushion, insulation, warmth, dryness and traction, and minimizes the risk of injuries. Concrete, rubber mats, water beds and mattresses can only be acceptable resting surfaces when they are adequately bedded; the lack of adequate bedding reduces lying time and increases the risk of lameness and injuries.^{11,12,13,14} Cattle have increased lying time in well-bedded environments, which also reduces

the risk for lameness.^{15,16} The most important predictor of hock injuries, for example, is the lying surface. Cows kept on deep, loosely bedded stalls of sand or dried manure solids, for instance, consistently have fewer hock injuries than those kept on sparsely bedded mattresses.¹⁷ In addition, appropriate bedding materials and manure removal help control mastitis. Bedding should be smoothed and groomed as often as is necessary to keep the surface clean, soft and dry.¹⁸

Bedding is also dry in best practice. A number of research studies provide strong evidence that cattle spend less time lying down in wet bedding or mud and will avoid wet surfaces if given a choice.¹⁹ Dryness is also important for bedding to provide insulating properties. This is particularly important for young calves in cooler weather. Dairy calves also show a clear preference for drier bedding and aversion to concrete lying surfaces, indicating that access to soft and dry bedding is also important for growing calves.²⁰

Stall dimensions should always be considered relative to the size of the animals that will use them, genetic improvements and their effect on size of future herd members, as well as the behavior of cattle when using stalls. There should exist sufficient space for each animal to lie down without disturbance from neighbors, and stalls should be designed to allow for the normal rising and lying movements of the cow. Unobstructed lunge space is essential to allow cattle to complete the normal rising movement. Longer stalls improve leg health and cows spend more time lying down in wider stalls.^{21,22} Stall dimensions (stall width, brisket boards, neck rail placement) and tie-stall chain length should be set to maximize cow comfort and use of the lying area. Tie-stall design features should not keep the stall clean by preventing cows from using the stall for lying and standing. In freestalls, the stall is often her only chance to stand on a soft surface. Less restrictive neck rails (further from the curb and higher) allow her to move fully

into the stall and have been shown to reduce lameness. For instance, neck rail position that prevents standing on all four feet in the stall has been shown to increase lameness.²³

Exercise for tied animals provides opportunities for grooming the back of the body, social grooming and walking/trotting.^{24,25} Controlled studies show that exercise and pasture access may improve hoof health.^{26,27}

Comparisons across farms indicate that access to pasture reduces the risk of lameness,²⁸ but other work shows that access to an outdoor area is a risk factor for some hoof health issues, including sole ulcers and digital dermatitis.^{29,30} These results indicate that the quality of the exercise/outdoor area is important and, in best practice, minimizes any hoof damage. In best practice, tied cattle have daily outdoor access/exercise (weather permitting) and the quality of the area provided for this is clean, dry and of appropriate flooring material (see section on flooring later in this chapter).

Space Allowance

In loose housing systems such as freestall barns, increased cow density in the pen increases competition among cows for access to feed,³¹ stalls³² and water. Cattle management must accommodate these challenges so that all animals within a pen receive adequate nutrition and water without competitive pressure. In best practice, all animals have access to a sanitary and comfortable place to rest and eat at any given time (see Tables 3 and 4). The implications of overstocking barns is complex. In studies where only the number of freestalls are changed and feeding space is held constant, lying time is always reduced when there are fewer stalls than cows. However, on farms where stocking density affects both the number of stalls available and feeding space, overstocking is not an important predictor of lying time but does increase feeding rate.³³ However, overstocking is associated with more lameness,^{34,35} more hock

injuries in some cases³⁶ and less milk production.³⁷

Proper open-lot systems begin with a design that ensures proper site drainage.³⁸ Current recommendations suggest 600 ± 50 square feet of open-lot space per cow,³⁹ fence line to fence line. For bedded packs, suggested bedded space allowance is provided below for heifers and mature cows in Tables 1 and 2.

TABLE 1. ESTIMATED HEIFER BEDDED PACK SPACE REQUIREMENTS

SPACE REQUIREMENT	Body Weight Estimate (lbs)							
	<130	135	220	330	440	660	880	1100
BEDDED RESTING AREA (SQUARE FEET/ANIMAL)	15	17	21	24	29	35	41	46

Interdisciplinary report "Housing Design of Cattle - Danish Recommendations." 2001. The Danish Agricultural Advisory Center. Translated into English and issued in 2002. Accessed from The Dairyland Initiative. "Bedded Packs" Accessed August 5, 2015. http://thedairylandinitiative.vetmed.wisc.edu/tdi/h_bedded_pack.htm

TABLE 2. ESTIMATED ADULT COW BEDDED PACK SPACE REQUIREMENTS

SPACE REQUIREMENT	Body Weight Estimate (lbs)				
	1100	1300	1400	1600	1800
BEDDED RESTING AREA (SQUARE FEET/ANIMAL)	46	54	70	90	120

Interdisciplinary report "Housing Design of Cattle - Danish Recommendations." 2001. The Danish Agricultural Advisory Center. Translated into English and issued in 2002. Adapted and accessed from The Dairyland Initiative. "Bedded Packs" Accessed August 5, 2015. http://thedairylandinitiative.vetmed.wisc.edu/tdi/ac_bedded_pack.htm

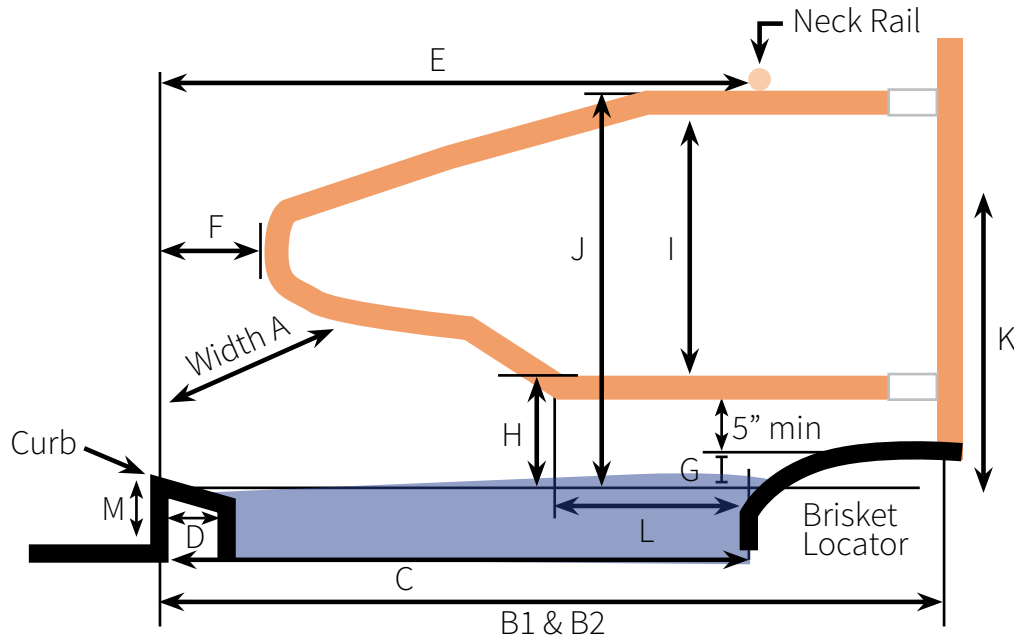
The lying area should be 1-to-2 feet higher than the pen surface and located under the pen shades, if used. If cattle cooling systems are used under the shade, daily grooming is necessary. A best practice is to provide bedding under the shade during extreme cold or wet conditions. Current recommendations for freestall design and space provision for heifers and mature cows are provided in Tables 3 and 4.

TABLE 3. ESTIMATED HEIFER FREESTALL DIMENSIONS

STALL DIMENSION (INCHES)	BODY WEIGHT (LB)			
	400-600	600-800	800-1000	1000-1200
<i>Approximate age, months (large-size Holsteins)</i>	~6 to 10	~11 to 13	~14 to 16	~17 to 21
<i>Approximate age, months (small-size Holsteins)</i>	~6 to 10	~11 to 14	~15 to 18	~19 to 22
Stall length	80	88	96	108
Stall width (on center)	34	38	42	45
Height to the bottom of the neck rail	34	38	42	45
Distance of the neck rail from the rear point of the curb	46	55	64	66
Distance of the rear curb to the brisket locator (maximum height 3 inches)	Not Recommended		64	66
Interior diameter of the stall divider loop	24	28	30	33
Height of upper edge of the lower divider rail	8	8	10	10
Rear curb height	6	8	8	8
Distance from rear edge of divider loop to point of curb	9	9	9	9
Outside curb to outside curb for head-to-head platform	Not Recommended		192	204

For details about feeding space see Chapter 5: Nutrition. Reference: The Dairyland Initiative. "Heifer Freestall Dimensions". Accessed May 16, 2013. www.thedairylandinitiative.vetmed.wisc.edu/tdi/h_freestall_dim.htm

TABLE 4. ESTIMATED ADULT COW FREESTALL DIMENSIONS



STALL DIMENSION (INCHES)	BODY WEIGHT ESTIMATE (LBS)					
	1000	1200	1400	1600	1800	2000
Center-to-center stall divider placement (Stall width) (A)	42	45	48	50	54	57
Total stall length facing a wall (B1)	96	108	108	120	120	126
Outside curb to outside curb distance for head-to-head platform (B2)	180	192	192	204	204	216
Distance from rear curb to brisket locator (C)	64	66	68	70	72	75
Width of rear curb (D)	6-8	6-8	6-8	6-8	6-8	6-8
Horizontal distance between rear edge of neck rail and rear edge of curb for mattress stalls (E)	64	66	68	70	72	75
Horizontal distance between rear edge of neck rail and rear edge of curb for deep bedded stalls (E)*	58	60	62	64	66	69
Distance from rear edge of divider loop to point of curb (F)	9	9	9	9	9	9
Height of brisket locator above top of curb (loose bedded stall or mat/mattress surface) (G)	3	3	4	4	4	4
Height of upper edge of bottom stall divider rail above top of curb (loose bedded stall or mat/mattress surface) (H)	10	10	12	12	13	14
Interior diameter of the stall divider loop (I)	30	33	33	36	36	36
Height of neck rail above top of curb (loose bedded stall or mat/mattress surface) (J)	42	45	48	50	52	54
Obstruction height (K)	5-35	5-35	5-35	5-35	5-35	5-35
Horizontal distance from brisket locator to loop angle (L)	20-22	20-22	20-22	20-22	20-22	20-22
Rear curb height (M)	8	8	8	8	8	8

*E in deep, loose-bedded stalls is less than in mat/mattress stalls to encourage cows to stand with rear feet in alley instead of on stall base. Reference: The Dairyland Initiative. "Freestall Dimensions" Accessed August 5, 2015. http://thedairylandinitiative.vetmed.wisc.edu/tdi/ac_freestall_dimension.htm

Flooring

✓ ***The dairy farmer monitors and takes action to reduce the risk of slips and falls.***

Under best practice, concrete flooring surfaces are appropriately grooved or textured to reduce the risk of animals slipping, which can result in injuries, and should be designed such that they do not cause injury. Skid-resistant surfaces reduce injuries and must retain their non-slip characteristic after cleaning, scraping or wear. High-traction, rubber flooring is desirable in areas of the facility where cows stand for prolonged periods (e.g. holding area), in transfer lanes to reduce hoof wear and in other areas to reduce the risk of slipping and injury. A plan should be in place to minimize the impact of seasonal changes that impact traction, such as ice. It is essential that all maternity areas have high traction flooring given the increased number of standing bouts during labor.⁴⁰

Social Environment

Cattle are herd animals. Socially isolated cattle show signs of stress: increased heart rate, vocalization, defecation/urination and heightened cortisol levels.^{41,42} As a best practice, isolation is minimized and at least visual contact with other animals maintained, the only exception being when cows approach calving (see Special Lifecycle Considerations in next column).

Management of Facilities

Properly designed and maintained facilities operated by trained animal caretakers greatly facilitate efficient movement of animals. In best practice, fences and gates are made of strong, smooth material and are devoid of sharp objects that can cut, puncture or bruise an animal. Their height and ground clearance prevent animals from trying to go over or under them. Fences hold animals in designated areas. Corrals, holding pens and feeding areas generally are permanently fenced, whereas temporary electric fences are

often used around pastures. Gates let an animal easily pass through. It is beneficial to locate gates in the corners of pens. Install them to swing inward and outward so that the animals can easily enter or leave the pen. Under best practice, the latching mechanisms on gates are cattle-proof so that animals cannot open the gate. The latching mechanism on a stationary post does not create a sharp point when the gate is open, because this may injure passing animals.

Specific Lifecycle Considerations

Calving/Maternity Area

The calving area is soft, cushioned, dry, well-lit and well-ventilated. ✓

A soft, cushioned, dry, well-lit and well-ventilated calving area has many health benefits for the calf at the time of birth. Wet, dirty calving areas foster the growth of bacteria that can invade the newborn calf's navel or mouth and create a disease load that overwhelms the calf's naïve immune system. A separate calving area (maternity pen or paddock) that is designed to be comfortable, functional and hygienic allows for close observation of the cow and easier, more effective assistance at calving. Recent work indicates that cows prefer social isolation beginning about 8 hours prior to calving.⁴³

A best practice is to clean pens, corrals or paddocks between calvings. Recent work indicates that cows prefer to calve on sand and concrete flooring (covered with straw) compared to rubber flooring covered with straw.⁴⁴ Lighting should allow inspection of animals and provide safe working conditions. In facilities where animals are routinely observed or handled, such as for milking or estrus observation, lighting should be evenly distributed. An outdoor light attached to a corral or building where animals congregate provides sufficient illumination for safety purposes.

Pre-Weaned Calf Housing

Individual Housing Each calf is housed in separate pens or hutches. While this method is perceived to minimize the risk of spread of disease,⁴⁵ avoid competition for feed, allow dry starter intake of the individual to be monitored and prevent cross sucking, there is limited evidence to support these claims.⁴⁶ There is little scientific evidence of a consistent relationship between individual housing and calf health. Some studies^{47,48} have found more health problems in group-reared calves, but a growing number of empirical studies have found no advantage of individual housing in reducing morbidity when compared with small groups.^{49,50,51} Disease transmission is complex and many other farm management practices, in addition to grouping, influence the incidence of these diseases, such as method of milk-feeding, hygiene, ventilation, colostrum practices, diet and health monitoring. There is also now a growing body of evidence showing that individually housed calves exhibit cognitive deficits compared to socially housed (e.g. pair housing) calves.^{52,53}

Group Housing There is a growing interest in group housing, particularly with the advances made in computerized calf-feeding equipment. Group housing allows for social interactions. Calves are social animals that need exercise and keeping dairy calves in groups may provide a number of advantages to both dairy farmers and their calves. Successful adoption of group housing will mean avoiding problems such as increased disease and competition for access to food resources. Successful group rearing requires appropriate management, including feeding method and group size. Adherence to appropriate cleaning of milk feeding equipment is essential (see **Chapter 3: Management – Standard Operating Procedures**).

New Animals

New animals are to be handled in a way agreed upon by the dairy farmer and veterinarian that is consistent with the biosecurity needs of the farm.

Breeding Bulls

Breeding dairy bulls are known to be aggressive towards humans. As a best practice, workers are trained in safety issues when breeding bulls are housed with the milking herd. In consultation with the veterinarian, bulls are managed in such a way that they have appropriate rest when rotating through breeding pens. Breeding bulls are included in the Herd Health Plan to deal with any health issues that may arise such as lameness, body condition and infectious disease.



RESOURCES

Effect of Flooring and/or Flooring Surfaces on Lameness Disorders in Dairy Cattle

Shearer and Van Amstel, March 2007.
Online at wdmc.org.

The Dairyland Initiative “Heifer Freestall Dimensions”

Chapter 5: Nutrition. Accessed May 16, 2013. Online at thedairylandinitiative.vetmed.wisc.edu.

Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching

Federation of Animal Science Societies, 2010.
Online at fass.org.

Interdisciplinary report “Housing Design of Cattle - Danish Recommendations”

The Danish Agricultural Advisory Center, 2001.
Translated into English and issued in 2002.
Accessed from The Dairyland Initiative. “Bedded Packs” Accessed August 5, 2015. Online at thedairylandinitiative.vetmed.wisc.edu.

The Dairyland Initiative “Freestall Dimensions”

Accessed August 5, 2015. Online at thedairylandinitiative.vetmed.wisc.edu.



08

Handling, Movement and Transportation

MANAGEMENT CHECKLIST

- ✓ Documentation exists of training for all (new and existing) employees with animal care responsibilities in stockmanship as well as their assigned animal care responsibilities (such as calf care, euthanasia, non-ambulatory cow management, etc.) at least on an annual basis.
 - ✓ Self-locking stalls provide an emergency release for animals when necessary.
 - ✓ Calves are moved by lifting, walking or using clean, properly designed mechanical transport devices.
 - ✓ Animal caretakers are trained to handle and restrain calves with minimum stress to the animal.
-

ADDITIONAL CONSIDERATIONS FOR HANDLING, MOVEMENT AND TRANSPORTATION INCLUDE:

A specific written protocol and routine for milking exists and is followed to ensure low-stress animal handling and well-being.

See Chapter 3: Management Procedures

Written protocols for culling and transporting to slaughter dairy animals, developed in consultation with the herd veterinarian

See Chapter 10: Dairy Beef

Under best practice, cattle are handled in a calm, controlled and gentle manner. Animal caretakers are properly trained in animal handling and the consequences of inhumane handling are understood and enforced. Animal caretakers are assessed and retrained on an annual basis. Prods, canes and other cattle handling aids are only used as a last resort, in emergency situations, and not in routine animal handling. Cattle are moved in a manner that minimizes the risk of slips and falls.

Stockmanship

✓ ***Documentation exists of training for all (new and existing) employees with animal care responsibilities in stockmanship as well as their assigned animal care responsibilities (such as calf care, euthanasia, non-ambulatory cow management, etc.) at least on an annual basis.***

When handling and transporting dairy animals, the animals' comfort and safety, as well as the animal caretaker's safety, are the primary concerns. Dairy farmers ensure that animal caretakers are trained and qualified in proper handling techniques and in the appropriate use of restraint equipment. When using any handling device, **abuse is not tolerated**. In addition, dairy farmers ensure that an adequate number of animal caretakers are available to perform assigned tasks. Injuries may be prevented if facilities are properly designed, maintained and operated.

Animals are handled humanely at all times. Routine contact with humans from birth, including regular gentle handling, will reduce fear and flight distance, make observation and treatment easier, improve productivity and enhance animal care. Cattle are moved at a slow walk, particularly if the weather is hot and humid, or if the flooring is slippery. It is particularly important to control the herd's speed in lanes and alleyways to prevent crowding or crushing at corners, gates and other narrow places in a facility.¹

In addition to these guidelines, the tail must never be used aggressively to move a cow. Willful mistreatment of cattle is unacceptable. The FARM Program does not tolerate abusive behavior.

Observation of any abusive behaviors during Second-Party Evaluation will trigger the FARM Program Willful Mistreatment protocol (*see Appendix G*).

Noise

Loud noises are known to be aversive for cattle and thus every effort should be made to minimize loud noises during routine management practices such as handling, milking and transport. In best practice, care is taken to minimize noise of all types, including equipment and personnel. Dairy cows do not respond positively to excessive noise or yelling. Animal handlers should take care to minimize such behavior and treat animals—and other employees—with respect.

Equipment

Self-locking stalls provide an emergency release for animals when necessary. ✓

In best practice, animals are handled by equipment appropriate for the procedure. Use of flags, plastic paddles and a stick with ribbon attached to it are appropriate for handling animals that refuse to move through facilities, but only if minimal force is applied. Any force used must be applied calmly.

Excessive or routine slapping or prodding indicates an underlying problem that requires management attention and correction. In all cases, use the least amount of force necessary to control the animal and still ensure the safety of herd mates and animal caretakers. Aggressive behaviors in dairy cattle can be modified and their impact reduced by using acceptable practices and restraint devices (e.g., palpation rails, head chutes,

nose leads, squeeze chutes and stanchions). All equipment used to restrain cattle and all cattle housing areas have provisions for the humane release and removal of cattle that go down or are otherwise in distress. Preferably, use equipment with emergency release devices.²

Loading and Unloading

Under best practice, animals are loaded and unloaded for transit in a manner that minimizes stress. The process of being moved, especially if it involves a loading chute, is a potentially stressful experience to many animals. In best practice, three measures are taken to minimize stress: (1) train animal caretakers in proper loading and unloading practices, (2) properly locate and design loading areas, and, (3) minimize the number of directional changes an animal must take.³ Excessive use of electric prods is unacceptable.

Animal caretakers observe proper loading densities and plan to load or unload animals at the time of day that is best for moving the animals. Animals grouped together for the first time are not to be crowded. In best practice, sufficient labor and appropriate equipment and/or facilities (i.e. ramps) are available for loading or unloading animals. Sick or injured animals require special handling. In best practice, marketing decisions are made in a timely manner such that the animals are fit for transport. Non-ambulatory animals or animals that are so weak or debilitated that they are likely to go down during transit are treated or euthanized on-farm.

Transportation Factors

Transportation factors related to animal care include: facilities that are safe and comfortable to the animal; in-transit care provided by knowledgeable crews and drivers; uniformity of the animals loaded; and duration of the trip. Both the FARM Program “Top Considerations for Culling” (*see Appendix H*) and the Master Cattle

Transporter Guide are excellent resources for developing protocols for culling and transporting dairy animals.

Trucks and Trailers

Trucks and trailers have an impact on animal care. Even though transport vehicles are not stationary, they are facilities that require the same consideration for cow comfort and needs. These include (1) clean/disinfected truck or trailer when moving young stock or cull cows, (2) sides high enough to prevent animals from jumping over them, (3) nonslip flooring that provides secure footing (avoid abrasive floor and wall surfaces), (4) ventilation and proper bedding to protect animals from weather extremes, and (5) adequate vehicle covering to protect animals from adverse weather.

In-Transit Care

Proper in-transit care will minimize animal injuries, bruises and carcass damage, which can impair the animals’ well-being and value. In best practice, transport crews are knowledgeable about animal care expectations and skilled in handling animals properly. In general, chances for injuries are reduced when animals on a truck are confined in several smaller groups. Weak or unhealthy animals are only shipped to a veterinarian (not to a processing facility) and segregated from healthy ones during loading and during transit; care is provided for their special needs (*see Chapter 9: Injured and Non-Ambulatory Animals*).

An adequate amount of time for the trip is allotted to include periodic checking of the condition of the animals. Drivers start and stop the vehicle smoothly and slow down for curves and corners. If an animal falls in transit, it is helped to its feet, provided that it does not pose a risk to the handler, and possibly segregated from the other animals for the rest of the trip. Provisions for water are made immediately and provisions for feed are made if the trip takes more than 24 hours. Follow any state regulations

regarding frequency and amounts. Feeding high-fiber dry feed for 48-to-72 hours before shipping reduces the moisture content of manure and improves air quality, animal comfort and hygiene. In best practice, all workers and handlers are properly trained in handling dairy animals and have a basic understanding of typical dairy cattle behavior (see section on stockmanship above).

Newborn and Milk-Fed Dairy Calf Handling

- ✓ *Calves are moved by lifting, walking or using clean, properly designed mechanical transport devices.*
- ✓ *Animal caretakers are trained to handle and restrain calves with minimum stress to the animal.*

Calves are handled in a calm, controlled and gentle manner. Animal caretakers are properly trained in animal handling, and the consequences of inhumane handling are known and enforced, as discussed above in the section on stockmanship. Calves are moved from the dairy onto the truck or in the auction market by walking or lifting them. Calves can be injured if they are dragged, pulled or caught by the neck, ears, limbs, tail or any other extremities, or if they are thrown. The FARM Program does not tolerate abusive behavior of animals of any age. Observation of any abusive behaviors during a Second-Party Evaluation will trigger the FARM Program Willful Mistreatment protocol (**see Appendix G**).

Specific Lifecycle Considerations

Transition Cows

To avoid the possibility of calves being born in marketing channels, cows near expected calving date are not shipped. In the event a late-gestation cow needs to be transported for reasons other than marketing, special considerations are made. Lactating cows are milked just before transportation, under best practice.

RESOURCES

Beef Quality Assurance

Beef Quality Assurance Resources, 2015.

Online at bqa.org.

Behavioral Principles of Livestock Handling

Grandin, 1999. Online at grandin.com.

“Considering Human and Animal Safety: Dairy Safety training”

Southern Great Plains Dairy Consortium, 2012.

Online at jtmtg.org.

Dairy Care365® Animal Handling Video Training Series

- Introduction to Dairy Stockmanship
- Low-Stress Handling of Dairy Cows and Heifers
- Moving Cows to the Parlor
- Handling Non-Ambulatory Cows
- Calf Care: Birth to Two Weeks
- Calf Care: Weaning to the Group Pens

Contact your local Merck Animal Health representative for more information, visit www.dairycare365.com or email info@DairyCare365.com.

Livestock Handling and Transport

Master Cattle Transporter Guide, 2000.

Online at livestocknetwork.com

Livestock Handling Tools

AVMA, January 2013. Online at avma.org.

See It? Stop It!

The Center for Food Integrity, 2013.

Online at seeitstopit.org.

Top Considerations for Culling and Transporting Dairy Animals to a Packing or Processing Facility

NMPF, NCBA, 2016.

Online at nationaldairyfarm.com.



Injured and Non-Ambulatory Animals

MANAGEMENT CHECKLIST

- ✓ Non-ambulatory animals have access to feed and water at all times.
 - ✓ Written protocol and training for non-ambulatory animal management.
 - ✓ Written protocol and training for euthanasia that aligns with approved AABP and/or AVMA recommendations.
 - ✓ Facilities are provided to segregate sick or injured animals.
 - ✓ Hospital area provides protection from heat and cold through use of shade, fans, water cooling and windbreaks.
-

ADDITIONAL CONSIDERATIONS FOR INJURED AND NON-AMBULATORY ANIMALS INCLUDE:

Written protocols for management of cattle that develop disease or become injured that specify procedures for managing pain in all applicable age classes

See Chapter 6: Animal Health

Even with the best care and adherence to the Herd Health Plan, animals can become ill, require medical treatment or euthanasia, or die. If an animal becomes sick, non-ambulatory or dies, it is critical to protect the other animals from potential diseases and provide special care for the sick or recovering animal. A best practice on dairy farms includes being prepared to handle these conditions through proper employee training, segregation and prompt decision making to treat, market or euthanize an animal.

Nutrition

✓ *Non-ambulatory animals have access to feed and water at all times.*

When an animal becomes sick or injured requiring separation from the herd for medical treatment (special-needs animal), the recovery of that animal is enhanced through appropriate nutrition. In best practice, a non-ambulatory animal has access to clean water (or milk or milk replacer in the case of a pre-weaned calf) and feed at all times. The diet of a special-needs animal may need to be adjusted from its healthy counterparts based on its feed intake abilities and special considerations for its illness or injury. These animals are also protected from inclement weather in all seasons, including shade provision in summer.

Animal Health

✓ *The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, that includes a written protocol and training for non-ambulatory animal management including:*

- Proper movement, including use of special equipment
- Access to feed, water, shelter/shade, isolation from other animals and protection from predators
- Prompt medical care
- Euthanasia in a timely manner, if warranted

✓ *The dairy has a written Herd Health Plan, developed in consultation with the Veterinarian of Record, that includes a written protocol and training for euthanasia that align with approved AABP and/or AVMA recommendations including:*

- Designated employees trained to recognize animals to be euthanized and trained on proper technique
- Carcass disposal in compliance with local regulations
- Record of mortalities and causes

Non-ambulatory cows are unable or unwilling to stand^{1,2} and remain recumbent for 12 hours or more.^{3,4} Prompt decisions and actions are necessary if an animal becomes non-ambulatory. The dairy farmer or animal caretaker in charge must determine immediately whether the injured animal is otherwise healthy and can be nursed back to health or cannot be saved. If the non-ambulatory animal can be nursed back to health, protect it from further injury, provide it with shelter, feed and water, and give it care to minimize its pain and discomfort during the recovery process. Euthanasia is appropriate when an animal's quality of life is decreased or when pain and suffering cannot be alleviated. Personnel who routinely work with cattle need to be trained to recognize situations where euthanasia is the best option for the animal.

Designated animal caretakers are trained to perform euthanasia through a preferred technique consistent with recommendations from the American Association of Bovine Practitioners and the American Veterinary Medical Association. If the

animal appears to be experiencing severe pain or distress, can't be saved or moved properly, has been chronically ill, or was recently treated with antibiotics requiring an extended withholding period, it should be euthanized by a person appropriately trained in the procedure. Dead animals, either euthanized or expired from natural causes, are potential sources of infection. They are promptly disposed of by a commercial rendering service or other appropriate means (e.g., burial, composting or incineration) in accordance with applicable ordinances. In best practice, dead animals are moved quickly to a designated location away from healthy animals and away from public view. Various state biohazard laws now regulate the disposal of infectious wastes. A postmortem examination on well-preserved animals can provide important animal health information and prevent further losses to the herd. Where warranted and feasible, waste and bedding of an animal that has died is removed from the facility to an area inaccessible to other animals.

EUTHANASIA DECISION MAKING AND CONSIDERATIONS

Actions involving compromised cattle include treatment, slaughter or euthanasia. The following criteria should be considered when making a decision:

- **Pain and distress of animal**
- **Likelihood of recovery**
- **Ability to get to feed and water**
- **Drug withdrawal time**
- **Economic considerations**
- **Condemnation potential**
- **Diagnostic information**

INDICATIONS FOR EUTHANASIA

The following conditions or situations may lead to an animal being compromised to such an extent that euthanasia is indicated:

- Fracture, trauma or disease of the limbs, hips or spine resulting in immobility or inability to stand
- Loss of production and quality of life (advanced age, severe mastitis, etc.)
- Disease conditions for which no effective treatment is known (i.e. Johne's disease, lymphoma)
- Diseases that involve a significant threat to human health (i.e. rabies)
- Advanced ocular neoplastic conditions ("cancer eye")
- Disease conditions that produce a level of pain and distress that cannot be managed adequately
- Emaciation and/or debilitation from disease, age or injury that result in an animal being too compromised to be transported or marketed
- Disease conditions for which treatment is cost prohibitive
- Extended drug withdrawal time for clearance of tissue residue
- Poor prognosis or prolonged expected recovery

Reference: Practical Euthanasia of Cattle (Animal Welfare Committee of AABP, 2013) Online at http://www.aabp.org/resources/AABP_Guidelines/Practical_Euthanasia_of_Cattle-September_2013.pdf

Environment and Facilities

- ✓ *Facilities are provided to segregate sick or injured animals.*
- ✓ *Hospital area provides protection from heat and cold through use of shade, fans, water cooling and windbreaks.*

A hospital or sick pen that isolates the animal(s) from the herd is part of best practice. Because sick or injured animals are more susceptible to discomfort than are healthy animals, it is important that the pen be equipped to maximize animal comfort. It provides adequate shade, bedding, air movement and accessibility to feed and water. Tools may include the use of shade, fans, water cooling and windbreaks (*see Chapter 7: Environment and Facilities*).

Handling, Movement and Transportation

Non-ambulatory cattle that cannot be carried are moved with an appropriate sled, sling or bucket, with the exception of cases where an animal must absolutely be moved a few feet before an appropriate movement aid can be used (e.g. if a cow becomes non-ambulatory in the milking parlor and the animal is likely to recover and have a good quality of life). Cattle are not pulled, dragged or otherwise moved through mechanical force applied directly to the animal. In best practice, the prognosis of an animal is considered before the decision is made to move an animal. If the animal is highly unlikely to become ambulatory again, with little chance of recovery or good quality of life, the animal is euthanized and then moved (in accordance with the Herd Health Plan). Prevention, preparation, and prompt action are keys to their proper handling. Weak and emaciated animals often become non-ambulatory. Conditions that increase an animal's susceptibility to injury – slippery floors, improperly designed loading ramps and excessive loading densities on trucks – are minimized in best practice. A commitment to prevent animal injuries includes shipping promptly.

Clearly defined policies requiring appropriate handling practices are established and followed, and animal caretakers are trained and supervised in proper animal handling, especially during parturition. If moving a non-ambulatory animal becomes necessary, such movement requires the proper equipment and trained animal caretakers.

An animal may become injured on the dairy or during transportation. Use an adequate number of people along with equipment and handling devices that are appropriate to the animal's size. If these techniques are not practical, euthanasia is recommended. Euthanasia is strongly recommended if an animal goes down in the belly compartment of a semi-trailer that does not have side doors because humane removal is nearly impossible.

Recommended Procedures for Moving a Non-Ambulatory Animal

Gently roll a non-ambulatory animal onto a large piece of plywood or conveyor belting. If belting is used, reinforce one side with smooth-edged metal strips to prevent it from buckling and bending when moving the animal. If the animal goes down in a pen or alley, tow it on the plywood or belting with a truck or tractor to a transfer point. To offload a non-ambulatory animal from the center compartment of a semi-trailer equipped with side doors or from a low stock trailer, drag the belting with the animal on it to a transfer point.

Carefully transfer the animal to a properly equipped forklift or to the bucket of a large loader, or move the animal with a special lifting harness.

If a forklift is used, construct a pallet platform to fit over the forks. Angle the pallet's leading edge to form a ramp for rolling the cow onto the pallet, and equip the pallet with straps to prevent the animal from falling off. Never use exposed forks.

Specialized hoists can fit into tight spaces and are built to gently lift and lower a non-ambulatory animal.

When using the bucket of a large loader, a best practice is to have at least three people available to transfer the animal into the bucket. One person runs the loader, and the other two roll the animal onto the bucket.

Do not drag or lift an animal by its limbs unless there is no other alternative and only if the animal must be moved a few feet, such as in a milking parlor. If the animal must be dragged because no other moving alternative exists or because it can be saved only by dragging, pad non-injured limbs and use padded belts to which a rope, chain or cable can be attached. Drag the animal the shortest possible distance to a point where a better method of moving can be employed. If this procedure cannot be done humanely, then the animal is to be euthanized in place and then moved.

If a mature animal is discovered to be down, it may need to be moved. If the animal is down in a stanchion, tie stall or freestall, frequently the rear leg on the down side is cramped in an unnatural position. Often, moving an animal so the legs are properly positioned will allow the animal to stand on its own. If, following treatment, the animal is unable to rise, it is imperative that it be moved so that its legs can be extended. The only practical way to move such an animal is with a strong halter on the head or a padded chain around the neck. If a single rear limb is used to move the animal, further injury may be incurred.



RESOURCES

AVMA Guidelines for the Euthanasia of Animals: 2013 Edition

AVMA, 2013. Online at avma.org.

Carcass Disposal Information

Veterinary Compliance Assistance, 2016.
Online at vetca.org.

Dairy Care365® Animal Handling Video Training Series

- Handling Non-Ambulatory Cows
- Euthanasia

Contact your local Merck Animal Health representative for more information, visit www.dairycare365.com or email info@DairyCare365.com.

Disabled Livestock Policy

AVMA. Online at avma.org.

Practical Euthanasia of Cattle

Animal Welfare Committee of AABP, 2013.
Online at aabp.org.

Preventing Crippled and Non-Ambulatory Animals


Grandin, 2000. Online at grandin.com.



10

Dairy Beef

MANAGEMENT CHECKLIST

- 
- A faint, blue-tinted background image of a cow standing in a field, looking towards the camera.
- ✓ Written treatment protocols that specify age, class, product and route of administration to ensure food safety, including proper milk and meat residue withholding times as well as definitions of what cattle are eligible to be marketed.
 - ✓ The dairy has written protocols for culling and transporting to slaughter dairy animals, developed in consultation with the herd veterinarian.
 - ✓ Each animal is permanently identified.
 - ✓ The dairy maintains permanent, easily accessible drug treatment records that denote how all drugs were used and disposed.
 - ✓ The dairy adheres to all withdrawal times for milk and meat. In the last three years, the dairy has not been subject to any milk or tissue residue violations.
 - ✓ All calves receive colostrum or colostrum replacer soon after birth, even if immediately transported off the farm.
 - ✓ All calves receive a volume and quality of milk or milk replacer to maintain health, growth and vigor until weaned or marketed.
 - ✓ All age classes of animals (including milk-fed dairy calves) have access to clean, fresh water as necessary to maintain proper hydration.

Dairy animals are an important source of beef in the United States. Approximately 20 percent of the nation's total beef production on an annual basis comes from the dairy sector, including fed dairy cattle and marketed cows and bulls. This chapter specifically focuses on marketed dairy cows, bull calves and freemartin heifers during their time on the dairy farm and considerations for their marketing as beef animals. For information on animal care for beef animals (including dairy steers) please follow the guidelines of the Beef Quality Assurance Program.

Dairy Beef

Marketing a dairy animal as beef is an important part of dairy farming. A dairy farmer must ensure the appropriateness of transitioning a dairy animal to the beef sector. In best practice, an animal is not marketed if there is a reasonable chance it will become non-ambulatory at any time from leaving the farm to the slaughter facility, or does not meet the food safety requirements for withdrawal periods or disease. Animals in poor body condition have an increased likelihood of becoming non-ambulatory during transport to or at a processing facility. Dairy farmers must also take care to observe all treatment withdrawal times. Before a lactating dairy animal is shipped, she is milked to reduce potential udder discomfort.

The following are some important initial considerations that should be followed to ensure a safe beef supply.

✓ ***Written treatment protocols that specify age, class, product and route of administration to ensure food safety, including proper milk and meat residue withholding times as well as definitions of what cattle are eligible to be marketed.***

✓ ***The dairy has written protocols for culling and transporting to slaughter dairy animals, developed in consultation with the herd veterinarian.***

In best practice, such protocols should include the following considerations:

- Do not ship non-ambulatory animals to market under any circumstances.
- Make the decision to treat, cull or euthanize animals promptly. Sick and injured animals should be segregated from the herd.
- Delay transport of an animal that appears to be exhausted or dehydrated until the animal is rested, fed and rehydrated.
- Milk all cows that are still lactating just prior to transporting to a packing plant or a processing facility.
- Use a transportation company that is knowledgeable about your animal care expectations and provides for the safety and comfort of the animals during transport.
- Do not transport animals to a packing or processing facility until all proper treatment withdrawal times have been followed.
- Do not transport animals with a poor body condition, generally a Body Condition Score of less than 2 (1 – 5 scale).
- Do not transport heifers or cows where calving is imminent and likely to occur during the transportation or marketing process.
- Do not transport animals that require mechanical assistance to rise and walk, except to receive veterinary treatment. When using any handling device, abuse is never tolerated (***see Chapter 8: FARM Willful Mistreatment protocol and Appendix G***).

- Do not transport animals with bone fractures of the limbs or injuries to the spine. Animals with a recent fracture unrelated to mobility should be culled and transported directly to a packing or processing facility.
- Do not transport animals with conditions that will not pass pre-slaughter inspection at a packing or processing facility. If unsure, consult with your veterinarian before transporting an animal to a packing or processing facility.

Transporters play a critical role in the health and welfare of dairy cattle. The proper handling and transport of cattle can reduce sickness in calves, prevent bruises and improve the quality of the meat from these animals. In best practices, animal transporters are trained in how to properly move cattle up and onto the trailer, distribute cattle correctly on the trailer, employ hauling techniques that reduce cattle stress and handle emergency situations. Additionally, all transporters should sign a cow care agreement indicating that they have received basic stockmanship training and agree to treat all animals humanely. Animal abuse is never tolerated.

- ✓ ***Each animal is permanently identified.***
- ✓ ***The dairy maintains permanent, easily accessible drug treatment records that denote how all drugs were used and disposed.***
- ✓ ***The dairy adheres to all withdrawal times for milk and meat. In the last three years, the dairy has not been subject to any milk or tissue residue violations.***

Does the dairy have copies on site and use the FARM Program Milk and Dairy Beef Drug Residue Prevention Manual?



USDA inspectors are instructed to look for animals that present a possible risk to the food supply and look for signs of disease or recent administration of animal health products to determine if an animal should be subjected to additional testing and possible removal from the food chain. In best practice, the dairy retains treatment records for at least two years (see the FARM Program Milk and Dairy Beef Drug Residue Prevention Manual).

CONDITIONS THAT WILL NOT PASS PRE-SLAUGHTER INSPECTION

Dairy producers should not transport animals with conditions that are unlikely to pass pre-slaughter inspection. These conditions include, but are not limited to:

- Cancer eye, blindness in both eyes
- Drug residues
- Fever greater than 103°F
- Peritonitis
- Cows that are calving or have a high likelihood of calving during transport
- Fractures or lameness (3 on the FARM scale)
- Distended udders causing pain and ambulatory issues
- Unreduced prolapses
- Visible open wounds
- Suspected central nervous system symptoms

Conditions that Warrant Additional Testing at USDA Slaughter Facilities

The following list contains descriptions, directly from USDA documents, of conditions that may warrant testing of carcasses for drug residues.

Mastitis Signs of mastitis can vary based on the severity and duration of infection and may exhibit varying degrees of clinical signs, from pus-like or discolored discharge from the teats and redness and swelling of the udder, to no visible change in the udder.

Metritis USDA inspectors will look for this post-mortem indication. Be mindful of sending animals to slaughter that show signs of metritis.

Peritonitis and Surgery Signs of recent surgical procedures or findings of surgical devices (e.g., suture, toggles, fistula devices) are only significant if they are associated with active peritoneal or subcutaneous inflammation.

Injection Sites Live animals and carcasses with lesions or abscesses associated with injections on any part of the animal are of potential concern.

Other Disease Symptoms Any signs of the following diseases or conditions can lead to an animal being tested for potential chemical residues or to determine fitness for harvest: depression, an elevated or subnormal body temperature, hyperemic skin, congested mucous membranes, dehydration, or poor body condition in association with an injury or inflammatory condition, such as abscesses, arthritis, pneumonia, mastitis, metritis or diamond skin.

Signs of Treatment Signs of treatment, as indicated by leakage around jugular veins, subcutaneously, intramuscularly or intraperitoneally, or clinical signs indicative of treatment by mouth, such as discoloration

from particles found in any part of the digestive tract are important signs when examining veal calves for testing.

Additionally, inspectors are aware of common industry practices that could indicate an animal was recently treated. Dairy cows arriving for slaughter with fetlock or ankle bands indicate that the animal has previously received treatment for a medical condition. When observed, inspectors are instructed to determine the appropriateness of additional testing or removal from the food supply.

Recommendations for administration of vaccines and other injectable products:

- Always follow label instructions for route of administration and dosage (needle size).
- All injections should be given in front of the shoulder slope and in a subcutaneous manner if label permits.
- Never straighten a bent needle and use again.

Dairy Bull Calves and Freemartin Heifers

All calves receive colostrum or colostrum replacer soon after birth, even if immediately transported off the farm. ✓

All calves receive a volume and quality of milk or milk replacer to maintain health, growth and vigor until weaned or marketed. ✓

All age classes of animals (including milk-fed dairy calves) have access to, clean, fresh water as necessary to maintain proper hydration. ✓

In best practice, all calves, whether they are raised as a replacement heifer, veal or dairy steer, receive colostrum or colostrum replacer and are fed in a way that promotes health and reduces the risk of disease (**see Chapter 4: Newborn and Milk-Fed Dairy Calves for additional information on newborn calf animal care practices**).

RESOURCES

Beef Quality Assurance

Beef Quality Assurance Resources, 2015.
Online at bqa.org.

Master Cattle Transporter Guide

Livestock Handling and Transport, 2000.
Online at livestocknetwork.com

The Cattle Industry's Guidelines for the Care and Handling of Cattle

NCBA, 2015. Online at bqa.org.

The National Dairy FARM Program Milk and Dairy Beef Drug Residue Manual

NMPF, 2016. Online at nationaldairyfarm.com.

Top Considerations for Culling and Transporting Dairy Animals to a Packing or Processing Facility

NMPF, NCBA, 2016.
Online at nationaldairyfarm.com.

USDA Guidelines on Slaughter

USDA-FSIS, 2015. Online at fsis.usda.gov.

A photograph of three construction workers standing on a wooden platform or bridge at a construction site. They are silhouetted against a bright, overexposed background that shows a large, light-colored building and some trees. The entire image is overlaid with a semi-transparent green filter. The workers are wearing hard hats and work clothes. The scene is likely a construction or industrial site.

11

Third-Party Verification

MANAGEMENT CHECKLIST



As part of the National Dairy FARM Program, the evaluated farm will participate in the random statistical sampling Third-Party Verification program.

Confirmation by Third-Party Verifiers of the practices used by FARM Program participants demonstrates the integrity of the program's animal care guidelines and provides evidence to our stakeholders documenting the dairy industry's commitment to ethical care and well-being of dairy animals. The objective of the FARM Program is to set guidelines for care of dairy animals and to provide statistically verified data demonstrating that proper animal care is an expectation in the dairy industry, in a scientifically supported method.

Program Integrity Through Third-party Verification

✓ *As part of the National Dairy FARM Program, the evaluated farm will participate in the random statistical sampling Third-Party Verification program.*

? Has the dairy undergone a Third-Party Verification?

Third-Party Verification is not to identify winners and losers in animal care, but to test the integrity of the FARM Program animal care guidelines. In essence, when the dairy industry makes assertions about animal care based on participation in the FARM Program, Third Party-Verification ensures those assertions are measurably true.

Through statistical sampling, an appropriate number of dairy farms participating in the FARM Program are randomly selected for Third-Party Verification. The Third-Party Verification is administered at the randomly selected sites, and is not intended to imply preference for those operations or give them permission to use the verification as an advantage over other operations. The statistical sampling includes selection criteria such as geographic location, size and operation type to ensure that the number of randomly

selected dairy farms mirrors participants in the entire program.

The program uses an annual Third Party Verification process. The complete statistical sampling program and Third-Party Verification process are available on the FARM Program website. Third-Party Verification must be conducted by someone who does not have a conflicting interest in the operation or the outcome of the verification process.

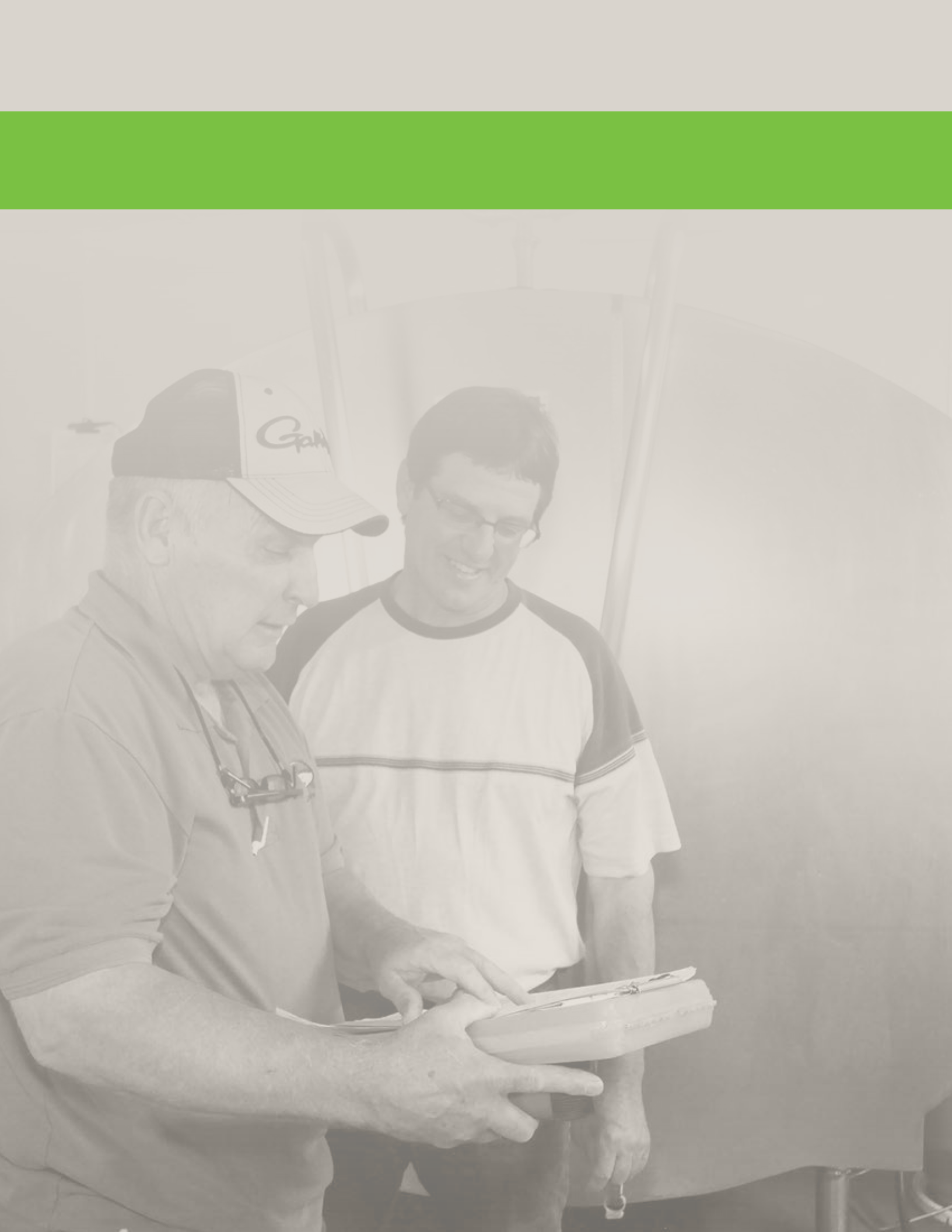
From a pool of certified and trained qualified Third-Party Verifiers, the FARM Program has retained the services of an ISO-certified Third-Party Verification company. Verification by outside parties helps ensure that the program accomplishes its goals and objectives, and provides customers and consumers with a statistically valid demonstration that dairy farmers are meeting their ethical obligation for on-farm animal care. Using the same criteria as the FARM Program Second-Party Evaluators, a Third-Party Verifier conducts an on-farm assessment of each dairy farm that is randomly selected in the verification process.

There are only two ways to be automatically removed from the FARM Program: (1) refusal to participate in Third-Party Verification, or (2) if willful mistreatment of animals is observed at any time.

The FARM Program is a collective program for all participants, so an individual dairy farm that is randomly selected for Third-Party Verification will not be responsible for the cost of the on-farm verification process. Details of the Third-Party Verification process are available on the FARM Program website.

Other Verification Options

An individual dairy farmer, cooperative or proprietary processor may choose to have Third-Party Verification conducted on their farm(s) outside of the statistical sampling that occurs among all FARM Program participants. A dairy farmer, cooperative or proprietary processor who chooses additional Third-Party Verification will be responsible for associated costs. A cooperative or proprietary processor may use statistical sampling or conduct Third-Party Verification on all of its dairy farms. In any of these cases, Third-Party-Verification should be conducted by someone who does not have a conflicting interest in the operation or the outcome of the verification process. Such should be obtained from a pool of certified and trained or otherwise proven qualified Third-Party Verifiers. The FARM Program can assist in identifying such providers.



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APPENDIX A



Technical Writing Group

FARM Program Technical Writing Group

The FARM Technical Writing Group helps ensure that the FARM Program fosters a culture of continuous improvement and that the best management practices, which are the cornerstone of the program, evolve with the latest research on animal welfare and humane handling.

Current Technical Writing Group experts include:

1. Dr. Karen Jordan, DVM, Dairy Farmers of America Member, Producer
2. Antone Mickelson, Northwest Dairy Association
3. David Darr, Dairy Farmers of America, Inc.
4. John Mahoney, Land O'Lakes, Inc.
5. Kevin Olson, Prairie Farms Dairy, Inc.
6. Gatz Riddell, DVM, American Association of Bovine Practitioners
7. Nigel Cook, DVM, University of Wisconsin
8. Nina Von Keyserlingk, Ph.D., University of British Columbia
9. Cassandra Tucker, Ph.D., University of California-Davis
10. Marcia Endres, Ph.D., University of Minnesota
11. Josh White, National Cattlemen's Beef Association
12. Branden Treichler, Select Milk Producers
13. Paul Humphrey, Foremost Farms USA
14. Keri Retallick, Praedium/Validus
15. Steve Maddox, Dairy Management, Inc. Board Member
16. Dr. Richard Doak, DVM, Maryland & Virginia Milk Producers Cooperative Association
17. Chase DeCoite, National Cattlemen's Beef Association
18. Tim Raasch, Land O' Lakes, Inc.

APPENDIX B



Hygiene Scoring

The FARM Program goal for Hygiene Score is that 90% or more of animals should score 2 or less on the FARM Hygiene Scorecard.

Sound facility management will keep animals dry, clean and free of manure. The goal of evaluating animal hygiene is to gauge the on-going sanitation management in both the resting areas and the traffic lanes. All areas should be maintained clean and dry, even in areas with minimal housing.

The Hygiene Score Scale is a 1 to 4 scale, where:

- 1 = Clean
- 2 = Manure splatters on lower leg
- 3 = Manure splatters on upper leg, udder and belly area
- 4 = Manure splatters on udder/belly area and toward top of cow (alley cow)



Hygiene Score = 1

This cow is clean, with few manure stains on her legs. Her belly and udder area are very clean.



Hygiene Score = 2

This cow is quite clean on her belly and udder area. However, she has manure on her lower legs and knee area.



Hygiene Score = 3

This cow and heifer have significant manure on their legs, thigh and on the cows' udder.
Manure extends up to their rear end.



Hygiene Score = 4

This cow and heifer have manure extending up their sides. Their bellies are dirty and dirt and manure extend onto their back. There is significant manure on the cows' udder.



APPENDIX C



Locomotion Scoring

The FARM Program goal for Locomotion Score is that 95% or more of the lactating and dry herd score a 2 or less on the FARM Locomotion Score Scale.

Locomotion scoring is recommended to improve lameness detection and to regularly assess the distribution of cows at each score level. The FARM Program also encourages a written lameness prevention protocol to be in place.



Locomotion Score 1 = Sound

Animal has normal posture and a normal gait.



Locomotion Score 2 = Moderate Lameness

Stands well but is noted to favor a limb when walking.



Locomotion Score 3 = Severe Lameness

Severe lameness is defined as an animal either unable to move, or able to move, but barely able to bear weight on the affected limb. Signs may also include back arch, poor body condition, head bob and an inability to flex the lower leg joints. This cow is sore on her left rear leg, favoring it both standing and walking.

APPENDIX D



Body Condition Scoring

The FARM Program goal for Body Condition Score in a herd is that 99% or more of all animals score 2.0 or higher on the FARM Body Condition Score Scale.

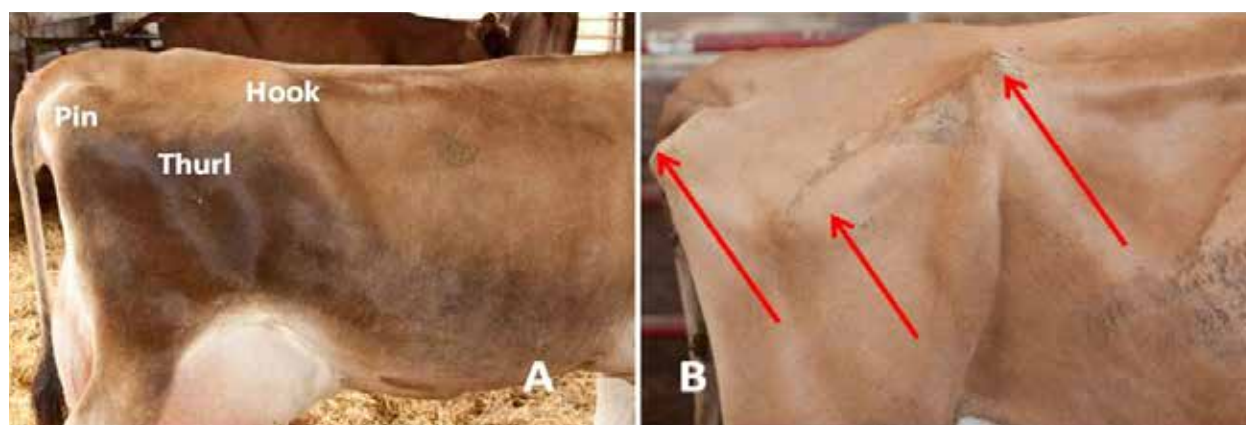
The Body Condition Score (BCS) Scale is 1 to 5, where:

- 1 = Gaunt animal, having no fatty tissue around the tail head or short rib region
- 2 = Thin animal, with a shallow cavity around the tail head region
- 3 = Good condition
- 4 = Animal with no depression in the loin area and one where the short ribs cannot be felt
- 5 = Animal having a thick layer of fatty tissue around her short ribs and over her tail head region

For purposes of evaluating animal well-being, the FARM Program goal targets identifying the percentage of all animals that have a BCS less than 2.0. View each of the areas shown below to determine body condition.

Below, key areas are identified on the left picture and referenced with red arrows on the right picture for clear viewing.

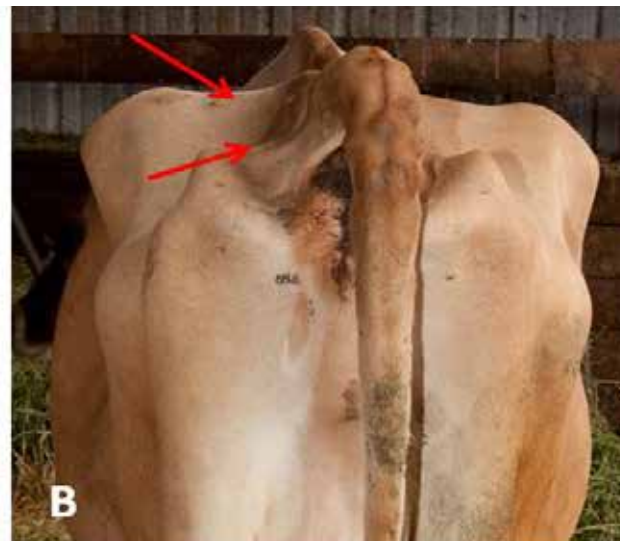
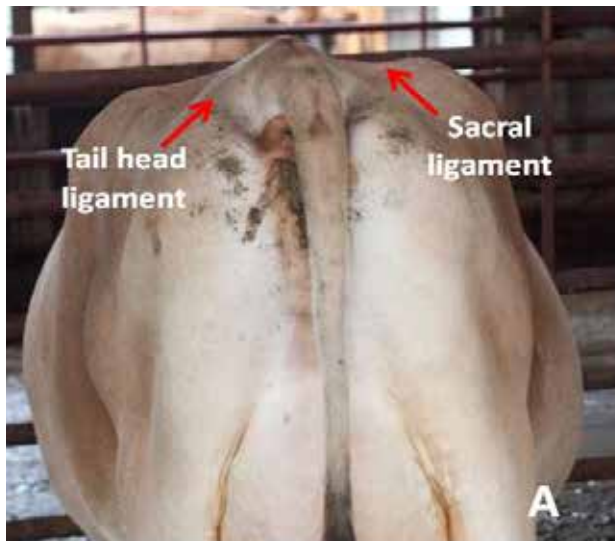
The cow in Picture B demonstrates BCS of less than 2.0. If the animal being scored has more fat cover than the animal in Picture B, the BCS will be a 2.0 or greater.



View the hook-thurl-pin section from the side. If this section has fat cover, then the BCS will be a 2.0 or greater. If the hook-thurl-pin section is nearly devoid of any fat cover, then the BCS will be less than 2.0.



View the short ribs from the side. If the short ribs have a fat pad cover, then the BCS will be greater than 2.0. If the short ribs are independently visible, with little to no fat covering, then the BCS will be less than 2.0.



View the tail head and sacral ligaments from the rear. If both of these ligaments are clearly visible, then the BCS will be less than 2.0. If these ligaments are not clearly visible, with fat cover, then the BCS will be 2.0 or greater.

BODY CONDITION SCORE: 1

This cow represents a BCS 1. Notice how bony her tail head, hooks and pins are. Her short ribs are very prominent. She has relatively little to no fat cover on her frame.



BODY CONDITION SCORE: 2

This cow represents a BCS 2. While her hooks, pins and short ribs are clearly seen they are not as prominent as those in the cow on the previous page. Her thighs are flat. She is thin, but is still a healthy cow in peak lactation.



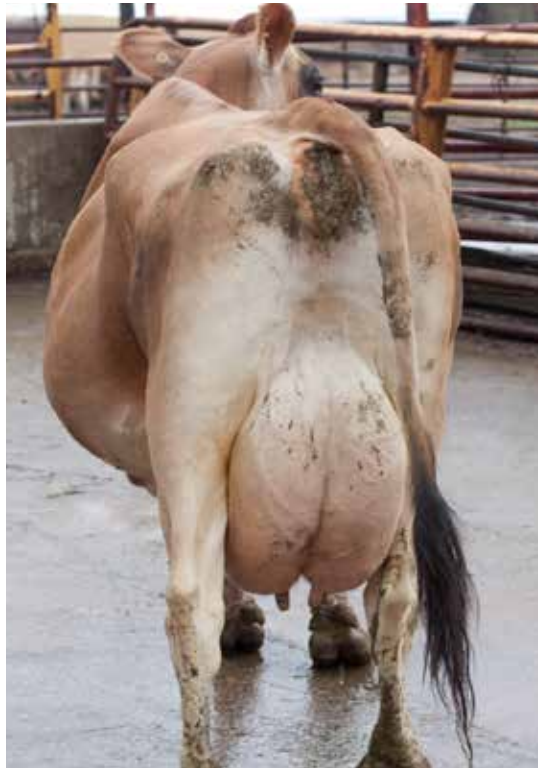
BODY CONDITION SCORE: 3

This cow represents a BCS 3. While her hooks, pins and short ribs are seen, they have a more obvious fat cover than those in the cows above. This is reflective of a cow after she has regained some body condition post-peak lactation.



BODY CONDITION SCORE: 4

This cow represents a BCS 4. She is carrying a heavy fat layer over her hooks, pins and short ribs. This is reflective of a cow in late lactation, as she is approaching dry off.



BODY CONDITION SCORE: 5

This cow represents a BCS 5. She is carrying a very heavy fat layer over her hooks, pins and short ribs. Notice the fatty bulges over her tail head region.



DAIRY CALF AND HEIFER BODY CONDITION SCORING

When Body Condition Scoring dairy calves and heifers, view the calf from the top and side. If ribs are clearly visible, then the BCS is less than 2.0.

BCS = 1



BCS = 2



BCS = 3



BCS = 4



APPENDIX E



Hock and Knee Lesion Scoring

The FARM Program goal is that 95% or more of the lactating and dry herd scores a 2 or less on the FARM Hock and Knee Lesion Scorecard.

Hock and knee lesions (swelling, abrasion and even ulceration) are an important indication of inadequate bedding and lack of animal comfort. Dairy farms with a higher prevalence of hock lesions also tend to have a higher number of lame cows. A healthy hock is free from hair loss (the hair coat is smooth and continuous with the rest of the leg) and swelling. Skin breakage provides an opportunity for infection to occur, which can lead to swelling, discomfort and lameness.



1 = No hair loss/swelling

Hair loss less than a quarter sized, with no lesion or swelling.



2 = Some hair loss/no swelling

Hair loss at least the size of a quarter, no swelling.



3 = Visible swelling and/or abrasion through the hide

Visible swelling and/or abrasion through the hide. Lesion may be purulent or bleeding.

The Scoring System applies in the same way when evaluating the Knee.



1 = Hair loss on front knees, less than the size of a quarter.



2 = Hair loss is greater than the size of a quarter.



3 = Hair loss is greater than the size of a quarter and visible swelling in either knee.



APPENDIX F



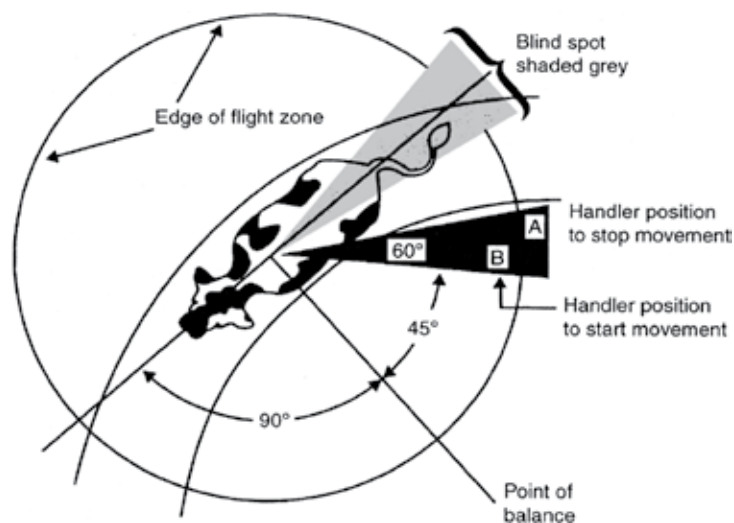
Safe Handling

Flight Zone

The flight zone is the animal's safety zone, and its size varies depending on the animal's degree of wildness or tameness. Cattle that seldom see people have a large flight zone, varying from a few feet to 100 yards or more. When a person enters the flight zone, the animal will turn away. If a person is outside the animal's flight zone, it will turn and look at him or her. The size of the flight zone is determined by three interacting factors:

- Genetic traits (excitable versus calm),
- Amount of contact with people (see them every day or only twice a year)
- And the quality of the contact with people (negative versus positive).

Animal Handling – Figure 1



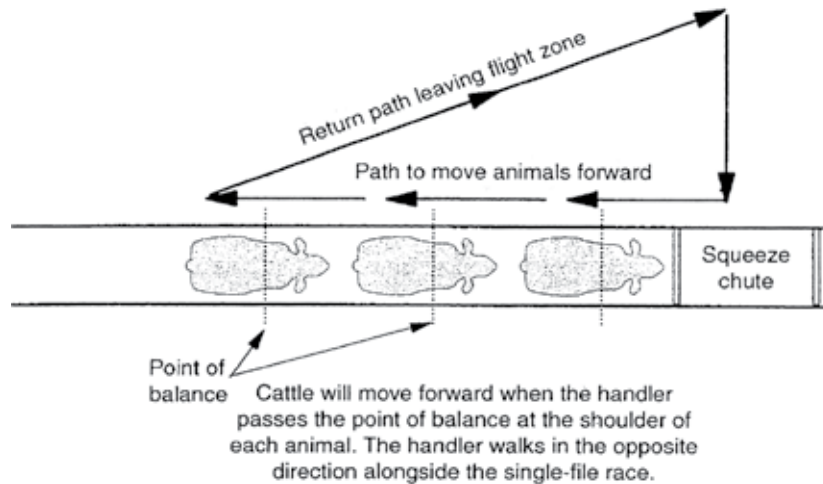
Handling is safer when animals are moved quietly. Handlers should not yell or flap their arms, because this may agitate the animals. Excessive use of electric prods increases animal agitation, as well as hazards to handlers. Animals that have a large flight zone move more quietly and with less agitation when the handler works on the edge of the flight zone. The handler penetrates the edge of the flight zone to make the animal move and retreats outside the flight zone to induce the animal to stop moving. Excited, agitated animals have a larger flight zone than calm animals. A handler must be behind the point of balance (line at animal's shoulder) to make an animal go forward.

Reference: Temple Grandin, Safe Handling of Large Animals (Cattle and Horses). Online at grandin.com.

Point of Balance

Handlers need to understand the point of balance. The point of balance is an imaginary line at the animal's shoulders. To induce the animal to move forward, the handler must be behind the point of balance. To make the animal move backward, the handler must be in front of the point of balance. Grazing animals move forward when a handler walks past the point of balance in the opposite direction of desired movement

Animal Handling – Figure 2



This movement pattern can be used to induce an animal to move into a squeeze chute. The handler walks inside the flight zone in the opposite direction of desired movement. The animal moves forward when the handler crosses the point of balance.



APPENDIX G



Willful Mistreatment of Animals

FARM Program Protocol Following Allegations of Willful Mistreatment of Animals

The National Dairy FARM Program™ (FARM Program) takes seriously all allegations of willful mistreatment of animals. The FARM Program has established this protocol to investigate credible evidence to determine if willful mistreatment of animals has occurred, and if necessary, to place a participating farm on probation. Finally, this protocol establishes procedures, including successful implementation of an animal care improvement plan, to reinstate the participant in the FARM program. The focus of this process is to ensure a farm's practices are consistent with the program's guidelines – not to exclude the farm from future participation in the FARM Program.

The FARM Program will place a participating farm on probation “if willful mistreatment of animals is observed at any time.” Willful mistreatment of animals is defined as follows by the FARM Program:

“Acts that maliciously cause pain, injury or suffering including, but not limited to: needlessly applying any type of prod to a sensitive part of an animal (prods are only used when animal or human safety is in jeopardy, and as a last resort and never on calves), malicious hitting or beating of an animal, movement of non-ambulatory cattle in a manner inconsistent with the National Dairy FARM Program guidelines, prolonged lack of access to feed and water, and inappropriate on-farm harvest or euthanasia.”

Investigation

Upon receiving credible evidence of willful mistreatment of animals, the FARM Program will contact the program participant and the cooperative or proprietary processor they are affiliated with to discuss the allegation. Additionally, the FARM Program may conduct a third-party on-site audit or on-farm investigation of alleged animal care issues. The FARM Program will use all information from the credible evidence, discussions with parties involved, and the third-party on-site audit to determine if willful mistreatment of animals occurred.

Probation

Upon conclusion of the investigation, if it is determined that willful mistreatment of animals occurred a farm will be placed on probation. If a farm is placed on probation both the farm and the cooperative or proprietary processor they are affiliated with will be notified by letter. The letter will explain the basis for the action, and will also detail the process to enable reinstatement in the FARM Program.

Reinstatement

To be reinstated in the FARM Program the farm must do the following:

- Take immediate action to discipline any employees found to have engaged in willful mistreatment of animals;
- Retrain all employees involved in animal care on the proper handling of animals;
- Conduct an on-farm audit by an independent third-party auditor utilizing the FARM Program or another industry recognized audit, such as the Validus Dairy On-Farm Animal Welfare Audit (NOTE: the FARM Program third-party on-site verification may qualify);
- Create an Animal Care Continuous Improvement Plan with the third-party auditor and herd veterinarian that outlines the steps to be taken to address any deficiencies identified in the audit and a clear timeline for addressing any issues found (NOTE: an Improvement Plan may be developed in conjunction with the FARM Program third-party on-site verification);
- Re-evaluation by a FARM Program Second-Party Evaluator after 60-90 days with demonstration of timely progress on items detailed in the Continuous Improvement Plan. With successful completion of the re-evaluation, the farm will be provisionally allowed back into the FARM Program; and
- A final follow-up evaluation, based on the timeline for completion of the Continuous Improvement Plan items, must take place, no later than a year after the re-evaluation, for complete reinstatement in the program.
- Failure to implement the items in the Continuous Improvement Plan will result in the removal of the farm from the FARM Program.

The FARM Program has developed a number of resources that can be used to meet the program's guidelines. These resources include videos describing the Animal Care Manual chapters in English and Spanish, sample Standard Operating Procedures (SOPs) for actions such as moving non-ambulatory animals and a sample Herd Health Plan. These and other materials can be found on the FARM Program secure website as well as the public website, nationaldairyfarm.com.



APPENDIX H



Top Considerations for Culling



1

Do not move non-ambulatory animals to market under any circumstances.

2

Make the decision to treat, to cull, or to euthanize animals promptly. Sick and injured animals should be segregated from the herd.



3

Delay transport of an animal that appears to be exhausted or dehydrated until the animal is rested, fed and rehydrated.

4

Milk all cows that are still lactating just prior to transporting to a packing plant or a processing facility.



5

Use a transportation company that is knowledgeable about your animal care expectations and provides for the safety and comfort of the animals during transport.

6

Do not transport animals to a packing or processing facility until all proper treatment withdrawal times have been followed.



7

Do not transport animals with a poor body condition, generally a Body Condition Score of less than 2 (1 – 5 scale).

8

Do not transport heifers or cows where calving is imminent and likely to occur during the transportation or marketing process.



9

Do not transport animals that require mechanical assistance to rise and walk, except to receive veterinary treatment. When using any handling device, abuse is never tolerated (see FARM Willful Mistreatment Protocol, chapter 8).

10

Do not transport animals with bone fractures of the limbs or injuries to the spine. Animals with a recent fracture unrelated to mobility should be culled and transported directly to a packing or processing facility.

11

Do not transport animals with conditions that will not pass pre-slaughter inspection at a packing or processing facility. If unsure, consult with your veterinarian before transporting an animal to a packing or processing facility.



CONDITIONS THAT WILL NOT PASS PRE-SLAUGHTER INSPECTION

Dairy producers should **not** transport animals with conditions that are unlikely to pass pre-slaughter inspection.

These conditions include, but are not limited to:

- Cancer eye
- Blindness in both eyes
- Fever greater than 103°F
- Drug residues
- Peritonitis
- Fractures or lameness (3 on the NDFP scale)
- Unreduced prolapses
- Cows that are calving or have a high likelihood of calving during transport
- Distended udders causing pain and ambulatory issues
- Suspected central nervous system symptoms
- Visible open wounds



APPENDIX I

PRACTICAL EUTHANASIA OF CATTLE



Practical Euthanasia of Cattle

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OVERVIEW

Livestock caretakers have an obligation to ensure the welfare of animals under their care. Euthanasia of an animal that is suffering from irreversible disease or injury is a primary responsibility caretakers assume. As per the “AVMA Guidelines for the Euthanasia of Animals (2013)” euthanasia is defined as: “A method of killing that minimizes pain, distress, and anxiety experienced by the animal prior to loss of consciousness, and causes rapid loss of consciousness followed by cardiac or respiratory arrest and death”. The contents of this pamphlet are intended to aid caretakers, animal owners, livestock market operators, animal transporters, and veterinarians in choosing effective euthanasia methods.

The “AVMA Guidelines for the Euthanasia of Animals (2013)” recognizes and accepts three primary methods (two have conditions) of euthanasia for cattle:

- Intravenous (IV) administration of a lethal dose of a barbiturate or barbituric acid derivative to induce a transition from consciousness to unconsciousness and then death.
- Gunshot using an appropriate firearm and ammunition to cause physical disruption of brain activity by direct destruction of brain tissue.
- Penetrating captive bolt to induce unconsciousness in combination with an adjunctive step such as exsanguination, administration of IV potassium chloride, or pithing (increasing destruction of brain and spinal cord tissue) to ensure death.

When properly applied, the above euthanasia methods can cause rapid loss of consciousness and death with no detectable distress to the animal.

Cover photos: Top left, Adams Ranch by Bud Adams; top right, Donson breeding heifers by Leo Timms, DVM; bottom, Renee Dewell.

CONSIDERATIONS FOR SELECTION OF METHOD OF EUTHANASIA

When euthanasia is the most reasonable option for a compromised animal, the following elements should be considered to aid in the selection of the appropriate method:

1. HUMAN SAFETY: The first consideration in the choice of euthanasia method is human safety. For example, the use of a firearm carries greater safety risks when compared to other methods.

2. ANIMAL WELFARE: All methods of euthanasia should produce a rapid death with no detectable pain and distress. Select a euthanasia technique that considers human safety as well as animal welfare and is appropriate for the specific situation.

3. RESTRAINT: When performing euthanasia procedures, appropriate methods of restraint should be used. Some methods, such as captive bolt, require excellent restraint of the animal. Quality and availability of cattle chutes, halters, gates or other forms of restraint make certain forms of euthanasia more practical than others.

4. PRACTICALITY: An appropriate euthanasia technique must also be practical to use. For example, not all individuals responsible for carrying out euthanasia procedures have access to pharmaceuticals or firearms.

5. SKILL: Certain techniques require skill and training to accomplish correctly. Individuals responsible for conducting euthanasia should be trained in proper euthanasia protocol and should have access to appropriate, well-maintained equipment and/or medications.

6. COST: Euthanasia options vary in cost. Certain techniques, such as the use of firearms or captive bolt, require a larger initial investment, which may be defrayed over time if used often.

7. AESTHETICS: Certain euthanasia techniques, such as use of a barbiturate overdose, may appear more humane to the general public when compared to other techniques. Some methods, such as a penetrating captive bolt, may cause significant involuntary movements by the animal that may be misinterpreted as a voluntary painful response to those inexperienced in bovine euthanasia. When selecting a euthanasia method, potential negative reactions by the animal or observer should be considered.

8. DIAGNOSTICS: The selected euthanasia method should not compromise diagnostic sample collection.

9. CARCASS DISPOSAL: Carcass disposal is a critical consideration when selecting a euthanasia technique. Carcasses must be handled and disposed of in accordance with state and federal regulations. Options may include rendering, burial, composting, incineration and potentially landfills. Cattle euthanized using a barbiturate overdose may not be accepted at rendering facilities since the drug persists in residual material following the rendering process. In some regions, regulations require animals euthanized with barbiturates to either be incinerated or buried. Appropriate disposal of the carcass prevents scavenging and potential toxicity issues among wildlife. Gunshot or captive bolt is often a viable option that may facilitate ease of disposal.

DECISION MAKING

Actions involving compromised cattle include treatment, slaughter or euthanasia. The following criteria should be considered when making a decision:

1. Pain and distress of animal
2. Likelihood of recovery
3. Ability to get to feed and water
4. Drug withdrawal time
5. Economic considerations
6. Condemnation potential
7. Diagnostic information

INDICATIONS FOR EUTHANASIA

The following conditions or situations may lead to an animal being compromised to such an extent that euthanasia is indicated:

- Fracture, trauma or disease of the limbs, hips or spine resulting in immobility or inability to stand
- Loss of production and quality of life (advanced age, severe mastitis, etc.)
- Disease conditions for which no effective treatment is known (i.e. Johne's disease, lymphoma)
- Diseases that involve a significant threat to human health (i.e. rabies)
- Advanced ocular neoplastic conditions ("cancer eye")
- Disease conditions that produce a level of pain and distress that cannot be managed adequately
- Emaciation and/or debilitation from disease, age or injury that resulting in an animal being too compromised to be transported or marketed
- Disease conditions for which treatment is cost prohibitive
- Extended drug withdrawal time for clearance of tissue residue
- Poor prognosis or prolonged expected recovery



Bud Adams, Adams Ranch

MECHANISMS OF EUTHANASIA

The agents of primary or adjunct euthanasia cause death by one of the three following mechanisms:

1. Direct depression of the central nervous system or organs necessary for life function (barbiturate overdose, intravenous administration of saturated potassium chloride or magnesium sulfate).
2. Hypoxia associated with agents or procedures that displace or block the uptake of oxygen (such as that caused by exsanguination).
3. Physical disruption of brain activity (such as that caused by gunshot, penetrating captive bolt, or pithing).

TABLE 1: APPROVED METHODS FOR PRACTICAL EUTHANASIA

Method	Risk to Human Safety	Skill Required	Potential Public Perception Issues	Adjunctive Method Required
Gunshot	High	Moderate*	Moderate: Some blood and motion	No
Penetrating Captive Bolt	Moderate	Moderate*	Moderate: Some blood and motion	Yes
Barbiturate Overdose	Low	Moderate*	Perceived well	No

* Operator training required

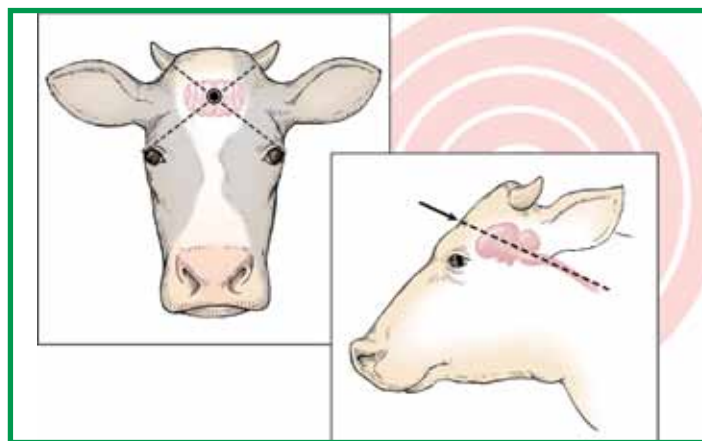


Figure 1. Optimal point of entry for bovine euthanasia with gunshot or captive bolt described as on the intersection of two lines each drawn from the lateral canthus (outer corner) of the eye to the center of the base of the opposite horn (or where horn would be).

ACCEPTED PRIMARY EUTHANASIA METHODS

1. GUNSHOT: When properly executed, gunshot induces instantaneous unconsciousness and death, is inexpensive and does not require close contact with the animal. It should be emphasized that this method should only be attempted by individuals trained in the use firearms and who understand the potential associated dangers. Firearm options include handguns (pistols), rifles or shotguns. Current recommendations suggest that the .22

caliber handgun or rifle loaded with a solid point bullet is sufficient for calves, but may not be the best choice for consistent use on adult animals.

The "AVMA Guidelines for the Euthanasia of Animals (2013)" recommends the use of solid-point bullets. Muzzle energy available from a .22 LR is in the range of 100 to 150 ft./ lb. (135 to 216.8 joules), whereas larger calibers such as the .38 Special, .357 magnum or 9 mm will push muzzle energies well above the 300 lb. (407 joules or greater) range. Rifles are capable of higher muzzle energies compared with handguns and are often a better choice in situations where a fractious animal must be shot from a distance. Finally, shotguns are very lethal at close range (less than 2 feet from point of intended entry) whether

loaded with shot-shells or slugs. The 12-, 16-, and 20-gauge shotguns are a good choice for euthanasia of adult cattle.

The 28 or .410 gauge shotgun is an excellent choice for use in calf euthanasia. If using a shotgun loaded with shot shells the operator should be very conscious of the distance

from the gun barrel to the animal as projectiles will spread out into a larger pattern that can greatly increase the risk of ricochet and operator and bystander injury. The firearm should be held within 1 to 2 feet from the intended target and the bullet should be directed perpendicular to the front of the skull to minimize the likelihood of ricochet. In cattle, the point of entry of the projectile should be at the intersection of two imaginary lines, each drawn from the outside corner of the eye to the base of the opposite horn as shown in Figure 1.

2. PENETRATING CAPTIVE BOLT: Captive bolt devices ("guns" or "stunners") are either penetrating or non-penetrating. Only penetrating captive bolt devices are approved for euthanasia of mature bovines and, according to "AVMA Guidelines for Euthanasia of Animals (2013)", must not

be used as the sole method of euthanasia. The bolt gun must be placed firmly against the skull at the same entry point previously described for a gunshot. Since use of the captive bolt gun requires close proximity to the animal, adequate restraint and prior sedation or tranquilization may be required. It is critical to maintain and clean the





Grant Dewell, DVM

bolt gun as described by the manufacturer. Additionally, selection of cartridge strength may vary among manufacturers and the appropriate type and strength for the size of the animal must be used. The optimal point of entry

for the penetrating captive bolt is depicted in Figure 1.

3. BARBITURATE AND BARBITURIC ACID DERIVATIVES: When properly administered by the intravenous route, barbiturate overdose (60-80 mg/kg sodium pentobarbital IV) produces rapid unconsciousness and anesthesia followed by respiratory depression, hypoxia, and cardiac arrest. The barbiturate selected should be potent, long acting, and stable in solution. The carcass of barbiturate treated animals is considered unfit for human or animal consumption. Ingestion by wildlife or other animals can induce toxicities. (FDA-CVM 2003 <http://www.fda.gov/AnimalVeterinary/NewsEvents/CVMUpdates/ucm119205.htm>).

Finally, as mentioned previously, the use of pharmaceuticals limits carcass disposal options as renderers are less likely to accept animals euthanized by these methods.

DETERMINATION OF UNCONSCIOUSNESS

A state of apparent unconsciousness must be established immediately following the initial euthanasia procedure. In the field, the surrogate to unconsciousness is "lack of response" described below, as true unconsciousness can only be determined by EEG. The person performing euthanasia must be prepared to immediately apply an accepted euthanasia technique if any sign of consciousness is detected by the observer or demonstrated by the animal.

Secondary or adjunct euthanasia methods must not be performed until the animal has been determined to be unconscious.

SECONDARY OR ADJUNCT EUTHANASIA METHODS

A second shot, exsanguination, pithing and rapid intravenous injection of a concentrated solution of potassium chloride or magnesium sulfate may serve as adjunct

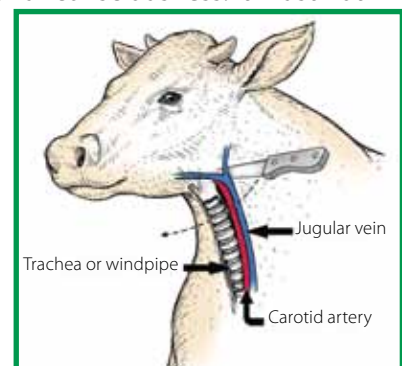
SIGNS OF UNCONSCIOUSNESS

- Absence of corneal reflex
- Absence of vocalization
- Absence of gag reflex (no voluntary tongue movements or swallowing)
- Lack of rhythmic respiration
- No coordinated attempt to rise or right itself

methods to ensure death following use of an acceptable primary euthanasia method.

EXSANGUINATION

This method can be used to ensure death subsequent to stunning, anesthesia, or unconsciousness. It must not be used as the sole method for euthanasia. The most common exsanguination method in the bovine is to lacerate both the jugular vein and carotid artery. A 6-inch long sharp knife is fully inserted behind the point of the jaw and directed downwards until blood is freely flowing. Brachial vasculature can be lacerated by lifting a forelimb, inserting the knife deeply at the point of the elbow and cutting skin and vasculature until the limb can be laid back against the thorax of the animal. The aorta can be transected via the rectum, by a trained individual, so that blood pools within the abdominal cavity.



J.K. Shearer

Figure 3. Exsanguination technique

PITHING

Pithing is an adjunctive technique designed to cause death by increasing the destruction of brain and spinal cord tissue. It is performed by inserting a pithing rod or similar tool through the entry site produced in the skull by a bullet or penetrating captive bolt device. The operator



Dr. Dee Griffin

manipulates the pithing tool to destroy both brain stem and spinal cord tissue, which results in death.

POTASSIUM CHLORIDE (KCL)

Rapid IV administration of a saturated solution potassium chloride (KCl) induces cardiac arrest. Cattle must be anesthetized or unconscious prior to administration. The injection of xylazine or any other alpha-2 agonist has not been shown to induce anesthesia and must not be used alone. The use of a captive bolt is also acceptable if a state of unconsciousness is achieved. The specific dose of KCl will vary according to the size of the animal, but an injection of 250 ml of a saturated KCl solution is appropriate for most mature cows. The KCl solution should always be given to effect (i.e., until death).

MAGNESIUM SULFATE

Similar to potassium chloride (KCl), magnesium sulfate is approved for use only in anesthetized animals. Compared to the use of IV KCl, death is usually much slower.

CONFIRMATION OF DEATH

Confirmation of death following a euthanasia procedure is absolutely essential regardless of what method of euthanasia is chosen. Keep personal safety in mind when confirming death because animals can make sudden involuntary movements.

The following combination of criteria recommended by the AVMA includes: "...lack of pulse, breathing, corneal



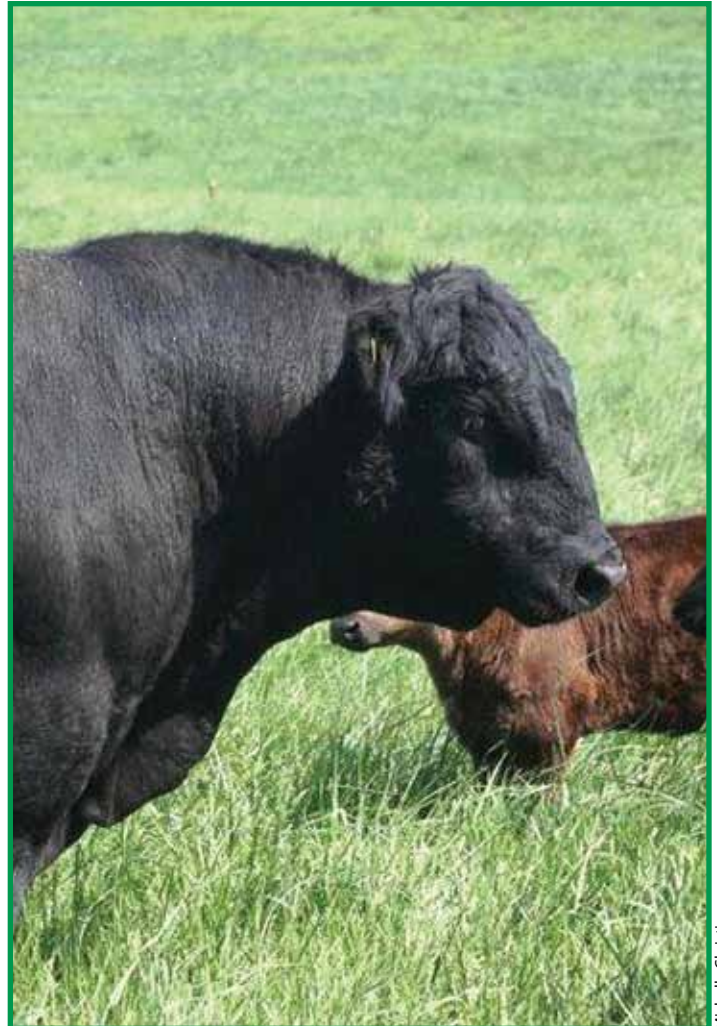
Renee Dewell

reflex and response to firm toe pinch, inability to hear respiratory sounds and heartbeat by use of a stethoscope, graying of the mucous membranes and rigor mortis. None of these signs alone, except rigor mortis, confirms death."

The presence of a heartbeat can be best evaluated with a stethoscope placed under the left elbow. Observation for movement of the chest indicates respiration. However, respiration rates may be very erratic in unconscious animals; therefore, one must be cautious in the interpretation of respiration for confirmation of death. Lack of heartbeat and respiration for three to five minutes should be used to confirm death. The corneal reflex may be tested by touching the surface of the eye. Normal or conscious animals will blink when the eye's surface is touched. Lack of a corneal reflex alone is not sufficient for confirmation of death. Continued monitoring of animals for a period of 20 to 30 minutes after euthanasia has been performed is also good advice to livestock owners and managers.

CONSIDERATION FOR EUTHANASIA OF CALVES AND BULLS

Calves and bulls require special consideration in selecting the proper method of euthanasia. Ethical considerations do not change for the calf because it is small or more easily handled. Blunt trauma by physical blow to the head is not acceptable for euthanasia of calves because the skull is too hard to consistently achieve immediate and lethal destruction of brain tissue. This method is also difficult to apply



Michelle Christianson

consistently because of restraint and complications in positioning the calf for effective use of blunt trauma methods. In addition to the methods outlined in Table 1 for mature bovines, the use of a purpose-built non-penetrating captive bolt stunner is an acceptable (with conditions) method of euthanasia for calves.

Euthanasia of bulls presents unique challenges because of their size, temperament, and thickness of their skull. Operator safety is of primary concern in euthanasia of bulls, and for certain techniques such as barbiturate overdose or captive bolt, proper restraint is critical. Bulls may be euthanized with specialized heavy-duty captive bolt guns or firearms capable of muzzle energies of 1000 ft. / lb., or by barbiturate overdose.

UNACCEPTABLE METHODS OF EUTHANASIA

Based on ethical and humane considerations, the “AVMA Guidelines for the Euthanasia of Animals (2013)” considers the following methods unacceptable techniques:

- Manually applied blunt trauma to the head of calves or mature cattle
- Injection of unapproved chemical agents or substances (e.g. disinfectants, non-anesthetic pharmaceutical agents)
- Sedation with alpha-2 agonist such as xylazine followed by potassium chloride, magnesium sulfate, or any other euthanasia method that requires the animal to be unconscious prior to its use
- Air injection into the vein
- Electrocution with a 120-volt electrical cord
- Drowning
- Exsanguination of conscious animals

CONCLUSION

Personnel at sites that routinely handle cattle should be prepared with the knowledge, necessary skills, and well-maintained equipment to conduct euthanasia. Penetrating captive bolt and gunshot are the only two acceptable methods typically available to non-veterinarians for emergency euthanasia of cattle. Animal transporters should also be properly trained in euthanasia techniques and should have contact information for appropriate personnel in case of an emergency. An action plan for routine and emergency euthanasia should be developed and followed wherever animals are handled. Persons who perform this task must be technically proficient, mentally capable and possess a basic understanding of the anatomical landmarks and equipment used for humane euthanasia of animals. If there is any degree of question or discomfort with a proposed euthanasia procedure, a veterinarian should be consulted.

Livestock markets and sale yards should have written euthanasia protocols to follow and trained personnel should be available for emergency euthanasia during all shifts. When practical, select a location where the carcass can be easily reached by removal equipment.

Dead animals should be disposed of promptly and in accordance with all federal, state, and local regulations.



Bud Adams, Adams Ranch



To learn more about the National Dairy FARM Program, log on to

NATIONALDAIRYFARM.COM

or contact the National Milk Producers Federation at

(703) 243-6111

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