



BEEF QUALITY ASSURANCE

FIELD GUIDE



Funded by the Beef Checkoff

The BQA cattle care agreement is an example for cattle operations to set animal care expectations for each team member. The printable template can be found at www.bqa.org.



Cattle Care Agreement

Responsible Party Information

Facility Name: _____

Owner/Employer Name: _____ Phone: _____

Employee/Animal Care Taker Name: _____ Phone: _____

Agreement

I confirm my commitment to the highest standards of animal care by hereby agreeing that proper animal care is the responsibility of every individual who is around animals, including me. I understand that animal abuse, neglect, harm and mishandling are unacceptable and will not be tolerated. I will immediately report any signs of deliberate animal abuse, neglect, harm or mishandling to a supervisor or other individual(s) responsible for enforcement of proper animal care.

Owner/Employer Signature:

Date:

Employee/Animal Care Taker Signature:

Date:



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BQA PRODUCER FIELD GUIDE

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The *BQA Producer Field Guide* is a quick reference version of the *BQA National Manual*. All chapter numbers in the guide correspond with the chapter numbers in the *BQA National Manual*. The goal of this guide is to provide producers with reminders and important references when making management decisions.

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*Links to third-party
websites should not
be considered an
endorsement by the Beef
Checkoff of the actual
website or the company
or organization that owns/
manages that website.*

CHAPTER 1

INTRODUCTION

BQA Mission Statement

To guide producers towards continuous improvement using science-based production practices that assure cattle well-being, beef quality and safety.

“Today’s consumers have greater interest in how their beef is raised and the practices behind it. Programs like BQA help bring our customers and beef community closer together in that understanding, building trust to ensure a sustainable future for our industry.”

John Stika
President, Certified Angus Beef

Attaining BQA certification signifies that cattle producers have been exposed to science-based guidelines, receiving education and training to align with standards set by a collaborative team of cattle producers, veterinarians, animal-care experts, extension specialists, and scientists.



How to Use the BQA Field Guide

This guide is a condensed version of the *BQA National Manual* that is meant as a quick reference for everyday use on the operation. Find the full *National Manual* and additional resources at bqa.org.

Introduction to the BQA Program

The Beef Checkoff-funded BQA program sets in the forefront of what we do as beef producers, and it serves as the path for sustainability in producing high quality and wholesome beef that consumers are proud to enjoy at the center of their plate. The program provides cattle producers with the resources to enable continuous improvement with the mindset of doing things the right way at the right time.

Grassroots-based, voluntary, and backed with science, education, and certification, BQA provides the backbone for cattle care and management practices. This not only improves the production of beef, but also enhances consumer trust and acceptance of the final product. The BQA program provides accountability throughout the supply chain by participant adherence to best management practices, including cattle health and well-being, beef safety, beef quality, worker safety, and environmental stewardship. Producers and employees from cow-calf operations, dairy farms, grazing operations, and cattle-feeding operations are trained by well-informed and expert educators at face-to-face events and through online training courses. The BQA program is designed to serve cattle producers from every region of the country or any beef production system and marketing program.

Preventive Approach to Total Quality Management (TQM)

As a result of the findings in the initial National Beef Quality Audit (NBQA) in 1991, supply chain partners and the industry implemented Hazard Analysis Critical Control Point (HACCP) programs to ensure quality and safety. Industry groups have developed HACCP-based programs such as BQA for the preharvest production segments of the industry. HACCP principles include the following.

- Identify the control points where potential problems can occur, be prevented, and/or controlled.
- Establish critical limits associated with each control point.
- Establish control point monitoring requirements to ensure that each control point stays within its limit.
- Establish effective record keeping procedures that document that a system is working properly.
- Establish procedures for verifying that the system is working properly.

TQM encompasses animal health and well-being, performance, carcass characteristics, and eating satisfaction which are results of management decisions made throughout the beef production system. Because factors other than food safety are involved in quality, the material in this guide is oriented toward the TQM concept. This concept establishes that every member of a production team adheres to high standards of work in every aspect of production in order to deliver high-quality products and services.

National Beef Quality Audit

The National Beef Quality Audit provides an understanding of what quality means to the various industry sectors, and the value of those quality attributes, while providing valuable information about the production of live cattle into beef carcasses and serves as a benchmark for the beef industry. Approximately every five years, the NBQA is conducted to benchmark the industry's collective progress in addressing these quality challenges. This research helps the industry make modifications necessary to increase the value of its products.

Key Takeaways from the 2022 NBQA¹

Progress Made in the Industry	Areas for Continuous Improvement
Supply Chain Efficiency	Improving Mobility Scores
Quality of Beef Produced	Minimizing Bruising
Fewer Injection Site Lesions	Eliminating Foreign Objects in Beef
Improved Confidence in Food Safety	Increasing the Number of BQA Certifications

The findings from the 2022 NBQA serve to improve quality, minimize economic loss, and aid in advancements in producer education for the U.S. beef industry. To read the entire NBQA report, visit **www.bqa.org**.

BQA Program Overview

The BQA program comprises multiple areas of education and serves all sectors of the beef industry including cow-calf, stocker/backgrounder, feedyard, transportation, and dairy. The components of the educational program include:

■ **Certification**

- The foundation of Beef Quality Assurance is regular, high-quality training and certification for cattle producers on the principles and management protocols of BQA.
- Producers can obtain a BQA certification through the completion of a training online or in-person through a BQA State Coordinator.

■ **BQA Educational Resources**

- BQA houses print and video-based educational resources.
- Visit the National BQA program YouTube channel for videos.

Certification and Recertification Requirements

- To earn a BQA certification, cattle producers and caretakers must either complete a BQA training online or in person, held by a BQA State Coordinator or trainer, as well as pass a test. To complete a BQA certification online or find an in-person training, visit **www.bqa.org**.
- All BQA trainings online or in person contain a test that must be passed to ensure the rigor and standardization of the BQA program across the country.
- BQA certifications are valid for three years from the date the original certification was earned.

Continuing Education

- BQA now offers Continuing Education (CE) as an option to renew a BQA certification.
- All BQA CE courses are a deeper dive into topics within the BQA manual.
- A producer can participate in CE online or by finding an in-person training by visiting **www.bqa.org**.
- To renew a BQA certification through CE, a producer must obtain three CE credits before their BQA certificate expires.
- To view the CE course library, log into your account on **www.bqa.org**.
- CE is only available to producers who are renewing a BQA certificate.

BQA Equivalents

Cattle enter the food supply as beef through a variety of production systems. To ensure cattle care and consumer confidence in beef products, there are multiple quality assurance programs BQA recognizes as equivalents. Completion of the following programs are recognized as equivalents to the BQA program.



While Beef Quality Assurance Transportation (BQAT) is not an equivalent of the BQA program, it is a large part of the overall goal of Total Quality Management. BQAT is a separate certification program with the focus of training cattle haulers on research driven guidelines and suggestions for providing thoughtful and responsible cattle management. BQAT is offered both in-person and online.

The BQA program and its equivalents are designed to serve cattle producers from every region of the country or any beef production system and marketing programs in the U.S. and Canada. The remainder of this guide is designed to assist cattle producers, students and caregivers in delivering excellent care to cattle.

**Find BQA tips and training videos at
the BQA YouTube Channel.**



CHAPTER 2

RECORD KEEPING



Objectives

- Understand the types of records that should be kept on an operation for daily management and regulatory reasons.
- Utilize the operation's records to make better management decisions.
- Understand the importance of record keeping relative to maintaining animal health and a safe food supply.

Record keeping is a key element of Beef Quality Assurance and a good business practice in general. A quality record keeping system is one that cattle producers are comfortable using and that maintains accurate, thorough, and timely production records. Using pen and paper may be a feasible option that is better than not having a record keeping system. Maintaining accurate records helps with the management of herd health, biosecurity, worker training, nutrition programs, and overall production costs.

Important Note

Throughout the rest of the *BQA Field Guide*, you will find a **Record Keeping Reminders** section at the end of each chapter to further emphasize the types of records that should be kept within the chapter topic.

The BQA program recommends keeping records for a minimum of two years, or longer as required by laws/regulations.

- Pesticide records should be kept for three years.
- Veterinary Feed Directive records should be kept for two years.

CHAPTER 3

CATTLE BEHAVIOR, HANDLING, & FACILITY DESIGN



Objectives

- Understand the basics of cattle behavior and how to use correct pressure to handle cattle.
- Understand various cattle handling techniques and different facility designs to properly move, process, treat, and handle cattle.
- Understand how external factors and stressors affect cattle when handling them.
- Prioritize the importance of both human and animal safety when moving and handling cattle by providing proper training to employees.

Cattle Behavior-Informed Handling

Cattle behaviors result from their innate instincts, sensory perceptions, and experiences that develop conditioned learning.

- Cattle are a prey species — relying on their senses to detect and respond to predators. In some scenarios, cattle may perceive humans as predators and react accordingly.
- Cattle have herd instincts and are motivated to remain in physical and visual contact with other members of the herd.
- Cattle respond favorably to routine and may be distressed by frequent or sudden changes in their habits.

Principles of Cattle Behavior

■ Cattle want to see you

- Positioning yourself so cattle can easily see you can significantly improve their response to pressure. The blind spot in cattle is directly behind them or underneath their body. Objects are out of focus when they are behind the shoulder and located close to the animal.

■ Cattle want to go around you

- This observed behavior led to the development of curved working systems aimed at taking advantage of this behavior.
- This behavior is the result of cattle wanting to remove pressure and still wanting to see you. If the handler puts pressure on an animal and it walks forward, the handler will get out of focus so the animal will begin to turn in an effort to see the handler.
- If this is not the behavior desired, the handler will have to move out and away from the animal after movement starts. This will change the angle on the eye and keep forward movement straight.

■ Cattle want to be with and go with other cattle

- The herd instinct is beneficial to moving cattle. Take advantage of this behavior by starting movement through the animals at the front of the herd. Once that movement starts handlers can feed additional movement into the herd by working down the side of animals from head to tail. If movement is started in this manner, elicit movement until it is stopped by a physical barrier or by human interaction.
- This same herd behavior makes it important to avoid isolating cattle if possible. If an isolated animal becomes agitated, when possible, put another animal with it. A gentle animal will often keep an excited animal calm.

■ Cattle want to remove pressure

- This is commonly stated as “cattle want to return to where they have been.” However, the desire to return to where they came from is initiated by additional pressure occurring when they are moved into a more confined environment.

■ Cattle can only process one main thought at a time

- It is the handler's responsibility to show or position the animal so that they can determine what they are being asked to do. Additionally, it is the responsibility of the handler to keep enough pressure applied so that the animal makes the decision to move forward into what is normally a high-pressure environment such as a processing area or some form of transportation.



Video showing how cattle senses work.
National Dairy FARM Program

Stockmanship is the art and science of using the natural behavior of animals to handle and manage movement of cattle and other livestock to reduce stress and increase safety.

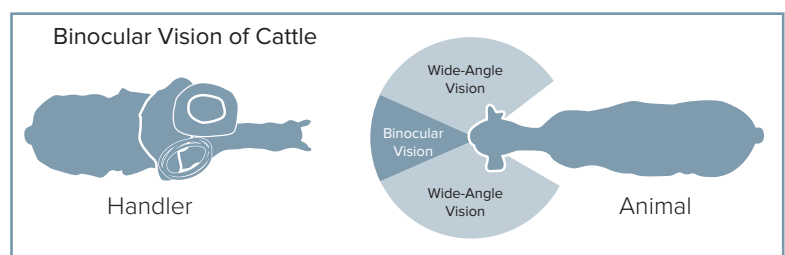
This benefits both the animal and handler.

Aggressive and Agitated Cattle

- If an animal becomes agitated, it can become aggressive and unpredictable. Once an animal enters this state it takes a minimum of 30 minutes after the source of agitation is removed before the behavior has a chance to return to normal.
- Most injuries and death to humans come from livestock that are in an agitated state. Humans not adapting to the animal's behavior can also contribute to potential injuries.

Vision

Due to the location of their eyes, cattle have a wide-angle vision field in excess of 300 degrees. Their narrow blind spot is located directly behind them. When cattle focus both eyes on an object in front of them, they have a binocular vision of about 25-50 degrees.



- Keep cattle in visual contact with other cattle to help them remain calm.
- Ensure loading ramps and handling chutes are properly designed to minimize animals seeing distractions outside of the working area. If cattle can see moving objects and people through the sides of a chute, they might balk or become frightened.
- Check for things that may be impeding movement and distracting cattle, such as hanging chains, shadows, backstops, dogs, or people if cattle are not easily moving up the chute.
- Facilitate entry by adding a spotlight directed onto a ramp or other apparatus. Always shine light in the direction cattle need to move.
- Paint handling facilities one uniform color because cattle are more likely to balk at a sudden change in color.
- Avoid leaning over the chute and causing cattle to back up and become agitated while waiting in a single file chute.



Learn how to move an animal using its flight zone.

Hearing

Cattle have a wider range of hearing than humans do. However, their sound localization does not allow them to determine a sound's source as well as human hearing does. Cattle are sensitive to high pitch and frequency sounds. Sudden or loud noises may startle cattle. Handling guidelines related to cattle's hearing-based behaviors include the following.

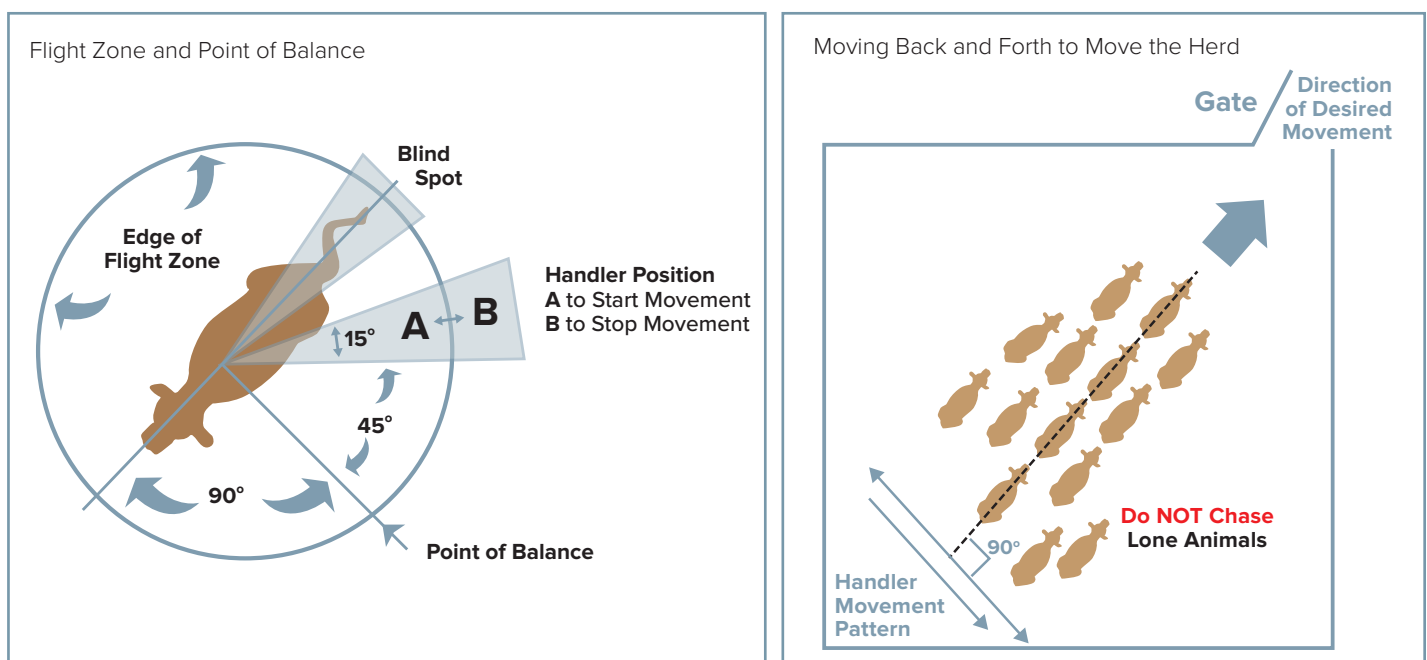
- Avoid loud noises in cattle handling facilities; small amounts of noise may assist in moving livestock. Yelling and shouting can cause excess stress to cattle and hold up the flow of cattle while working.
- Place rubber stops on gates and squeeze chutes and position the hydraulic pump and motor away from the squeeze chute to help reduce noise.
- Divert pipe exhaust from pneumatically powered equipment away from the handling area.
- Use sound, as needed, to add pressure and move cattle.

Cattle Response to Human Stimuli

Flight Zone

Understanding the animal's flight zone, or personal space, can reduce stress and help prevent accidents.

- ☐ Determine the edge of an animal's or group of animal's flight zone by slowly walking up to them; they begin to move away when you have entered their flight zone.



- ☐ Work on the edge of cattle's flight zone.
- ☐ Avoid entering the animal's flight zone too deeply or quickly as this may cause them to bolt away or back past you.
- ☐ Retreat from an animal's flight zone if you want it to stop moving.
- ☐ Quietly move cattle using their natural flight zone.
- ☐ In a chute and alley, move cattle forward by moving toward their rear past their eye and shoulder.
- ☐ In a chute and alley, stop cattle by moving forward past their point of balance.
- ☐ Allow cattle to follow one another in the direction that they are facing.
- ☐ Move the leader(s) rather than the rear animals if a group of cattle bunch up.

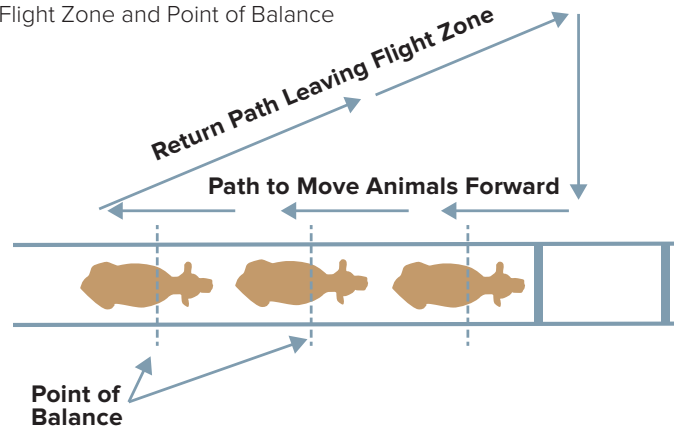


Learn how to move an animal using its point of balance.

■ Point of Balance

- ☐ Point of balance is normally considered to be a static point on an animal but it is not. If an animal is not conditioned to move past a human, the point of balance is usually located around the shoulder. However, the point of balance can be changed much further forward on the animal. If it is moved forward by acclimating cattle to move past a handler it makes processes such as sorting, loading or moving cattle into a chute much easier.

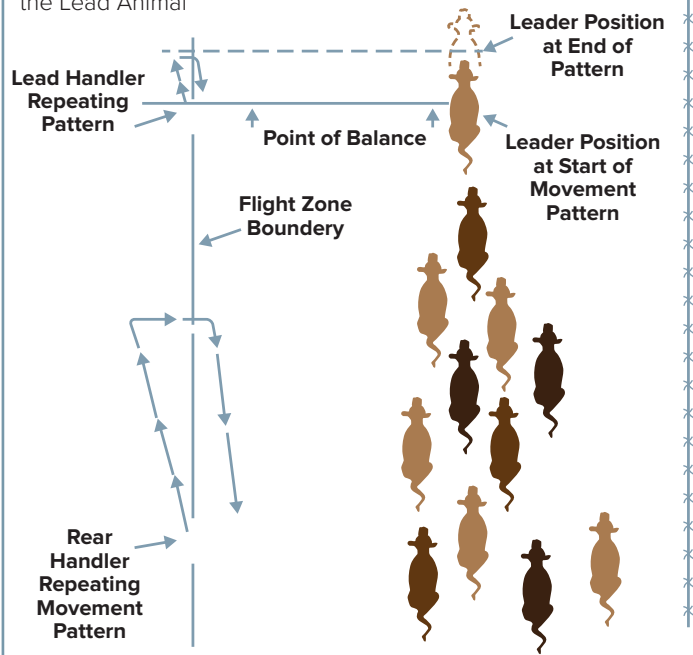
Moving Animals Forward Using Flight Zone and Point of Balance



■ Using pressure

- ☐ **Location of pressure** is where you stand in relation to the animal, either on the side or at the rear, avoiding animal blind spots.
- ☐ Handlers should **anticipate responses** of the animal based on location of pressure.
- ☐ **Have a plan** before you apply pressure – cattle need to have somewhere to go before you apply pressure.
- ☐ **Reward** cattle for doing what you want by removing pressure.
- ☐ **Learned behaviors**
 - ▶ Human learned behaviors can be the hardest to break, therefore it is important to practice low-stress cattle handling and utilize cattle natural behaviors when moving and working cattle.
- ☐ **Evaluate temperament**
 - ▶ Cattle temperament should be evaluated prior to handling and precautions should be used when handling aggressive cattle.

Example of Moving Cattle Using Two Handlers and Focusing on the Lead Animal



Use the temperament score to evaluate cattle docility.
Beef Improvement
Federation

Handling Tools

Acceptable non-electric handling tools include sorting sticks, plastic paddles, sorting flags, or a simple bag tied to a stick. Handlers should use acceptable handling tools to quietly guide and turn cattle. Using firearms to muster cattle is abuse and a food safety issue. Use of any projectile, whether it comes from a firearm, crossbow, bow, darts, or slingshot has the potential to penetrate the skin and embed in the muscle or fat tissue of an animal.

Electric Prods (Hotshots)

Electric prods should be used sparingly and not be a handler's "first choice/go-to" handling tool.

- Minimize the use of electric prods for safety and welfare reasons. Under desirable conditions, 90% or more of cattle should flow through cattle handling systems without the use of electric prods.
- When cattle prods must be used, avoid contact with sensitive areas including the eyes, rectum, genitalia, and udder. Use of electric prods in these sensitive areas is considered animal abuse.

Use of Dogs

Properly trained dogs can be effective and humane tools for cattle handling. However, handlers should ensure that barking or the position of the dog is not impeding cattle movement and flow.

Dogs should not be allowed to continuously bite cattle that are restrained or contained in an alley or chute, or by any other means that prevents movement or a way to escape. This is considered unchecked dog biting and animal abuse.



Place hotshots two to three feet away from the working facility.

Shotguns are NOT a handling tool.

The routine use of darts is NOT an excuse for poor handling facilities.

Cattle Handling Facilities and Management

It is especially important to properly design, construct, maintain, and utilize cattle handling facilities. When utilized correctly, facilities and equipment can improve cattle handling and welfare and human safety. Keep facilities and equipment clean and maintain working parts to ensure they function properly and are safe for cattle and handlers. Make sure handling facilities are free of sharp edges and protrusions to prevent injury to animals and handlers. Evaluate cattle handling facilities using the BQA self-assessment tools provided at www.bqa.org.

- Cattle handling facilities refer to the entire setup of grazing, holding, sorting, processing and transportation components of an operation. Pasture layout, lanes, holding pens, alleyways, and processing and loading areas should be designed to decrease stress.
- Pasture layout cannot always be done to make movement to holding and processing areas easy, but always consider options to rotate or move cattle to pastures that make it easier to corral them on the day of processing or transporting. The use of lanes can help facilitate movement of cattle across properties to reduce the chance of mixing herds/groups of cattle and reduce the labor needed to gather and corral stock. The pastures should feed into smaller holding traps or pastures close to the corrals.
- When possible, holding pens should be designed to take advantage of natural behavioral tendencies of cattle. Adequate square footage should be provided to minimize overcrowding.
- The type of processing facility design is often dictated by spatial constraints, which may limit some options.
- Keep in mind, all "crowding areas" should be designed and used as a flow-through part of the processing facility and not used to store cattle awaiting processing. Always bring the appropriate number of cattle into the "crowding area" that can easily fit into the crowd alley and chute.

Alleys and Chutes

- Adjust hydraulic or manual restraining chutes to the appropriate pressure for the size of handled cattle.
- Maintain flooring and avoid slippery surfaces, especially where cattle enter a single file alley leading to a chute or a chute’s exit. Grooved concrete, metal grating (not sharp), rubber mats, or deep sand can minimize slipping and falling. Quiet handling is essential to minimize slipping.
- Never fill a crowding pen with more than what can fit comfortably in the alley leading to the chute.
- Some features to consider in designing a crowd alley are width, length, covering of sides, and features to prevent backup.

Working Facility Designs

Overview of Bud Box Pros & Cons (Designed by Bud Williams)

Pros	Cons
■ When the handler uses the design as intended it is easy for cattle to understand the pressure and respond accordingly. ■ Lower cost of construction and ease of construction.	■ More skill-dependent than using a sweep system. ■ If cattle handling and employee training are not done as recommended, a Bud Box will not work better than another system. ■ If handlers try to push cattle out of a box (as opposed to guiding them out) it will become more dangerous to use.

Overview of Sweep Tub Pros & Cons

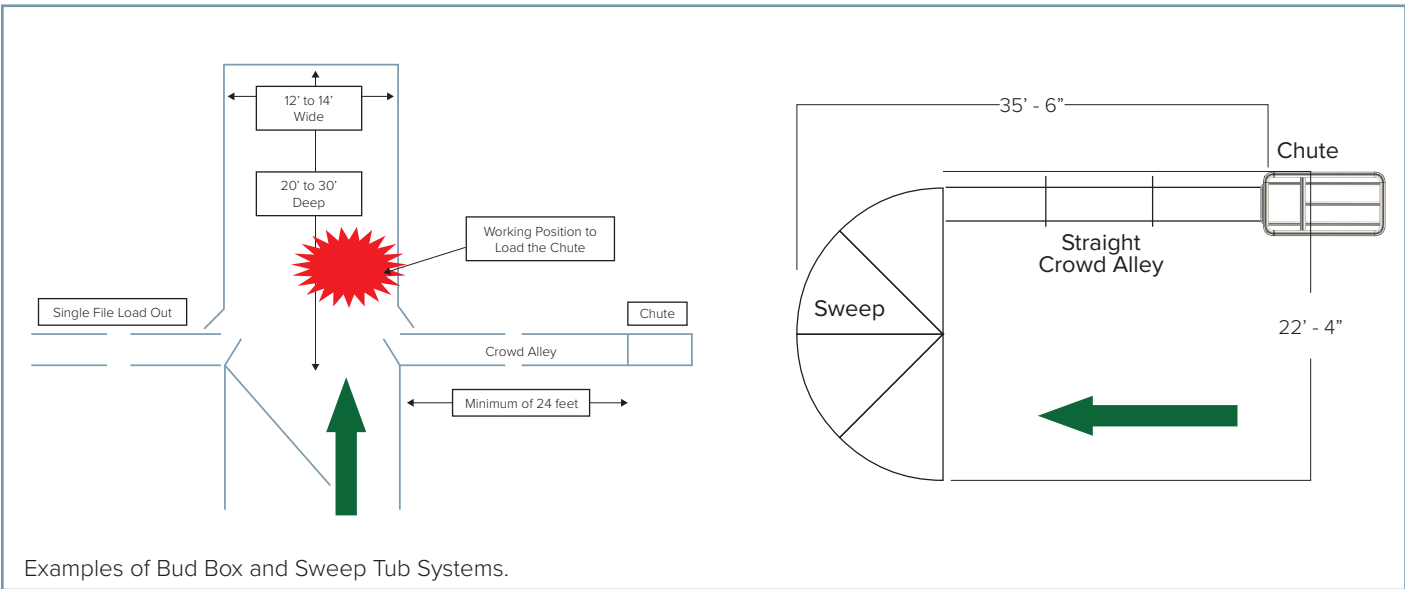
Pros	Cons
■ A sweep gate helps control animal movement out of the crowding area. When designed properly, the sweep system works similarly to the Bud Box. □ However, most sweep systems are not designed to take advantage of cattle behavior principles. Sweep systems designed by Dr. Temple Grandin, for example, take advantage of these principles. Sweep systems that do not facilitate the flow back past the pivot post do not work on the same principles as a Bud Box.	■ Variety of designs that do not allow the normal behavior of cattle to be used to improve flow through the sweep. ■ Cost of installation.



The red starbursts in the figures indicate the area the handler will normally need to work.



The green arrows indicate cattle movement.



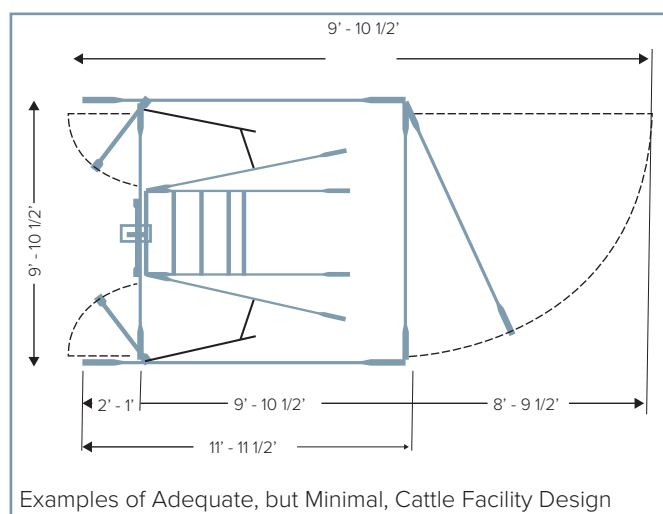
Other Facility Designs

There are several other types of forcing pens that are routinely used, with the most common being some variation of a V-shaped forcing pen. These systems are easy to construct much like a Bud Box but require the handlers to work them in a combination of techniques used in sweeps and boxes. Like sweeps, once the cattle are placed in the V the handlers should stop pressuring from behind or the cattle will usually turn around to try and exit the direction they entered.

Basic Cattle Facility Design

There is a wide variation in working facilities among operations, however, every operation regardless of size needs the ability to corral cattle, to restrain them for veterinary care, and to protect human safety. This can be accomplished with low-cost systems that are adequate to contain an animal. At a minimum, the processing facility should have a headgate on any single file crowd alley to facilitate restraint of the animal's head. These can be as simple as a headgate bolted to the end of a crowd alley or a calving stall that provides head restraint and restraint of the body without the construction of a sweep system or box and a crowd alley.

In addition to veterinary care, facilities are necessary to safely load cattle to take to market. This can be done with simple construction of some structure that allows a trailer to be backed up for loading. When loading cattle, it is recommended to have at least two pens to facilitate sorting along with an alley. Visit www.bqa.org for more information.



Housing

Cattle require the freedom to express normal behavior by providing sufficient space, proper facilities, and company of the animals' own kind. The optimal amount of space and shelter for cattle will vary depending on the operation's location and goals as well as the type of cattle housed.

- Ensure proper stocking density of confinement pens. Appropriate stocking density of any confinement pen allows for all cattle to lie down at any given time.
- Ensure cattle housing is constructed in a manner that allows for proper drainage that will not violate federal, state, or local laws.
- Ensure cattle housing is constructed in a manner that will allow for ease of manure removal.
- Ensure that all cattle housing is constructed in a manner that allows for an animal's continued access to food and water.
- Allow cattle to utilize natural shelters such as trees when possible.
- Consider the following features when fabricating shelters: adequate ventilation, amount of space per animal, the potential need for bedding, the direction and force of wind, safe use of mechanical/electrical devices, waste removal/drainage, and the animal's continued access to food and water.

Footing Considerations for Facilities

Providing proper footing for cattle is vital to reduce slipping and falling that may cause injury to the animal. Some examples of proper footing to help the animal increase traction with the ground include dirt, sand, wood shavings, rubber mats, and grooved concrete.

Pen Surface Management

Pen surface management can have a significant impact on cattle health and performance. Pens with excessive mud can be a challenge to both animal welfare and employee safety.

BQA has established a guideline that >30% of cattle in a pen should not have a mud and manure score of ≥ 3 .

Guidelines for pen surface management include the following.

- Maintain records of pen surface management. These records may identify chronic problem areas and assist in making long-term infrastructure decisions.
- Ensure pen floors properly drain and provide adequate traction to prevent injuries to animals and handlers.
- Ensure that mud depth is not consistently deeper than the ankles of cattle in pens.
- Monitor the accumulation of mud on cattle as a measure of pen condition and cattle care in relation to recent weather conditions.
- Maintain slopes so that water runs away from the feed bunks and does not pool excessively in the pens.
- Construct an elevated area to give cattle a dry place to lie down if the slope of the pen is not sufficient to facilitate proper drainage.
- Clean bunk aprons as needed so cattle do not have to stand in mud to eat from the bunk or drink from troughs.
- Maintain the pen floor and bunk apron interface so that cattle do not have to excessively step up to the apron.
- Use dust reduction measures to improve animal performance.

Extreme Weather Conditions

Heat

- It is ideal to work cattle before the temperature humidity index (THI) reaches 84. As an example, when the temperature is 98°F and the humidity is 30%, then the THI is 83. At a constant temperature, the THI increases as the relative humidity increases.
- Avoid handling cattle when the risk of heat stress is highest.
- Each one mile per hour increase in wind speed decreases the THI by approximately one point. Inversely, if wind speed reduces by 5 mph, the THI will increase 5°F.
- Provide abundant, clean water in holding pens during high temperature events.
- Work cattle more prone to heat stress (heavy or pregnant cattle) earlier in the day or whenever conditions are more favorable.
- When adult cattle and calves are huddled in groups, calves may have reduced airflow compared to mature cattle which could impact regulating body temperature.

Mud & Manure Scoring

Adapted from Beth E. Doran, 2016,
Iowa State University Extension
and Outreach

Mud & Manure Score 1: Clean hide.

Mud & Manure Score 2: Small lumps of mud in limited areas.

Mud & Manure Score 3



Small and large lumps of mud in large areas of the legs, side and underbelly. (12.8)

Mud & Manure Score 4



Small and large lumps of mud in even larger areas along the hindquarter, stomach and front shoulder. (N/A)

Mud & Manure Score 5



Lumps of manure on hide continuously on the underbelly and side of the animal from front to rear. (23.2)

() is pounds of mud on animal, Ramsey & Allen, 1975

- Handling events during high THI periods should be as low stress as possible. Minimize total cattle handling time when possible.
- If night temperatures do not drop below 70°F for at least four hours, cattle have no chance to decrease their core temperature and recover before the next episode of heat exposure, which could be detrimental to the animal if excessive heat events continue day after day.
- Pay close attention to predicted temperatures, especially following rain when humidity can increase, or when wind speeds are going to be less than 5 mph for several days.

Beef Cattle Temperature Humidity Index (THI)

		Relative Humidity (%)											
		30	35	40	45	50	55	60	65	70	75	80	85
Temperature (°F)	100	84	85	86	87	88	90	91	92	93	94	95	97
	98	83	84	85	86	87	88	89	90	91	93	94	95
	96	81	82	83	85	86	87	88	89	90	91	92	93
	94	80	81	82	83	84	85	86	87	88	89	90	91
	92	79	80	81	82	83	84	85	85	86	87	88	89
	90	78	79	79	80	81	82	83	84	85	86	86	87
	88	76	77	78	79	80	81	81	82	83	84	85	86
	86	75	76	77	78	78	79	80	81	81	82	83	84
	84	74	75	75	76	77	78	78	79	80	80	81	82
	82	73	73	74	75	75	76	77	77	78	79	79	80
	80	72	72	73	73	74	75	75	76	76	77	78	78
	78	70	71	71	72	73	73	74	74	75	75	76	76
	76	69	70	70	71	71	72	72	73	73	74	74	75
Temperature Humidity Index (THI)													
		Normal <75			Alert 75-78			Danger 79-83			Emergency >84		

Source: University of Nebraska - Lincoln

Cold

The lower critical temperature of cattle is not only influenced by environmental conditions such as temperature, humidity, and wind speed, but also by animal factors such as hair coat condition and body condition.

The condition of the animal's coat impacts the estimated lower critical temperature for beef cattle. For example, if the coat is wet or considered a "summer coat" the animal's lower critical temperature is 59°F. Meaning the animal may begin to experience cold stress at 59°F if they are wet (no matter coat thickness) or in a "summer coat."

Critical temperatures for beef cattle are determined in part by the condition of the coat. Below the critical temperature, livestock must expend more energy in order to keep warm. Adapted from D.R. Ames, Kansas State University.

Coat Description	Critical Temperature
Summer Coat or Wet	59°F
Fall Coat	45°F
Winter Coat	32°F
Heavy Winter Coat	18°F



Use USDA Agricultural Research Service's Forecast Heat Stress tool here.

Beef Cattle Wind Chill Index (WCI)

		Low Temperature °F																		
		-10	-8	-6	-4	-2	0	2	4	6	8	10	12	14	16	18	20	22	24	26
Wind Speed (mph)	25	-59	-56	-53	-50	-47	-44	-41	-38	-35	-32	-29	-26	-23	-20	-17	-14	-12	-9	-6
	23	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-28	-25	-22	-19	-16	-13	-10	-7	-4
	21	-54	-51	-49	-46	-43	-40	-37	-34	-31	-28	-26	-23	-20	-17	-14	-11	-8	-5	-3
	19	-52	-49	-46	-43	-40	-37	-35	-32	-29	-26	-23	-21	-18	-15	-12	-9	-6	-4	-1
	17	-48	-46	-43	-40	-37	-35	-32	-29	-26	-24	-21	-18	-15	-13	-10	-7	-4	-2	1
	15	-45	-42	-39	-37	-34	-31	-29	-26	-23	-21	-18	-15	-13	-10	-7	-5	-2	1	4
	13	-41	-38	-36	-33	-30	-28	-25	-23	-20	-17	-15	-12	-9	-7	-4	-2	1	4	6
	11	-36	-33	-31	-28	-26	-23	-21	-18	-16	-13	-11	-8	-6	-3	-1	2	4	7	9
	9	-30	-28	-26	-23	-21	-18	-16	-14	-11	-9	-6	-4	-2	1	3	6	8	10	13
	7	-24	-21	-19	-17	-15	-12	-10	-8	-5	-3	-1	1	4	6	8	10	13	15	17
	5	-15	-13	-11	-9	-7	-5	-3	0	2	4	6	8	10	12	14	16	18	21	23
	3	-4	-2	0	2	4	6	7	9	11	13	15	17	19	21	22	24	26	28	30

Source: Kansas State University

Willful Acts of Abuse

Willful acts of abuse of animals are not tolerated. Willful abuse is defined as acts that intentionally cause pain, injury, or suffering, which include but are not limited to the following.

- Deliberate application of electric prods to an animal that has no place to go.
- Deliberate application of electric prods to animals multiple times in an egregious manner.
- Deliberate application of electric prods to sensitive parts of the animal such as the eyes, ears, nose, anus, vulva, udder, or testicles.
- Deliberate slamming of gates on cattle unless for human safety.
- Malicious hitting/beating of an animal which includes forcefully striking an animal with a closed fist, foot, and/or handling equipment (e.g., sorting paddle or other hard/solid objects that can cause pain, bruising, or injury).
- Euthanasia by means other than approved methods covered under BQA guidelines.
- Branding wet cattle.

Egregious Acts of Neglect

Egregious acts of neglect such as the following are not tolerated.

- Failing to follow veterinary protocols related to timely euthanasia of critically ill/distressed or injured animals.
- Failing to euthanize a chronically diseased or injured animal with a BCS < 2 and according to protocols developed in consultation with a veterinarian.
- Failing to provide daily feed to cattle within a 24-hour period.
- Failing to provide water to cattle in home feeding pens.
- Failing to provide water to non-ambulatory animals.
- Failing to assist a known calving heifer or newborn calf in distress.
- Failing to immediately assist and provide medical care to a non-ambulatory animal.
- Failing to provide immediate medical assistance to a compromised animal unloaded from a livestock truck, as per BQAT guidelines.
- Loading a compromised animal without special transport provisions, as per BQAT guidelines.

Record Keeping Reminders

- Record training and education activities.
- Maintain records of pen surface management. These records may identify chronic problem areas and assist in making long-term infrastructure decisions.

CHAPTER 4

BIOSECURITY



Biosecurity includes keeping diseases off the farm through prevention and husbandry practices.

“Biosecurity is a verb, which means it’s always adapting to the situation.”

Nick Lyons, DVM



Objectives

- Evaluate the biosecurity risks on the operation and follow a plan to help mitigate risk.
- Recognize and mitigate the biosecurity risks associated with the introduction of new cattle and animal movement.
- Apply proper cleaning and disinfection practices to equipment, vehicles, and clothing to decrease the chance of microbial contamination.
- Understand how diseases are spread and how to prevent animal disease and zoonotic disease transmission.
- Develop herd specific biosecurity plans with a veterinarian.

Biosecurity involves taking steps to prevent the transmission of pathogens, or germs, to animals, humans, and the environment to minimize disease spread. These practices protect animals and people from developing disease, improves animal welfare, reduces production loss, and provides a safe product to support a safe food supply. Biosecurity also involves biocontainment, or keeping diseases that are already on the farm from spreading (such as calf scours).

Cattle producers have the most control over biosecurity on their operations. Work with a veterinarian to understand the specific operation’s risks and build a biosecurity plan that evaluates current practices and continuous improvement as biosecurity risks evolve. From family members and workers to delivery drivers and livestock haulers, everyone on the operation is responsible for biosecurity.

Biosecurity Basics

The goal of biosecurity is to implement preventive practices to protect animals (and humans) from disease which prevent the introduction and/or spread of disease and prepares the animal to defend itself from diseases. Vaccination protocols, stockmanship training, and good nutrition plans contribute to biosecurity and herd health. While zero risk does not exist when it comes to diseases, risk can be minimized on each operation through intentional, everyday practices. Each cattle operation will need to assess the risks.

Biosecurity Principles

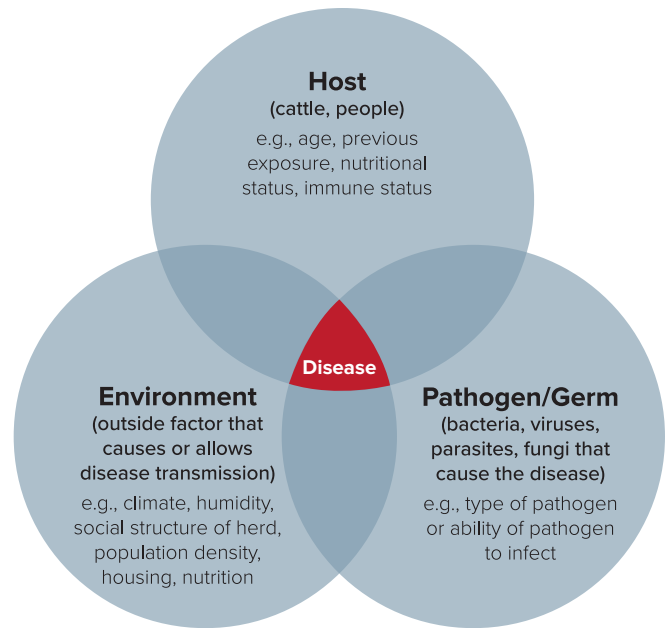
Diseases are infectious when they spread to others and cause an infection. Different factors can contribute to pathogen exposure and transmission. Understanding these interrelated factors and disrupting the connection between the host, pathogen, and environment is how the disease is stopped.

Annual biosecurity training for employees and visitors can reduce the risk of disease spread between animals and humans (zoonotic disease) and prioritizes public health. The following are key biosecurity principles to remember.

- **Exclusion:** Complete removal or elimination of disease risks with no introduction of animals, equipment, or other risk; most effective but most difficult to implement; modern swine and poultry production try to accomplish this.
- **Separation:** Preventing exposure to minimize disease spread.
 - Physical: walls, gates, fences, and distance between animals
 - Time between visits: quarantine, movement restriction
 - Procedural: changing clothing or footwear, clothing dedicated to the operation, employees dedicated to one area (such as the hospital area)
- **Cleaning:** Use scrub brush or pressure washer with detergent to remove organic material and contamination; if available, use hot or warm water; disinfectants cannot kill viruses/bacteria hidden beneath layers of dirt and can be inactivated by organic material.
- **Disinfection:** Proper product selection for the pathogen of concern is critical along with applying at the correct concentration and contact time; use disinfectant products according to label instructions. (See page 49 in *BQA National Manual*).

Identifying routes of transmission (or spread) of various pathogens can help protect against new or emerging infectious diseases. Exposure is needed to develop disease, so understanding the routes of transmission makes it easier to prevent spread or gain control over the spread.

Spread of disease agents or pathogens can go from animal to animal or animal to human. Transmission routes include aerosol, oral, direct contact, reproductive/venereal, fomite, and vector-borne. Zoonotic diseases can be spread by any of these routes.

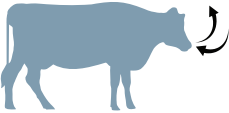
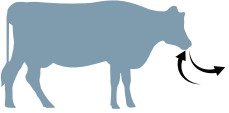
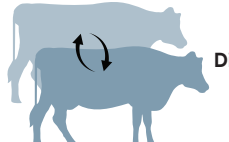
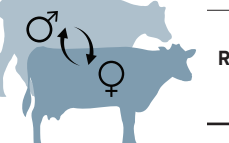
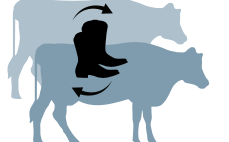
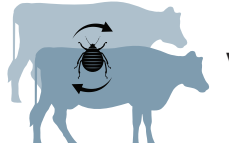
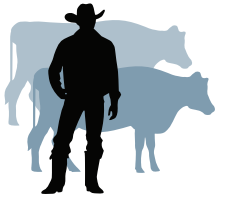


Epidemiologic Triad

The components of disease spread – host, environment, and pathogen/germ – and how they influence each other are important to understand for prevention and how to stop spread of a disease.

Zoonotic diseases are infections spread between animals and people.

Routes of Transmission, Disease Examples, and Prevention Practices

Route	Transmission	Examples (not all inclusive)	Prevention
 Aerosol	Respiratory droplets or via airborne transmission	Bovine viral diarrhea (BVD), bovine respiratory disease complex (BRDC) or pneumonia, influenza, or anthrax	Ventilation, dust, and humidity control to decrease pathogens in air Separation by distance Minimizing overcrowding and managing stocking density Respiratory protection for humans Vaccination
 Oral	Enters through mouth from feed, water, or equipment contaminated with feces, urine, or saliva	BVD, scours pathogens, Johne's disease, Leptospirosis, <i>Salmonella</i> , <i>E. coli</i> , parasites like worms, foot-and-mouth disease, anthrax	Keep feed, water, and surfaces (like troughs or bunks) that can be licked from being contaminated Pasteurizing milk and heat treating colostrum Reduce feed contamination from wildlife and rodents Using parasiticides specific to parasite's life cycle Vaccination Do not eat or put items (needle caps, pens) in your mouth while handling cattle
 Direct Contact	Exposed through directly touching open wounds, mucous membranes, or skin through blood, nose-to-nose contact, saliva, or bite Calves can also get infected through pregnancy or birth	BVD, Johne's disease, Leptospirosis, tetanus, brucellosis, Q fever, rabies	Separation by gates, space, time, or procedure Separating sick and newly introduced animals from healthy animals (quarantine or isolate) Vaccination
 Reproductive/Venereal	Subtype of direct contact – spread through mating or to the fetus during pregnancy	Trichomoniasis, Campylobacter/ <i>Vibrio</i> , BVD	Testing for diseases prior to purchasing or breeding (such as breeding soundness exams) Vaccination
 Fomite	Contaminated inanimate objects such as feed, needles, vehicles, trailers, wheels, and boots could transmit disease from one susceptible animal to another, or to a human A secondary exposure route (direct contact or oral) is required	BVD, ringworm, Anaplasmosis or bovine leukosis virus from needles	Proper cleaning, sanitizing, and disinfecting all equipment Single-use needles Have separate equipment for treating sick animals Use separate equipment for handling manure, dead animals, or feed (if not available, clean and disinfect equipment between uses) Clean livestock trailers between hauling different classes of cattle (ages, dairy vs. beef) or after hauling animals from another herd
 Vector-borne	Spread through arthropod vector (ticks or insects) Mechanical: pathogen carried on body (insects) or item (feet or feathers) from one host to another Biological: vector infected by pathogen and carries pathogen from one host to another	Mechanical: Pinkeye, mastitis Biological: Anaplasmosis, Theileria	Eliminating potential vector breeding grounds like standing water sources or cleaning manure and organic material Using topical, injectable, or oral insecticides or parasiticides specific to vector's life cycle Prevent feed contamination by insects or rodents
 Zoonotic	Transmitted between animals and people	Leptospirosis, <i>Salmonella</i> , <i>E. coli</i> , Tuberculosis, Listeria, Cryptosporosis, rabies, influenza	Wash hands after animal contact or touching items contaminated with bodily fluids (blood, saliva, urine, milk, calving fluids, feces) Wash hands before putting anything in your mouth, including needle caps or food Pasteurize dairy products Be careful around stillborn or aborted fetuses Use personal protective equipment (PPE) such as gloves, palpation sleeves, goggles or face shields, masks, closed-toed shoes, or clothing to cover skin (long sleeves or pants) Protect immunocompromised groups (young children, elderly, pregnant, other severe diseases from exposure to contaminated animals, clothing, or fluids)

Zoonotic Disease Prevention

Protecting people working with or around cattle from zoonotic diseases requires proper training. Operations should work with the herd veterinarian, extension team, or others to develop comprehensive training for the risks on the operation.

- Personal protective equipment (PPE) can vary depending on the risk. For instance, when working with calving, stillborn, or aborted animals, protect mucous membranes (eyes, mouth, breaks in skin) from reproductive fluids with latex gloves, palpation sleeves, masks, and goggles.
 - This also applies to other bodily fluids like blood, urine, saliva, and feces.
- Practice good hand hygiene and wash hands after contact with animals or their body fluids. Do not put items in your mouth when working livestock, including food, chewing material, needle caps, or others.
- If inviting guests to the operation, provide visitors with booties, coveralls, gloves, or other PPE to protect them from zoonotic diseases. Provide a handwashing station.

Protecting the Herd

Education and training of anyone working with cattle, from employees to family members to visitors, is important. Having biosecurity practices that are practical and executable improves the likelihood of implementing and maintaining biosecurity. Each operation is different and will have different risks.

- Show or exhibition animals have a different disease risk than the cow-calf herd due to travel and exposure at shows. Isolate or quarantine animals when returning from events and make sure animals are up to date on vaccinations.
- If there are multiple species like horses, goats, sheep, or others, that also needs to be considered when evaluating risks.

Evaluate ways to prevent fecal contamination of cattle feed, water, or oral cavity (ingestion). This includes preventing cross-contamination of feed, water, and equipment between groups with different health status. Below are general considerations for cattle operations.

- Handle or manage healthier animals before sick animals, and work from young to old to protect underdeveloped immune systems.
- Equipment, such as tubing or drenching equipment, should be cleaned and disinfected after using in sick animals.
- As practically as possible, prevent contact with neighboring cattle to reduce disease transmission risk.
- Use different equipment to feed and clean pens or clean and disinfect equipment between uses.
- Avoid stepping in the feed bunk.
- Observe septic leach fields and fix any broken pipes.
- Educate workers about the importance of personal hygiene near feedstuffs or feed bunks, water tanks, and pens.
- Regularly deworm dogs and cats that are in close contact with humans, as they can carry parasites that are zoonotic.
- Prioritize protecting the cattle water supply from contamination (e.g., manure, chemicals, etc.). Report and address any suspected contamination of a water supply.

Quarantine or Isolation Area

Quarantining new or replacement animals away from the home herd can prevent disease from entering the operation. Keep replacement cattle separate from other cattle for at least 21-30 days in a pen or area that has separate feed and watering equipment and no shared fence line.

For feedlots and stocker/backgrounder operations, daily monitoring is recommended to ensure good husbandry (eating and drinking) and to recognize illness early. Keep stocker/backgrounder animals separate from the home herd without a shared fence line. Another approach is to place incoming animals in pens next to older animals that have acclimated and are less susceptible to diseases.

The isolation area can also be used for sick animals to be isolated from the rest of the herd and prevent spread of disease. Clean and disinfect equipment like buckets, medication equipment, and areas after use with sick animals.

Animal Disease Testing and Certificates of Veterinary Inspection (CVI)

Testing for diseases is recommended prior to animals entering the operation and may be required for shipping. Health certificates or CVIs are required for some inter- and intra-state movements. Schedule time with the veterinarian with plenty of notice before movement so requirements and rules can be determined for each state. Visit www.interstatelivestock.com for more information or contact the state veterinarian's office for the states of origin and destination.

Maintaining animal movement logs is a key part of record keeping. Individual animal identification contributes to animal health and animal disease traceability. USDA has approved official identification methods listed for varying classes of cattle on their website, www.aphis.usda.gov/livestock-poultry-disease/traceability.

Knowing the vaccine history from purchased cattle can be helpful in assessing risk. Ask the seller or herd veterinarian about the biosecurity, vaccination, and testing programs for herd(s) or replacement cattle. Examples include the following: Bovine Viral Diarrhea (BVD), Johne's disease, Bovine Leukosis Virus (BLV), brucellosis, tuberculosis, trichomoniasis, and others recommended by the herd or state veterinarian.

Calf Management

Calves' immune systems are not fully developed until a few months old. Consult with the herd veterinarian annually about calf care and sooner if health issues arise.

Controlling environmental hygiene is one of the most impactful prevention strategies, from ensuring the calving area is clean and dry to providing a clean and dry area or bedding during wet or cold weather. Have a strategic vaccination and parasite control plan in place for all cattle, especially prior to calving. Clean and disinfect equipment after each use (calving chains, buckets, esophageal feeders).

Collected colostrum should be heat treated to prevent disease transmission. Providing at least 200 g of IgG (antibodies) to calves within six hours of birth helps with passive transfer of immunity, nutrition, and temperature regulation.

Permanent identification for calves is helpful in identifying illness, recording treatments and withdrawal times, and monitoring growth parameters.



Have two sets of esophageal feeder equipment and dedicate one set to sick calves and one set to healthy calves. Clean and disinfect after each use regardless of group.

Pest Control Program

Rodents, wildlife, and birds may transmit diseases to cattle and humans or damage equipment. Restrict stray or wild animals from accessing animal feed and water. Prevent nesting sites from being built. Consider employing a certified pesticide applicator or service. Read and follow all label directions for all control products, including withdrawal times. Work with wildlife services for control measures.

Mortality Management

Necropsy animals to verify the cause of death and wear proper PPE. Work with the herd veterinarian for technique and sample collection protocols. Equipment used to move mortalities should be used separately or cleaned and disinfected between uses. Do not allow rendering trucks to access feed or animal areas. Carcasses must be handled and disposed of according to local, state, and federal regulations.

Livestock Haulers and Transporters

Livestock haulers and transporters play a critical role in delivering a safe product and acting as a stop gap in the spread of everyday diseases and foreign animal diseases like foot-and-mouth disease (FMD). There is inherent contamination risk because trucks and trailers are contaminated with feces and bedding. Biosecurity practices need to be practical and executable. Plan out the day or week on what loads are safe(r) to haul in the same day.

Use PPE like coveralls or goggles and gloves and boots. When home, keep work clothes separate from family members' clothes, especially if immunocompromised family members like small children or parents live in the household.

Clean out the cab regularly and maintain as a 'clean' space (minimal manure enters). Disinfectant wipes can be used on surfaces. Practice good hand hygiene and wash hands regularly. Deworm pets that travel in the cab or pickup.



A sample biosecurity protocol for international and domestic visitors can be found [here](#).

Reducing stress to cattle as much as can be controlled will lessen pathogen shedding. Transport younger animals with developing immune systems in clean trailers and before older cattle. Cleaning maintains trailers since manure and urine can degrade flooring inside trailers. Weather, climate, and access to cleaning facilities may determine how often trailers get cleaned. Visit www.livestocknetwork.com/Livestock_Washouts/ to find washouts.

People Movement Logs

Keep a visitor log in the office. Limit people's access to cattle pens, feed mixing/storage areas, feed bunks, and cattle treatment areas. For agritourism activities, ask visitors to come with clean clothes and footwear. Provide PPE or cleaning facilities. Visitors should park in the designated parking area. Biosecurity protocols should be enforced with all visitors, staff, employees, and family members.

Anyone visiting livestock, wildlife, or other animals outside of the U.S. should follow USDA recommended quarantine from susceptible species upon return to the U.S. For example, for FMD, quarantine yourself from susceptible species for at least five days.

Building a Daily Biosecurity Plan

The BQA Daily Biosecurity Plan for Disease Prevention template offers an introductory, stepwise biosecurity plan for identifying biosecurity risks on cattle operations. Producers should customize plans to their own operation with the herd veterinarian.

This plan is a precursor to the Secure Beef Supply (SBS) Plan, an enhanced biosecurity plan which will be necessary during a potential foreign animal disease outbreak such as with FMD. Content sections are consistent between plans, allowing producers and veterinarians to build up to more stringent biosecurity steps that are necessary for the SBS plan.

Enhanced Biosecurity Practices for Preventing Foot-and-Mouth Disease (FMD) During an Outbreak

FMD is the most contagious viral disease that affects cloven-hooved animals (i.e., cattle, pigs, sheep, goats, wildlife) and will have major adverse consequences on the U.S. livestock industry if it arrives. It can be shed in saliva, via aerosols, or other body fluids of infected animals. FMD does NOT affect public health or food safety though the effects on the economy, trade, and way of life would be tremendous.

Onset and severity of clinical signs vary between animals. Cattle with FMD may exhibit one or more of the following signs:

- Vesicular lesions (blisters, ulcers, and sores) in the mouth, on the hooves, or on the teats
- Drooling
- Loss of appetite
- Lameness or reluctance to move
- Nasal discharge
- High fever

Early recognition of FMD signs and prompt reporting to the herd veterinarian or State Animal Health Official are critical to containing this highly contagious disease. Each state will rely on their State Animal Health Officials for guidance on animal movement, testing, and outbreak response.

For livestock producers, having biosecurity and contingency plans in place before such an event will help maintain business continuity. Producers and their team have a responsibility to protect their animals and facilities from becoming infected.



The Secure Beef Supply Plan for continuity of business includes information on enhanced biosecurity measures, what to expect in a national movement standstill, Premises Identification Number (PIN), how to build a premises map and line of separation, and more. The Secure Beef Supply (SBS) Plan provides guidance for producers and transporters who have cattle with no evidence of FMD infection to prepare to meet movement permit requirements. There is information specific to public land grazing, including livestock management options and movement decision criteria guidance. Visit www.securebeef.org for more information.

Content Sections Included in BQA Daily Biosecurity Plan for Disease Prevention and Secure Beef Supply Enhanced Biosecurity Plan

1. Biosecurity Manager and Written Biosecurity Plan
2. Training
3. Protecting the Cattle
4. Vehicles and Equipment
5. Personnel
6. Animal Movement
7. Animal Products
8. Carcass Disposal
9. Manure Management
10. Rodent, Wildlife, and Other Animal Control
11. Feed and Water
12. Labeled Premises Map



Biosecurity is one thing that the producer has the most control over. Biosecurity can be adapted based on risk assessments for an operation. Cattle producers in all sectors should strive for continuous improvement in biosecurity planning including record keeping and annual reassessment of their practices.



Secure Beef Supply and biosecurity resources for public land grazing.

When biosecurity plans are completed, they should address the following.

- Implement practices that reduce the introduction and spread of disease agents, including viruses, bacteria, and parasites.
- Create an environment where animal care is optimized by reducing the threat of infectious diseases.
- Promote infectious disease control practices among employees and visitors.
- Reduce the risk of zoonotic disease exposure and prioritize public health among employees and visitors.
- Protect the facility from liability and financial loss.
- Maintain client confidence in disease prevention.
- Promote continuous improvement by referring to the goals and principles of biosecurity to further develop and implement practices in the biosecurity plan.
- Print the daily and enhanced biosecurity plans, post them on the operation, and share with employees.

Record Keeping Reminders

- Self-assessments to update biosecurity plans are useful tools for training and continuing education for the team.
- Health certificates or certificate of veterinary inspection (CVI) are required for all interstate and some intra-state movements, such as to livestock shows.
- If the operation has visitors or deliveries, keep a log in the office or common area to record when visitors come to the operation.
- Permanent identification for calves is helpful in identifying illness, recording treatments and withdrawal times, and monitoring growth parameters.
- Maintaining animal movement logs is a key part of record keeping.
- The BQA Daily Biosecurity Plan for Disease Prevention template offers an introductory, stepwise biosecurity plan for identifying biosecurity risks on cattle operations.
- Record movement of animals, vehicles, equipment, and people in the event of a foreign animal disease outbreak.
- The Secure Beef Supply (SBS) Plan provides guidance for producers and transporters who have cattle with no evidence of FMD infection prepare to meet movement permit requirements.

CHAPTER 5

HERD HEALTH MANAGEMENT

THE FOUNDATION
OF BQA FOCUSES
ON SCIENCE-BASED
PRODUCTION PRACTICES
THAT ASSURE CATTLE
WELL-BEING, BEEF
QUALITY, AND SAFETY.



Objectives

- Understand the importance of a veterinarian-client-patient relationship (VCPR) to develop a herd health plan that conforms to good veterinary and husbandry practices.
- Implement preventive and proactive herd health management and the judicious use of antimicrobials.
- Understand how to read and follow labels of animal health products to ensure proper use, handling, storage, and administration, while following withdrawal times to prevent tissue residues.
- Recognize the importance of administering products in the injection triangle of the neck, in front of the shoulder slope.
- Understand proper landmarks and appropriate methods for euthanasia.

Total Quality Management requires handlers to understand animal welfare to optimize herd health, welfare, and production through continuous improvement. Prevention is the foundation for any herd health program.

Veterinarian-Client-Patient Relationship (VCPR)

An established VCPR allows the veterinarian to diagnose animals, prescribe medications and drug therapy to treat, control, or prevent disease, and issue Certificates of Veterinary Inspection (CVIs) or health certificates. VCPRs should be renewed annually, based on state or federal guidelines. Schedule a yearly consultation with the veterinarian to set goals for the next year and consider areas for improvement.

A valid VCPR is required for producers to use all prescription medications, extra-label use of non-prescription medications, and all Food & Drug Administration (FDA) feed medications that require a Veterinary Feed Directive (VFD).



A sample VCPR
can be found here.

Herd Health Protocol Development

- Any medication that requires a use other than as directed on the label must have revised administration procedures included in the management and treatment protocols.
- Having all product withdrawal times listed in a treatment protocol book is a best management practice.
 - All vaccines have a withdrawal time (21 days for non-oil adjuvant or water-based and 60 days for oil adjuvant).
 - ▶ An adjuvant is an ingredient that enhances the immune response to a vaccine.
- Develop a follow-up plan and/or alternative treatments if the initial treatment does not produce the desired result.

Veterinarians are an important team member in any cattle operation.

Prescription or Veterinary Drug Orders (VDO)

A prescription/VDO is a veterinarian-approved list of medications used on the operation that is issued to authorized veterinary supply companies or pharmacists to dispense supplies to an operation. Discuss with the herd veterinarian other products or supplements that fit the herd's care plan and follow state laws for review and renewal.

Animal Medicinal Drug Use Clarification Act (AMDUCA) and Extra-Label Drug Use (ELDU)

Veterinarians can prescribe ELDU (or off-label use) of certain approved new animal drugs and approved human drugs for animals under certain conditions (when health of animal is threatened or failure to treat may result in suffering or death). Under the AMDUCA regulations, ELDU is only legal if prescribed by a veterinarian(s) who makes a careful diagnosis in the presence of a valid VCPR. Producers cannot make this decision on their own. The Food Animal Residue Avoidance Databank (FARAD) and the Compendium of Veterinary Products (CVP) are useful online resources.

ELDU, or off-label use, is using a drug:

- at a dose not listed on the label.
- by a different route not listed on the label.
- for a condition or indication not listed on the label.
- in a different frequency and duration not listed on the label.
- in a species not listed on the label.

Aminoglycoside Use in Cattle

Aminoglycoside antibiotics (e.g., neomycin, gentamicin, kanamycin) should not be used in cattle, except as specifically approved by FDA.

The BQA program does not support the ELDU of aminoglycosides because of the extremely long withdrawal (over two years) and the potential for a violative residue.

Drugs Prohibited for ELDU in Food-Producing Animals

- | | |
|--|---|
| ■ Fluoroquinolone antibiotics | ■ Cephalosporin* drugs (excluding cephapirin) are generally prohibited for ELDU by the FDA in major food animal species, except for certain situations. |
| ■ Metronidazole | |
| ■ Nitrofurans (Furazolidone, Nitrofurazone) | |
| ■ Phenylbutazone (female dairy cattle >20 months old) | * <i>Cephalosporin ELDU is permitted for minor food-producing species.</i> |
| ■ Sulfonamides (lactating dairy cattle or dairy cattle >20 months old) | |

Compounding

Compounding is the combining, mixing, or altering ingredients of a drug product beyond what is described on the product label. Compounding of medications to treat cattle and other food-producing animals by a veterinarian is strictly regulated.² Using compounded medications is considered ELDU.

Judicious Use of Animal Health Products

Responsible antimicrobial stewardship is important to ensure that animal health technologies remain viable options for better disease management.

Antimicrobial Resistance

Antimicrobial resistance happens when bacteria, viruses, fungi, or parasites change over time and resist the effects of antimicrobials, which are designed to kill the microorganisms. Drugs can become less effective at treating infections. Antimicrobial resistance poses a threat to disease control and is a primary concern for human and animal health.

The U.S. Food and Drug Administration's Center for Veterinary Medicine requires increased veterinary oversight for use of medically important antibiotics that are important in human medicine and have a valid use in animals.^{3,4,5} This guidance supports judicious use of antibiotics by removing the use of antibiotics for growth purposes (which has been illegal in the U.S. since 2017), transitioning over-the-counter antibiotics to veterinary prescription, and promoting the VCPR.

Marketing cattle with a violative residue, even unintentionally, is illegal and can result in significant consequences — both legally and financially. Parasite resistance to antiparasitics, including injectables, dewormers, fly tags, and other parasite controls, is becoming more common.

Best Practices for Parasite Management

- Have accurate weights so animals are not underdosed.
- Proper application of all antiparasitic products is crucial to their function.
 - Topical pour-on products must be applied from the withers to the tailhead.
 - Oral drenches must be administered over the lump of the tongue to ensure product is swallowed.
 - Administer injectables following all BQA principles.
 - In-feed/mineral use must be fed and used per label directions.
- Only use antiparasitic products for parasites listed on the label (do not use dewormer for fly control).

Develop a refugia (leaving worms still susceptible to dewormers) program with the herd veterinarian and use diagnostic testing, such as Fecal Egg Count Reduction Tests (FECRT), as part of a parasite control program. Targeted selective treatment and non-treatment strategies can be discussed. In some cases, not all animals will need dewormed. Fecal testing may help decide if the herd needs dewormed or not.

Withdrawal Time: The time that must pass between the last dose of an animal health product (vaccine, antibiotic, dewormer, or other) given and when it is safe and legal to harvest the animal or its products.

- The animal will metabolize the product in this time frame and then it is safe to enter the public food supply.
- Keep detailed records of all treatments. Work with the herd veterinarian to confirm and record withdrawal times.
- All FDA approved products in food-producing animals have labeled meat and milk withdrawal times that caretakers are legally required to follow. The withdrawal time only applies if the drug is used according to label directions.

Did You Know?

Antimicrobials are medicines used to prevent, control, and treat infections caused by microorganisms. Different types include:

Antibiotics

Therapy against bacteria.



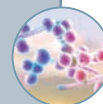
Antivirals

Therapy against viruses.



Antifungals

Therapy against fungi.



Antiparasitics

Therapy against parasites such as dewormers or parasite control.



Categories of Animal Health Products

- **Over-the-Counter (OTC)** products do not require a veterinary prescription for purchase or use but cannot be used extra-label unless directed by a veterinarian.
- **Prescription (Rx)** drugs require a VCPR and are restricted by federal law to use by or on the order of a licensed veterinarian. This includes medically-important antibiotics.
- A **Veterinary Feed Directive (VFD)** requires a valid VCPR and is required for any medically important antibiotic that is administered via feed in any food animal species.

A Beef Producer's Guide for Judicious Use of Antibiotics in Cattle

Antibiotic stewardship guidelines are intended to support responsible antibiotic use in the cattle industry, using preventive health programs as outlined in the BQA program and with the oversight of the herd veterinarian. See page 58 in *BQA National Manual* for full description.

1. **Prevent Problems:** Emphasize appropriate husbandry, hygiene, biosecurity, routine health examinations, nutrition, and vaccinations to prevent animal health concerns and reduce the need to use antimicrobials through worker training and veterinarian input.
2. **Adhere to FDA Guidance:** Follow label instructions and FDA guidance for the use of all antibiotics and animal health products.
3. **Select and Use Antibiotics Carefully:** Using a valid veterinarian-client-patient relationship (VCPR), consult with the veterinarian on the selection and use of antibiotics including post-treatment intervals and drug rotation.
4. **Combination Antibiotic Therapy is Discouraged Unless There is Clear Evidence the Specific Practice is Beneficial.**
5. **Avoid Inappropriate Antibiotic Use:** Limit therapeutic antibiotic use to proven clinical indications.
6. **Treatment Programs Should Reflect Best Use Principles:** Follow the veterinarian's instructions including treating for the recommended dosage, route of administration, time frame, and following withdrawal times.
7. **Treat the Fewest Number of Animals Possible:** Limit antibiotic use to sick or at-risk animals.
8. **Properly Dispose of Animal Health Products:** Follow all applicable local, state, federal, and tribal regulations and guidelines for disposal of pharmaceutical waste. Expired medications should not be used.
9. **Keep Records of Antibiotic Use:** Always follow proper meat and milk withdrawal times. Keep records for a minimum of two years or longer based on state and local regulations.
10. **Follow Label Directions:** Follow label instructions and never use antibiotics other than as labeled without a valid veterinary prescription.
11. **Extra-Label Antibiotic Use Must follow FDA Regulations:** Prescriptions for extra-label use of medications can only be prescribed by a veterinarian and must meet regulations. The producer must have a valid VCPR and expect an extended withdrawal time.
12. **Medically Important Antibiotic Use Should be Limited to Treat, Prevent, or Control Disease:** Antibiotics that are medically important to human medicine cannot be used to improve performance.

Residue Avoidance

The National Residue Program is a collaborative interagency program among USDA Food Safety Inspection Service (FSIS), FDA, Environmental Protection Agency (EPA), and other agencies that was established to protect public health by ensuring products such as meat, milk, and eggs are safe for human consumption. USDA FSIS conducts tests for chemicals such as antibiotics and other drugs, pesticides, and environmental chemicals in inspected packing plants through regular surveillance.

Animals that arrive at the processor emaciated, severely debilitated, or with signs of illness or recent surgery will likely be labeled as 'Suspect' on antemortem (pre-slaughter) inspection by a USDA inspector and would be subject to tissue sampling and testing by the USDA FSIS.⁶ Residue violations occur when levels of drug residue are present in meat or milk that exceed tolerance levels set by FDA or action levels set by EPA. FDA may conduct an inspection into violations and producers could be fined for violations.

If a drug is used in an animal production class not on the label, there is **NO TOLERANCE** for that drug – any detectable amount, even below the target testing/tolerance level for the labeled class, and is a violation.

- Treatments can be done by identifying each animal in the herd and/or identifying each animal when or if they are treated.
- Records for animals treated by group or lot assume that every animal in the lot or group received the treatment.
- If multiple products are administered to the group, the withdrawal time will be based on the product with the longest withdrawal period and on the last date of product administration to any individual animal.

Animal Health Product Handling and Storage

Animal health products, including vaccines, anti-inflammatories, antibiotics, medications, dewormers, vitamin and mineral supplements, and others, are vital to protect the health of cattle. Animal health products are approved by FDA, USDA, or EPA depending on the product after evaluation for safety and efficacy. For food-producing animals, there is an additional food safety requirement to prove the use of the product does not present a risk to human health. Withdrawal times for all veterinary drugs are set by the agency approving the product.

The highest quality vaccine or animal health product available is useless if it's not handled and administered properly.

Receiving Product, Proper Storage, and Handling

- Proper record keeping, storage, and handling of animal health products are important to ensure efficacy of the products.
- Determine who will be responsible for receiving biological and pharmaceutical products.
- Record product information including the receiving date, name, quantity, unit sizes, lot/serial numbers, and expiration dates in receiving and inventory records.
- Store and handle products as outlined by the manufacturer label or as recommended by the herd veterinarian.
- Maintain the cold chain during delivery, transportation, and storage of vaccines and other refrigerated products, which should be stored in a dependable refrigeration unit that maintains a temperature as directed by the product label (typically 35-45°F).
- Never mix two antibiotics, two vaccines, or other products in one syringe.
- Extreme temperatures and sunlight exposure will alter the product, limit its effectiveness, inactivate it, or cause it to be toxic.
- Freezing vaccines causes loss of efficacy and potentially illness or death.
 - ▶ For example, modified live vaccines (MLV) can be inactivated with high temperatures or sunlight exposure while clostridial vaccines, if frozen, can release excess toxins and should not be used.
- Store vaccines, dewormers, antibiotics, etc. on separate, labeled shelves.
- Expired products should not be used because they have lost efficacy, could cause adverse reactions, and are considered adulterated by the FDA.
- Consult a veterinarian to understand reactions to products and potential treatments.

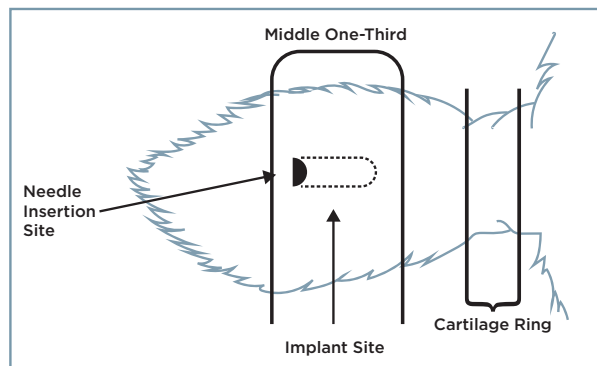
Growth Promotants (Implants)

The safety of implants is assured when FDA approved products are used according to their labels. Each type and brand of implant has a specific implant gun necessary to administer the implant.

The pellet (implant) should be placed under the skin in the middle third of the backside of the ear. The ear should be clean to minimize the risk of abscessing. The needle should be sharp and sanitary technique (wiping the needle on sponge with disinfectant) should be used between each use. If the needle “skips” and/or you have to “try again” – wipe the needle first. The needle should remain in contact with the sponge.

It is recommended to use a sponge soaked in 2% chlorhexidine disinfectant at a rate of 200 ml/gallon of water for disinfecting the implant needle. Change the solution every 50-100 animals implanted depending on the cleanliness of the ears. Proper sanitation is important for improved performance.

Implants have no slaughter withdrawal since the ear is removed during the slaughter process. Read label directions for class of cattle and reimplanting protocols. Follow manufacturers recommendation for storage, but in general implants should be stored in a clean, dry place and specific implants (i.e., TBA) need to be stored in a refrigerator after opening. As with other needle care, replace if burred or bent.



Correct Location for Implants⁷
Courtesy of Oklahoma State University Extension

Tips for Reading Product Labels

- Always read label and dosing instructions on all animal health products prior to herd health procedures. If the label does not specify the dose volume, administer a maximum of 10 cc per injection site.
- Work with a veterinarian to translate labels into other languages, if needed.

Example of Animal Health Product Label

Oxytetracycline Injection 200 (oxytetracycline) is a sterile, ready-to-use solution for the administration of the broad-spectrum antibiotic oxytetracycline by injection.

Caution: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian. When administered to cattle, muscle discoloration may necessitate trimming of the injection site(s) and surrounding tissues during the dressing procedure.

8 **Residue Warnings:** Cattle and swine intended for human consumption must not be slaughtered within 28 days from the last treatment. Milk taken from animals during treatment and for 96 hours after the last treatment must not be used for food.

7 **Precautions:** Exceeding the highest recommended dosage level of drug per lb of body weight per day, administering more than the recommended number of treatments, and/or exceeding 10 mL intramuscularly or subcutaneously per injection site in adult beef and dairy cattle, and 5 mL intramuscularly per injection site in adult swine, may result in antibiotic residues beyond the withdrawal period.

3 **Dosage:**

6 **Cattle:** A single dosage of 9 mg of oxytetracycline per lb of body weight (4.5 mL/100 lb) administered intramuscularly or subcutaneously is recommended in the treatment of the following conditions: 1) bacterial pneumonia caused by *Pasteurella* spp. (shipping fever) in calves and yearlings; 2) infectious bovine keratoconjunctivitis (pink eye) caused by *Moraxella bovis*.

5 **Swine:** A single dosage of 9 mg of oxytetracycline per lb of body weight (4.5 mL/100 lb) administered intramuscularly in the neck region is recommended in the treatment of bacterial pneumonia caused by *Pasteurella multocida* in swine.

9 **Refer to Package Insert for Complete Directions**
Storage: Store at room temperature 59° to 86°F (15° to 30°C). Keep from freezing.
Restricted Drug – Use Only as Directed

1 **Hexomycin®**
(oxytetracycline injection)

Antibiotic

Each mL contains 200 mg of oxytetracycline base as oxytetracycline dihydrate.

For the treatment of disease in beef cattle; dairy cattle; calves, including preruminating (veal) calves; and swine.

For animal use only.

Net Contents: 250 mL

Not for Human Use
This label is for learning purposes only and is not approved by FDA.

1 Product name and active ingredient

2 Animal species/class approved (treat only classes of cattle approved on label)

3 Dosage

4 Labeled diagnosis or disease

5 Duration of therapy

6 Route of administration (if changed from label, withdrawal times will be extended)

7 Cautions and warnings such as side effects

8 Residue warning and withdrawal times for meat and milk

9 Storage temperature

A statement, "Approved by FDA under NADA # XXX-XXX" if the drug is an approved and marketed brand name animal drug; or the statement, "Approved by FDA under ANADA # XXX-XXX" if the drug is an approved and marketed generic animal drug



Use a thermometer in the refrigerator to monitor temperature ranges for animal health products.



Use a vaccine cooler to protect against sunlight and extreme temperatures during processing.

Injection Site Management, Vaccinations, and Cattle Processing

Anyone processing cattle should be trained on proper needle selection for the product given and size of animal receiving it, dosage, route of administration, and issues resulting from mishandling.

Injection Sites and Techniques

Responsible product use involves following label directions regarding route of administration, injection location on animal, and at labeled dose. Regardless of animal's age, injections should be given in front of the shoulder slope (unless directed otherwise by a veterinarian or per label instruction).

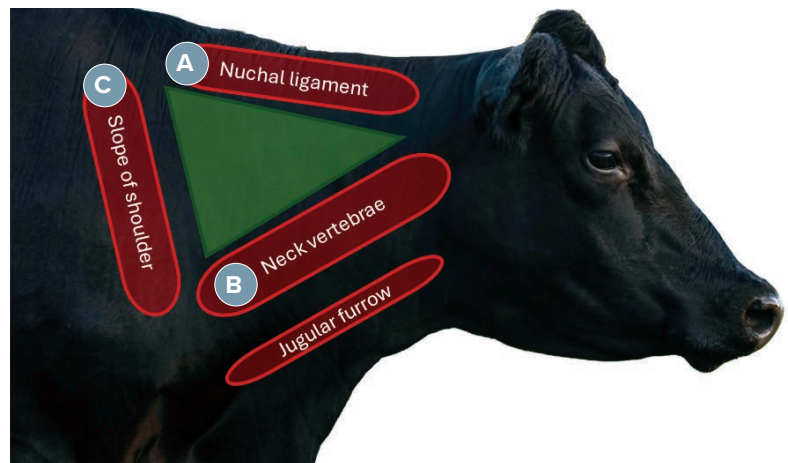
- Injections in the neck prevent costly damage to economically important beef cuts.
- To avoid adverse tissue reactions, inject products in the neck subcutaneous (SQ) whenever possible, or choose products that can be given intravenous (IV), intranasal (IN), or orally.

BQA Injection Site Triangle

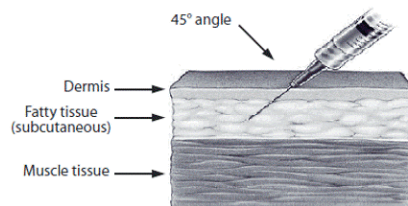
- (A) Upper border is below nuchal ligament (2" below topline)
- (B) Lower border is above neck vertebrae
- (C) In front of the slope of the shoulder

Routes of Administration

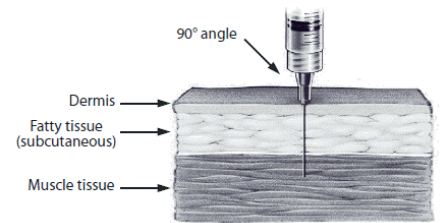
- (D) Subcutaneous (SQ) – Under the skin; given at 35-45° angle to neck
- (E) Intramuscular (IM) – In the muscle; given perpendicular to muscle; 90° to neck (Figure 4)
- Intravenous (IV) – In the vein
- Intramammary (IMM) – In the mammary gland and does not use a needle
- Base of ear (BOE) – Under the skin
- Intranasal (IN) – In the nose (without a needle)
- Topical – On skin, transdermal



D Subcutaneous (SQ) Injection with Needle Angle at 45°



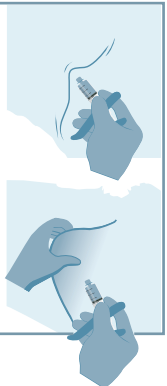
E Intramuscular (IM) Injection with Needle Angle at 90°



Illustrations courtesy of Colorado BQA Program.

Properly restraining animals assures good neck access and proper injection technique, minimizes risk of needles breaking or bending, and minimizes risk of human or animal injury. Depending on the chute and neck access, it is recommended to use the one-handed technique over the two-handed technique for SQ products to prevent hand injury.

- **One-handed Technique:** Involves using the injection needle tip to lift the skin after initial skin penetration. After popping through the skin at a 35-45° or flatter angle to the neck, push the plunger to administer the product. The flat angle helps avoid hitting the muscle layer.
- **Two-handed Technique:** If it can be safely done, use one hand to pull the cattle's skin away from the neck to make a skin tent, and use the other hand to insert the needle under the skin and inject into the pocket created. Be careful not to accidentally inject the tenting hand, which is why animal restraint is important.



The injection site should be clean and free from manure or mud to reduce the risk of abscesses developing. Other injection guidelines include the following.

- Space injections at least 4 inches apart (about a hand's width). This reduces the risk of the products mixing together which could cause a reaction or inactivate the products. If giving multiple injections, the highest volume should be given in the bottom of the injection triangle, so product drainage does not interfere with other injections. Use both sides of the neck if accessible.
- If intramuscular medications must be used, administer them in the neck and never exceed 10 cc per IM injection site. For example, if 24 cc is the calculated dose, use three 8 cc IM injections instead of two 12 cc IM injections.
- Limit the volume of SQ injections as indicated by the product label or as instructed by the herd veterinarian. If the label does not specify the maximum volume per injection site, limit to 10 cc.
- Some animal health products are approved for injection at the base of the ear (BOE) or on the backside of the ear. If route of administration is changed for BOE products, it is considered ELDU and will extend the withdrawal period to more than eight weeks.
- Administer antibiotics and vaccines on opposite sides of the neck so vaccines are not inactivated.
- BQA guidelines advise against giving SQ injections along the ribs, behind the elbow, or in the armpit (axilla) region. There are nerves and vessels in the area that can be damaged and cause irreparable injury, such as paralysis. In addition, if an injection site abscess were to occur in this area, there is not a good way to treat the abscess.
- Giving injections above the curve of the ribs could cause excessive trim in the area of the rib-roll or prime rib cut of meat. This is not an approved injection site.

Syringe and Needle Guidelines

Syringes

There are many types of syringes for use in cattle. Using clean syringes is important for product efficacy and minimizing local irritation or abscess formation. Choose a syringe size that closely matches the dose to draw a single dose for each individual animal.

Individual plastic syringes are sterile, disposable, and an accurate single-dose delivery system. These are designed to be single-use and should be discarded after use to prevent contamination. If the plunger becomes stiff and does not move smoothly, the syringe should be replaced.

Continuous-feed syringes reduce the chance of contaminating the vaccine by accidentally drawing product from the wrong bottle. Keep the hose and barrel sheltered from UV light, heat, or freezing temperatures, which can harm the vaccine or product.

If using a multi-dose, repeater, or pistol-grip syringe, lubricate the O-ring with non-petroleum-based products, as recommended by the manufacturer. Petroleum-based lubricants may inactivate MLV, chemically-altered (CA), or killed products. If the plunger and stopper are difficult to move without a lubricant, replace the syringe or, at least, the stopper. Other points to consider:

- Always inspect syringes prior to processing. Check the barrels for chips or cracks that could lead to leakage and underdosing.
- Dosage gauges on some multi-dose syringes can accidentally change volume settings, leading to under- or overdosing. Adjust the tension on the plunger to prevent leakage.
- Check calibration and dosage setting prior to (and continuously throughout) the process.
 - ☐ Some multi-dose syringes are not accurate enough for low-dose products.
- Keep a supply of extra disposable syringes as a backup delivery system.

Label syringes with one product type (e.g., MLV, killed, antibiotic, dewormer) to prevent contamination with other products. Never use one syringe to administer antibiotics or dewormers one time, and then vaccines the next time. Any residue will negatively affect the efficacy of the product.

There are many ways to clean and sanitize syringe systems. Training is needed whether using a microwave, hot water, autoclave, or pressure cooker as the cleaning and sterilization procedure (pressure, time) is different for every model.

- For cleaning multi-dose or repeater syringes, clean the exterior surfaces with soap, water, and a brush. Rinse well before disassembling as soap can leave residues inside the barrel and inactivate future vaccines.
- After cleaning the external components, rinse the internal components with distilled or deionized or sterile water that is warmer than 180°F (82.2°C) by drawing the water into the syringe interior (barrel and/or tubing) and squirting it out three to five times.
- **Never** use soap or disinfectants to clean inside of syringes as residues can negatively affect vaccines.
- If necessary, disassembly should be performed on a clean work surface.
- Store the clean syringe in a dust free, dry (low humidity) environment. Once dry, it can be stored in a new resealable plastic bag in the freezer. If stored in the freezer, metal syringes should be rinsed with hot (more than 180°F) water by pulling boiled water into the syringe three to five times then allowed to reach room temperature before using.^{8,9}

Stay S.A.F.E. with Needles and Syringes

- **S** is for Self
- **A** is for Animal
- **F** is for Food safety
- **E** is for Everyone working with you

Never select equipment that risks safety.



**Care for Veterinary
Vaccine Syringes**
University of Nebraska-
Lincoln Extension



**Cleaning and Sanitizing
Multi-dose Syringes and
Transfer Needles**
University of Wisconsin-
Madison Extension

Needles

Use proper cattle restraint and select high-quality needles that are sized, both in gauge and needle length, to fit the cattle, route of administration (i.e., SQ, IM, IV, or BOE), and product thickness (viscosity). Having a clean, sharp needle for every injection reduces the risk of contamination, tissue irritation, and animal discomfort. Adjust length of needle based on skin thickness of the cattle. Young calves or dairy influenced breeds will have thinner skin. Needles that are too long are at greater risk of breaking.

Never enter a bottle with a used needle. Do not inject leftover product back into the bottle as the product will no longer be sterile and can lead to abscesses. Rubber stoppers dull needles quickly; draw up product with one clean needle and use a new needle to inject animal. Do not store an animal health product with a needle in the rubber stopper, as dust can enter and contaminate the product.

General Needle Selection

- Select a short needle (1/2" to 3/4") for SQ injections. Recommend 1/2" needles for cattle less than 400 lbs, 5/8" needles for older cattle, and 3/4" for thick-hided animals.
- IM injections require at least a 3/4" needle to get into the muscle. Thick-hided animals may require 1" needles.
- The smaller 18 gauge needles are good for cattle less than 400 lbs, while 16 gauge needles work for cattle larger than 400 lbs.
- Extremely thick (viscous) products require a needle with a gauge larger than 16 gauge (such as 14 gauge x 5/8" and 14 gauge x 3/4").

BQA Needle Size Recommendations for Cattle Injections

Injectable Viscosity	Route of Administration								
	Subcutaneous (SQ) (1/2 to 3/4 inch needles)			Intramuscular (IM) (3/4 to 1 inch needles)			Intravenous (IV) (1 to 1 1/2 inch needles)		
	Cattle Weight (lbs)			Cattle Weight (lbs)			Cattle Weight (lbs)		
	< 300	300-700	> 700	< 300	300-700	> 700	< 300	300-700	> 700
Thin Example: Most Vaccines	18 gauge	18 - 16 gauge	16 gauge	20 - 18 gauge	18 - 16 gauge	18 - 16 gauge	18 - 16 gauge	18 - 16 gauge	16 - 14 gauge
Thick Example: Thick Antibiotics	18 - 14 gauge	18 - 14 gauge	16 - 14 gauge	18 - 16 gauge	18 - 16 gauge	16 gauge	18 - 16 gauge	18 - 16 gauge	16 - 14 gauge
SELECT THE NEEDLE TO FIT THE CATTLE SIZE (USE THE SMALLEST PRACTICAL SIZE WITHOUT FEAR OF BENDING)									

■ When to Change Needles

- ☐ Immediately if the needle is bent, burred, or dirty with feces, blood, dirt, or irritating chemicals.
- ☐ Between cattle with KNOWN bloodborne infectious disease, such as anaplasmosis, Johne's disease, or bovine leukosis virus (BLV) or as directed by the herd veterinarian.
- ☐ Every 10 to 15 injections for disposable needles (at a minimum) or under the instruction of the herd veterinarian.



■ Needle Care

- ☐ Use case or holder to protect syringes and needles during processing such as a vaccine cooler with syringe holder.
- ☐ Protect cattle handlers from accidental needle sticks by being aware of surroundings and understanding the risks of the vaccines or products being used.

Puncture-proof containers with a secure lid should be available for sharps disposal to improve human safety.



■ Needle Disposal

- ☐ Needle sticks can be a human safety risk, especially if the vaccine or product is hazardous to human health.
- ☐ Place in a puncture-proof container with a secure lid.
- ☐ Follow local, state, and federal EPA guidelines for disposal of used needles and other sharps.

**DO NOT
STRAIGHTEN OR
USE A BENT NEEDLE.**
Discard in sharps container

■ Disinfectants

- ☐ **DO NOT** use disinfectants on needles used for fluid injectables, especially MLV.
- ☐ Replace needles rather than disinfect.
- ☐ Always clean implanting gun needle between animals.

Damage on a 21 Gauge Needle at a Microscopic Level
Burring can occur when needles are used multiple times.



New Needle



Needle used once



Needle used twice



Needle used 6 times

Courtesy of North Carolina Harm Reduction Coalition.

Mixing and Drawing Vaccines

Handle all vaccines carefully and according to label instructions. Never vigorously shake to mix or expose vaccines to sunlight or temperatures outside the range on the vaccine label. Only sterile needles should enter vaccine vials.

When using vaccines that must be mixed prior to use, such as MLV products, mix only as much as can be used in **one hour or less**. These vaccines **CANNOT** be stored for later use as their efficacy decreases quickly after mixing.

Killed vaccines can be stored for short periods of time after initial use in the refrigerator if clean needles were used in the vial. Keep the rubber stopper clean between uses.

Use a sterile transfer needle when reconstituting MLV, CA, and IN vaccines. These vaccines are packaged with one vial of sterile diluent and one vial with dessicated (dried) vaccine cake that is vacuum sealed. Read and follow label instructions for each product.

Once reconstituted, administer IN vaccines using the provided nasal cannula or syringe with needle removed. Cannulas should be changed out every 10 to 15 head.

Learn how to mix
vaccines by watching
this short video.



Transfer Needles

Transfer needles reduce the risk of product contamination during mixing. If a transfer needle is not available, use a sterile syringe to draw out the diluent (liquid) for placement in the vial containing the desiccated vaccine cake.

Never refill a syringe or vial using a needle that has been used in an animal. Change needles before filling or refilling a syringe.

Transfer needles can be sterilized and reused. Do not use the same transfer needle for multiple products as contamination can occur.



Learn how to transfer vaccines with a syringe by watching this short video.

Learn how to properly use transfer needles by watching this short video.



Broken Needles in Animals is an EMERGENCY!

- If a needle is broken off in an animal, immediately stop working and attempt to locate and remove the needle.
- Place hand on needle location to restrict hide movement on the neck and use pliers to remove (needle nose pliers are recommended).
- If a broken needle cannot be removed at the ranch, contact a veterinarian immediately to have the needle surgically removed.
- If the broken needle is not located, the herd veterinarian and the operation's management must determine how animals will be handled. Mark the area where the needle was inserted and record in the animal's record.
- **Animals with broken needles should never enter the public food supply or be sent to a livestock market.** Work with a custom packer to responsibly harvest the animal for personal consumption. The animal should be accurately identified, and the packer should be notified of the broken needle at processing.

Foreign Objects

Foreign objects in beef are a food safety and consumer confidence concern. Foreign objects, including buckshot, birdshot, needles, wire, darts, and other contaminants are considered adulterants by the USDA FSIS and by the FDA.¹⁰ If contaminated, entire animals can be condemned.

Any abuse of animals is not tolerated. Using birdshot and/or buckshot to control or move cattle is not acceptable.

Concerns With Using Remote Drug Delivery (RDD) Systems

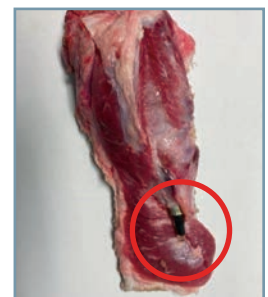
RDD systems (such as dart guns) are used to administer medication to or chemically restrain animals that cannot be caught or there is a human safety concern with their handling. The most common reported reasons for the use of RDDs include convenience, labor, and time savings. Darts are routinely found embedded in carcasses during fabrication.

RDD technology creates issues with the proper administration of animal health products and appropriate injection methods, depending on charge of device, distance to animal, environmental components, and skill of the person.

Research has repeatedly demonstrated failure of RDD systems to consistently deliver the intended labeled dose of the antibiotics commonly used to treat BRD in beef cattle tested.^{11,12,13} Underdosing or not injecting the full amount leads to failure to achieve the FDA approved levels of the antibiotic. This contributes to treatment failure and potential antimicrobial resistance due to underdosing.



Birdshot in Hamburger



Dart Embedded in Chuck Flap

While BQA recognizes RDD use in emergency situations when chemical restraint is necessary for human or animal safety, BQA does not support the routine use of RDD for treatment purposes.

It is recommended that anyone utilizing RDD technology complete an appropriate firearm or RDD safety training course and seek guidance and training on the specific device being used from the device manufacturer.

When remote delivery of medication is used, it should comply with BQA guidelines for injection site selection (in the injection triangle of the neck), routes of administration (SQ preferred), and needle selection. Treated animals should have clear identification and treatment records to avoid residue violations and foreign object contamination. If a dart is used in a medical emergency, users should recover all darts to prevent further injury to animals.

Research References

Coetzee *et al.* 2018. Pneumatic dart delivery of tulathromycin in calves results in lower antimicrobial concentrations and increased biomarkers of stress and injection site inflammation. *J. Anim. Sci.* <https://doi.org/10.1093/jas/sky222>

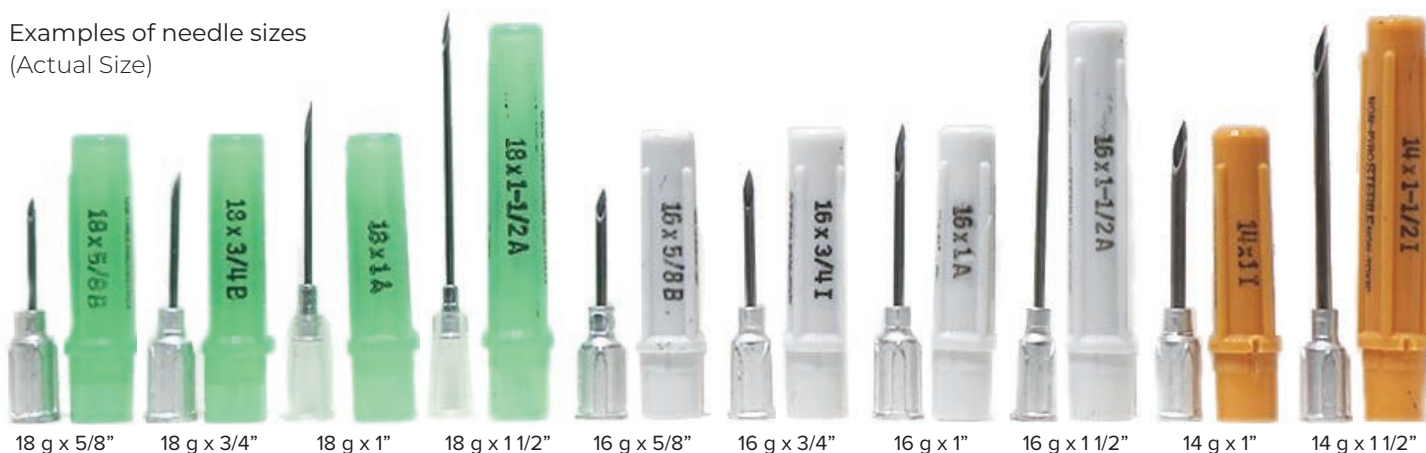
Rivera *et al.* 2019. Pharmacokinetics of tulathromycin following administration to stocker cattle with remote delivery devices. *J. Anim. Sci.* <https://doi.org/10.1093/jas/skz311>

Hairgrove *et al.* 2021. Effects of delivery via pressure-adjustable pneumatic gas-powered dart gun of three antimicrobial drugs on drug disposition and meat quality in cattle. <https://peerj.com/articles/11822/>

Vaccination Guidelines

- Work with a veterinarian to determine appropriate vaccines for the herd based on region, age of cattle, and disease risk.
- Prepare with processing crew prior to starting by gathering adequate supplies, assigning roles, and training.
- Prevent exposure of all vaccines to heat, UV light, and freezing.
- Draw from bottle with a sterile needle.
- Use quality syringes and needles.
- Inspect and maintain all working components of syringes.
- Label syringes in the cooler prior to processing to prevent mixing of vaccine when refilling syringes.
- Always read product label to administer product in proper dose and labeled route, understand side effects, and follow withdrawal times.
- Use proper needle size for size of animal, thickness of skin, and viscosity of product.
- Only administer vaccines and products in the injection triangle of the neck. Remember to use both sides of the neck if needed.
- Change disposable needles at least every 10 to 15 head to reduce tissue irritation or immediately if contaminated or damaged.
- Booster all vaccines as label recommends.
- Store vaccines in a dependable refrigeration unit or vaccine cooler that maintains a temperature as directed by the product label (typically 35-45°F).
- Never assume anything — always read product directions prior to use.

Examples of needle sizes
(Actual Size)



Feed Additives and Medicated Feeds

Federal regulations require that a Veterinary Feed Directive (VFD) is issued in compliance with the VCPR as defined by the state.¹⁴ For states that do not define a valid VCPR, the VFD must comply with elements of the federally defined VCPR.

The term ‘medicated feed’ includes feeds containing FDA approved medications included in animal diets. This includes medications such as chlortetracycline (CTC) used in mineral supplements, antibiotics used when mixing feed or premix (medications mixed with roughage/concentrates), and medicated complete feeds.

For more detail on FDA regulations concerning feed additives and medicated feeds, visit www.FDA.gov.

Key considerations for medicated feeds:

- Use only FDA approved medicated feed additives in rations.
- Follow Judicious Antibiotic Use Guidelines.
- Strictly adhere to medication withdrawal times to avoid a violative residue.
- Records must be kept a minimum of two years, or as required by laws/regulations.
- Extra-label use of FDA approved feed additives **is illegal**. The only exception is that ELDU may be prescribed for minor food animal species (sheep, goats) by a veterinarian.¹⁵

Veterinary Feed Directive (VFD)

The FDA requires a VFD for all feed-use antibiotics that could potentially impact human antibiotic resistance. When using a VFD feed medication, the VFD must be obtained from the veterinarian who has a VCPR with the producer. Approved VFD feed medications can only be used for treatment or control of diseases. The VFD can be issued for the feed-grade antibiotic for up to 180 days, depending on need and the label.

All VFD records must be available for inspection for two years by the issuing VCPR veterinarian, cattle producer, and distributing feed mill.

Several FDA approved feed medications do not require a VFD, such as ionophores and parasite control. However, if used in feed at the same time as a VFD drug, that concurrent use must be an FDA approved combination. Visit with the veterinarian or drug manufacturer for more detailed information.

Feed Manufacturers

Feed manufacturers are responsible for assuring that the feeds meet all legal and intended specifications.¹⁶ All feed mixing operations, regardless of size or products used, share this responsibility. See pages 73-74 in *BQA National Manual* for details on categories (Category 1 and 2) and types of medicated feeds (Type A, B, and C).

Herd Health Planning

Disease Management

Disease management programs should be made in consultation with a veterinarian. When monitoring for disease or problems in the herd, if any signs are detected at an increased rate, call a veterinarian quickly. The earlier diseases can be diagnosed, the better the outcome. Parasite control programs should be developed with the help of the herd veterinarian or a parasite specialist. It is recommended to review/revise the herd health plan at least annually. Vaccinating calves and adult cattle at strategic times throughout the year is a key component of a disease prevention program. The major pathogen groups producers can vaccinate against are included in the table.

Common Pathogens to Consider for Cattle Vaccination Programs

Respiratory Pathogens	Other Pathogens
■ Parainfluenza Virus (PI3)	■ Clostridium family (may cause blackleg, tetanus, others)
■ Infectious Bovine Rhinotracheitis (IBR)	■ Leptospirosis
■ Bovine Viral Diarrhea Virus (BVDV)	■ <i>Campylobacter</i> (formerly <i>Vibrio</i>)
■ Bovine Respiratory Syncytial Virus (BRSV)	■ Others based on herd's unique risk
■ <i>Mannheimia haemolytica</i>	

Pain Management

Managing pain throughout an animal's life is an integral part of BQA's internationally recognized standards on animal welfare. There are many types of pain management including injectable, topical, oral, local anesthesia, systemic pain relief, and chemical restraint. Producers must follow the veterinarian's instructions for all drug use, including ELDU, following extended withdrawal times, maintaining records, and identifying treated animals. Producers may consider scientifically validated pain management for such things as castration, dehorning/disbudding, lameness, calving/dystocia, mastitis, footrot/hoof issues, eye infections such as pinkeye, diarrhea, and others.

Receiving, Acclimating, and Processing

The health risk of newly purchased cattle varies and is influenced by such factors as age, time weaned, source, backgrounding, commingling, prior vaccination, nutrition, and fetal programming. Newly received cattle should be isolated and disease tested as recommended by a veterinarian. Receiving, acclimating, and processing protocols should be developed and reviewed by the herd veterinarian and nutritionist to address specific health-risk levels. Follow VFD guidelines if in-feed medication is needed.

Unload newly received cattle promptly and allow to rest with ample fresh water and clean hay/feed before additional handling. Observe cattle closely as they unload and after they are penned for evidence of injury or disease. Avoid handling cattle when the risk of heat stress is high. Decisions to handle cattle must consider temperature, humidity, wind speed, phenotype, and cattle acclimation. For more handling information, see *Chapter 3: Cattle Behavior, Handling, & Facility Design*.

Cattle Identification

Cattle identification (ID) contributes to quality record keeping and has many management benefits. Branding, tattooing, ear-notching, and ear-tagging with a silver/metal bright, orange official calfhood vaccination, or electronic identification (EID) tag are all common methods of identifying cattle individually.

Any of these methods may be used voluntarily by producers to identify their animals on the farm or ranch. Official animal identification goes a step further, referring to a specific system that enables animal health officials at the state and federal level to trace animals that move interstate. USDA APHIS issues unique identification numbers to manufacturers, to use on metal eartags and EID tags. Once an animal is tagged, it becomes permanently associated with the unique number on that individual tag, providing a means for identifying the animal in a food safety or animal disease event.

While metal tags were previously acceptable,¹⁷ as of November 5, 2024, all **new** eartags being applied for the purpose of complying with the regulations must be both visually and electronically readable. Metal tags applied to any animals **before** that date are grandfathered in and do not need to be retagged. Brands, tattoos, other identification methods acceptable to breed associations for registration purposes, or group/lot identification are also still accepted as official identification. All cattle moving interstate must be accompanied by an interstate CVI or health certificate. Check with your state if electronic CVIs are recommended or required.

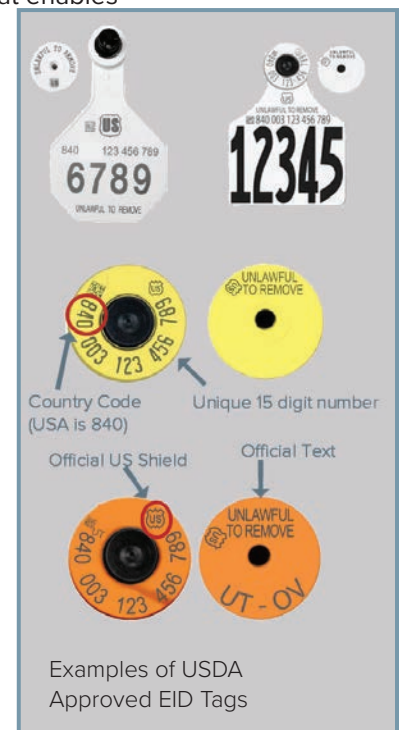
Note that brisket tags, wattles, ear notches, and group ear tags are not recognized as official identification.

Hot iron or freeze branding may be the only practical method of permanently identifying cattle and are legally required in some locations. If cattle are hot iron or freeze branded, it should be accomplished quickly, expertly, and with the proper equipment. Pain medications should be considered. BQA guidelines recommend branding on the hip area if possible. Do not brand cattle on the face or jaw unless state or federal programs require.

Not all over-the-counter products are legal to use in food animals. Read the label carefully or consult with the herd veterinarian before using them to avoid violative residues or illegal use of medications.



Examples of Ear Tags



Castration

Producers, in consultation with the veterinarian, should determine the most appropriate castration method, based on the animal's health and well-being, environment, and age. Animals should be restrained for castration in a way that minimizes stress and the risk of injury to the animal and the operator.

When possible, intact bull calves should be castrated at the youngest possible age (0-3 months if possible). The procedure may be delayed in some production systems (i.e., extensively managed commercial beef herds, seedstock operations).

Methods of castration include surgical (knife castration), banding methods, as well as crushing and disruption of the spermatic cord. All methods of castration cause pain. Producers should seek guidance from a veterinarian on the availability and advisability of analgesia or anesthesia for castration of cattle at any age, particularly in older animals.



Dehorning (Including Disbudding)

Dehorning can be as, or more stressful, than castration. Animals should be restrained for dehorning in a way that minimizes stress and risk of injury to the animal or operator. Operators performing dehorning of cattle should be trained and competent in the procedure and be able to recognize the signs of complications.

Cattle should be dehorned while horn development is still at the horn bud stage — 0 to 3 months or at the first available handling opportunity beyond this age. There is less tissue trauma when done earlier in life. The selection of polled cattle is an alternative for horn management.

Methods of disbudding at the horn bud stage include removal of the horn buds with a knife or dehorning spoon, thermal cautery of the horn buds, or the application of chemical paste to cauterize the horn buds. Disbudding should be performed between birth and two weeks of age.

All methods of disbudding and dehorning cause pain. Producers should seek guidance from a veterinarian on the availability and advisability of analgesia or anesthesia for dehorning of cattle at any age, but particularly in older animals where horn development is more advanced.



Tail Docking

Routine tail docking of cattle is not recommended. If tail docking is required due to injury, a veterinarian should be involved and proper analgesia and anesthesia should be discussed.

Calf Management

It is important for calves to receive colostrum (or colostrum replacer) as it will protect the calf from infectious diseases through passive immunity and provide nutrition for warmth. Colostrum replacer products generally have 100 grams of Immunoglobulin G (IgG, antibodies), and calves should receive a minimum of 200 grams of IgG within the first six hours of birth. If feeding colostrum from other farms, heat-treating is recommended (heat to 140°F or 60°C for 60 minutes).

Weaning is one of the most stressful times of an animal's life. Weaning methods include abrupt weaning, fence line weaning, nose flap weaning, intermittent separation, or a combination of the above. Reduce stress by castrating and dehorning, vaccinating against respiratory diseases, and providing proper nutrition prior to weaning.

Preconditioning practices could include: keeping the calf on the operation for at least 45 days after weaning; dehorning (if horned); castrating bulls; deworming; using low-stress weaning techniques (including fence line weaning and nose flaps); administering appropriate vaccines +/- boosters; transitioning to feed bunk and drinking water from a tank. Note that a true preconditioning program requires more than just vaccines given before weaning.

Breeding Herd

- Examine the breeding soundness of all bulls annually with a veterinarian including testing for transmissible diseases and vaccinating prior to turnout.
- Pre-calving vaccines: Administering vaccines 6-8 weeks prior to calving will boost immunity in the cow and prepares antibodies in the colostrum.
- Pre-breeding vaccines: These vaccines are generally given 4-6 weeks prior to breeding. Heifers will need a booster so timing the last dose for 30 days prior to breeding is important.
- Evaluate body condition scores (BCS) of cows and heifers at least annually before calving season.
 - Thin cows or bulls ($BCS \leq 2$ on either beef or dairy scale) cannot endure a long trip prior to harvest, bruise easier, and are at higher risk of becoming non-ambulatory during transport. **They are not considered fit for transport.**
- Check cows regularly for calving difficulties with special attention to first-calf heifers.
 - Call a veterinarian as soon as possible to help with calving difficulties.
- Examine cows early that have mild lameness, early eye problems such as cancer eye, mastitis, or loss of body condition and decide on shipping or treatment early in the process.

See **Chapter 7: Nutrition** to learn more about Body Condition Scores and to see photos.



Heifers and Purchased Breeding Stock Entering Herd

Quarantine new animals 21-30 days before allowing contact with the home herd, ideally with a separate fence line, feed bunk, and water source. Test all stock entering the herd for diseases such as BVD (or BVD-PI), brucellosis, bovine leukosis virus (BLV), tuberculosis, and/or Johne's disease.

Vaccinate animals as recommended by a veterinarian and follow BQA guidelines. Breeding bulls should be tested for trichomoniasis. Discuss whether a Breeding Soundness Exam is needed for new bulls with the herd veterinarian.

Stocker and Feeder Cattle

- The use of vaccines, antibiotics, and/or parasite control should be based on risk assessment and health history.
- If heifers are flank spayed, a local anesthetic should be used and systemic pain relief considered. Note that the American Veterinary Medical Association and American Association of Bovine Practitioners do not support the use of electroimmobilization for animal restraint.
- High-risk cattle should be checked at least daily for illness, lameness, and other problems during the first 30 days following arrival.
- Pregnancy in immature heifers can result in calving difficulties. It is often more humane to abort pregnant heifers.
- If heifers in the feedyard or a stocker operation deliver a full-term, healthy calf, it should be allowed to nurse to obtain colostrum or promptly fed a colostrum replacer.
 - These calves must be handled humanely and provided proper nutrition and colostrum. Compromised calves or fetuses should be promptly euthanized and disposed of according to local regulations.
- 'Bulling' is a term to describe aggressive riding of a steer by one or more pen mates. Bullers should be promptly removed from the pen to prevent serious injury.



Euthanasia

Timely euthanasia should be considered if animals are suffering or deemed unfit for transport or slaughter. Euthanasia is the intentional ending of an animal's life by an acceptable method to relieve pain, and should not be considered a failure. Euthanasia techniques should cause immediate loss of consciousness followed by cardiac and respiratory arrest (heart beat and rhythmic breathing stop) that ultimately results in loss of brain function and death.

Important Considerations

Slaughter should be considered for animals that are not in severe pain, freely able to stand and walk, capable of being transported, and free of disease and drug residues that would constitute a public health risk. Humane euthanasia is the appropriate choice whenever the above conditions are not met.

To that extent, it is the responsibility of all who own or work with livestock to have the proper equipment and knowledge to conduct euthanasia effectively, in a timely manner when necessary, and with a focus on avoidance of pain and distress for the animal. Reasons for euthanasia include the following (not all inclusive).

- Fractures or paralysis of the legs, hip, or spine that are not repairable and result in immobility or inability to stand.
- Emergency medical conditions that result in severe pain that cannot be relieved by treatment.
- Animals that are too weak to be transported due to debilitation from disease or injury or too thin ($BCS \leq 2$).
- Paralysis from traumatic injuries or disease that result in immobility.
- Potential or known exposure to toxins (lead toxicity) resulting in a food safety issue if sent to slaughter.
- Diseases that could threaten herd health (i.e., BVD or others).
- Disease conditions where no effective treatment is known, prognosis is poor/terminal, or a significant threat to human health is present.
- Prolonged expected recovery (declining quality of life) or failure to respond to treatment.
- Loss of production and/or failure to perform/thrive.
- Extended drug withdrawal time for clearance of tissue residue.
- Behavior or temperament issues which render an otherwise fit animal to be unsafe.

Persons who perform on-farm euthanasia must have received appropriate training, know the relevant anatomical landmarks, and understand the protocols used for humane euthanasia of animals. Ensuring human and animal safety during the process is essential.

Acceptable methods for conducting euthanasia in cattle include gunshot (most common), penetrating captive bolt with a secondary step to ensure death, and injectable barbiturate (only under veterinary supervision; rendering services will not accept dead animals euthanized with barbiturates).

- Effectiveness of the gunshot method depends upon selection of the appropriate caliber of firearm, type of bullet or shot/shell, and accuracy of aim. Never select a hollow point or other fragmenting bullet for euthanasia.
- Captive bolt guns are designed to cause damage to the brain sufficient to cause an immediate loss of consciousness. Use of penetrating captive bolt should be followed with a secondary step to ensure death.

Records should be maintained in accordance with the state's requirements for medical records. Records should also be kept for the euthanasia equipment including gun or captive bolt cleaning and service logs. Euthanasia tools should be cleaned after every use as recommended by the manufacturer.

Suggested Firearm, Caliber, and Bullet Types for Euthanizing Different Sizes of Cattle ^{18,19,20,21}

	Handgun	Rifle	Shotgun
Calves	 .32 to .45 caliber Solid-point bullet (within 1-3 feet)	 .22 LR caliber or larger Solid-point bullet	 .410 to 12 gauge #4-6 bird shot or slug (within 3-6 feet)
Adult	 .38 to .45 caliber Solid-point bullet (within 1-3 feet)	 .22 magnum or higher caliber Solid-point bullet	 20 to 12 gauge #4-6 bird shot or slug (within 3-6 feet)

When possible, restrain animal before euthanasia is carried out. A 22 long rifle (LR) is discouraged for use in euthanasia of adult cattle because it lacks sufficient ballistic energy to yield consistent results. Higher caliber rifles should be avoided as bullets may exit the body and place bystanders in danger.

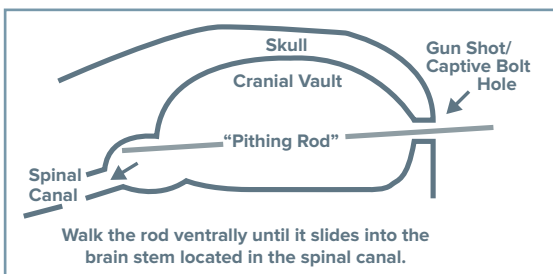
Anatomical Landmarks for Euthanasia

Current information for adult cattle and calves indicates that the point of entry of the projectile should be at (or slightly above) the intersection of two imaginary lines (A-dashed lines), each drawn from the outside corner of the eye to the center of the base of the opposite horn (or where the horn should be). An alternate method is to aim on midline between the base of the ears at the level of the ear canal (A-solid line). Angle should be directed perpendicular (B) or slightly downward (no more than 45 degrees).

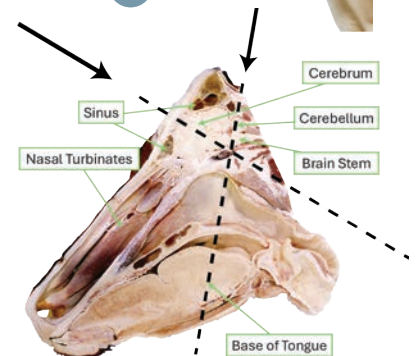
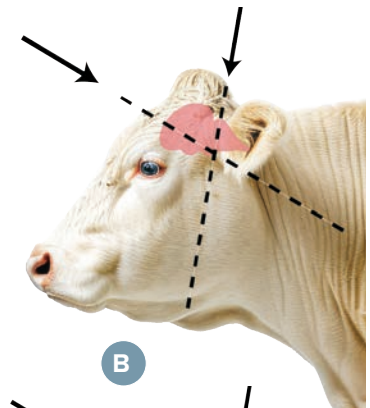
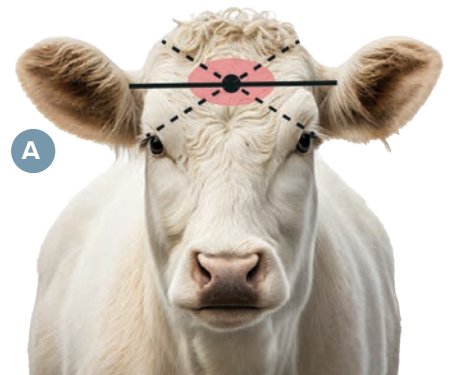
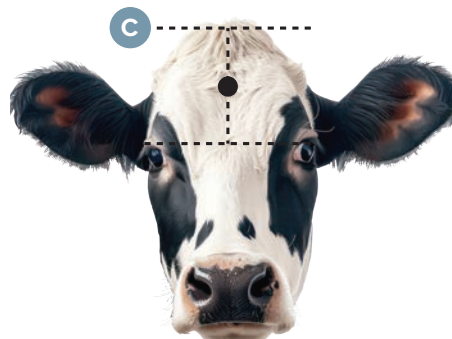
An alternate method for cattle with Brahman or Holstein genetics (more elongated skulls) is to place the shot midway between a line connecting the outside corner of the eye and the poll on midline (C).

If a firearm is used it should be used within three feet of the target and positioned so that the muzzle is perpendicular to the skull to avoid ricochet. It is unsafe to place the firearm flush with the skull.

When using penetrating captive bolt, operators are advised to restrain the head so the captive bolt may be held flush with the skull. A secondary method to ensure death is **REQUIRED** and includes a second shot in the original frontal or poll location, a third shot if necessary, exsanguination (bleeding out), use of a pithing rod to destroy the brain and spinal cord, or injectable solution (based on veterinarian recommendations).



Example of Using Pithing Rod



Indications of Unconsciousness

When conducting euthanasia procedures, the person must be prepared to immediately reapply an acceptable euthanasia technique if any sign of consciousness is detected. They should **always** observe animals for the following behaviors indicating unconsciousness.

- Absence of corneal reflex (eye reflexes gone, eyelids remain open, eyes facing straight forward, dilation of the pupil; check by touching the surface of the eye and no reaction should occur).
- Absence of vocalization.
- Absence of gag reflex (no voluntary tongue movements or swallowing).
- Lack of rhythmic respiration.
- Animal collapses immediately when shot and makes no coordinated attempt to rise or right itself.
- Body and muscles become rigid immediately upon collapse followed by relaxation of the body, brief tetanic spasms and eventually uncoordinated hind limb movements.

These signs should be observed and monitored in all animals for which euthanasia procedures have been applied. Animals that attempt to right themselves, vocalize, blink with their eyes, or begin rhythmic breathing are likely returning to a conscious state. In these cases, one should immediately recheck the anatomical site used and reshoot or reapply the captive bolt.

Confirmation of Death

Confirmation of death following a euthanasia procedure is absolutely essential regardless of what method of euthanasia is used. Criteria to be used for confirmation of death include the following.

- Lack of pulse.
- Continued cessation of rhythmic breathing.
- Absence of corneal reflex (eye reflexes gone, eyelids remain open, eyes facing straight forward, dilation of the pupil; check by touching the surface of the eye and no reaction should occur).
- Failure to detect/hear respiratory sounds or heartbeat by use of a stethoscope under left elbow.
- Rigor mortis (carcass is stiff).

Other than rigor mortis, none of these signs are reliable indications of death. After initial confirmation of death, rechecking the animal for these parameters after a period of 20 minutes is a very useful method for confirmation of death.



AABP Guidelines and Position Statements can be found here.

Carcass Disposal

Carcasses must be handled and disposed of following state and federal regulations. Animals euthanized with barbiturates should be buried or burned since they will not be accepted at rendering facilities due to contamination of rendered product. Composting does not eliminate barbiturate residues and can be a hazard for scavengers or the environment.

Several options for acceptable carcass disposal are available for livestock, including burial, incineration, rendering, and composting. Producers may contact the local waste disposal facility or landfills to determine if carcasses are accepted.

Herd Health Highlights for all Cattle Production Segments

- Conduct at least annual trainings of employees and cattle caretakers on topics such as cattle handling and behavior, biosecurity, animal health product management, identifying illness, and other preventive practices.
- Meet appropriate nutritional needs with safe, well-managed feedstuffs.
- Practice low-stress handling practices to minimize stress and bruising.
- Always read and follow label directions for animal health and pesticide products.
- Administer all injections in front of the shoulder, subcutaneously (SQ) if possible, and as indicated on the product label.
- Consider pain management in all production stages.
- Identify any animals treated to ensure the proper withdrawal time is followed.
- Make records available to the next production sector.
- Keep records of all products administered including date, animal identification, product used, serial number, amount administered, route of administration, person administering, and withdrawal time.
- Use a parasite control program that addresses external and internal parasites in the region.
- Consult with herd veterinarian for additional health procedures appropriate to the region.
- At least two people on the operation should be trained on humane euthanasia techniques and proper carcass disposal.
- Performing a necropsy of cattle that have died can be valuable for diagnosis and future management. Work with a veterinarian for training on anatomy and sample collection. Necropsies are most valuable within hours of death or at least within the first 24 hours.

Record Keeping Reminders

- A veterinarian-client-patient relationship (VCPR) is necessary for veterinary oversight of animal health and should be renewed annually, based on state or federal guidelines.
- Management and treatment protocols should be kept on file and at the treatment facility where workers can review them.
- Having all product withdrawal times listed in a treatment protocol book is a best management practice.
- Veterinarians and producers have accurate treatment records and extended withdrawal times for all animals treated. Records must be FDA accessible for two years.
- If extra-label drug use is indicated by a veterinarian's prescription, that veterinarian must establish and document appropriate withdrawal periods.
- Accurate records of treatments and outcomes should be used to evaluate efficacy of therapeutic regimens.
- Good record keeping and protocol development are essential to avoiding residues in meat and milk from food-producing animals.
- Records can help with a residue investigation.
- Proper record keeping, storage, and handling of animal health products are important to ensure efficacy of the products and are key to a cattle health program.
- Record product information including the receiving date, name, quantity, unit sizes, lot/serial numbers, and expiration dates in receiving and inventory records. This could be important if a product is recalled, or cattle have an adverse reaction.
- Place a thermometer in the vaccine refrigerator or product cabinet and check/record temperature periodically.
- Always label syringes.
- If a broken needle is not located, the herd veterinarian and the operation's management must determine how animals will be handled. Mark the area where the needle was inserted and record in the animal's record.
- Where applicable, keep complete records when formulating or feeding medicated feed rations. Feed additive and feed additive records are to be kept a minimum of two years, or longer as required by laws/regulations.
- All VFD records must be kept and be available for inspection for two years by the issuing VCPR veterinarian, the cattle producer, and the feed mill distributing the VFD medication.
- Producers must follow the veterinarian's instructions for all drug use, including ELDU, including following extended withdrawal times, maintaining records, and identifying treated animals.
- Parasite control programs should be developed with the help of the herd veterinarian or a parasite specialist. It is recommended to review/revise the herd health plan at least annually.
- Cattle identification contributes to quality record keeping and has many management and production benefits.
- Record keeping components are critical to note reasons or causes of death. Producers or veterinarians should necropsy selected animals to verify the cause(s) of death.
- Records should be maintained in accordance with the state's requirements for medical records.
- Records should be kept for euthanasia equipment including gun or captive bolt cleaning and service logs.
- Keep records of all products administered including date, animal identification, product used, serial number, amount administered, route of administration, person administering, and withdrawal time.

CHAPTER 6

TIMELY CULLING, FITNESS FOR TRANSPORT, AND TRANSPORTATION



Objectives

- Evaluate cattle before they are transported for their fitness for transport.
- Make timely culling decisions before Body Condition Score decreases, mobility worsens, or health deteriorates.
- Prioritize correct transportation strategies for human and animal safety.

Cull Cattle

Cull cattle are animals that are departing from the herd because of sale, slaughter, salvage, or death. Regardless of herd size, all beef cow operations will have to cull animals.

Decisions to Cull, Market, Slaughter, or Euthanize

Cattle producers play a critical role in following best management guidelines and ensuring the welfare of cattle.

- Everyone on the operation has a responsibility to make timely decisions in caring for injured or sick cattle.
- Timely marketing of cattle means selling or shipping an animal before it is too compromised to transport.
- Timely euthanasia should be considered if an animal is deemed unfit for transport.
- Market cull animals as early as possible, only if all drug withdrawal times are met, and the animals are fit for transport.
- Prioritizing safety reduces injury to people and cattle, ensuring a high-quality beef product, and showcasing the important role cattle transporters play in the industry.

Mobility Score Scale

1

Mobility Score 1

- **Fit for transport**
- Normal
- Walks easily
- No apparent lameness
- No change in gait

2

Mobility Score 2

- **Fit for transport**
- Exhibits minor stiffness
- Shortness of stride
- Slight limp
- Keeps up with normal cattle in the group



Examples of broken limb or severe limb injury.

3

Mobility Score 3

- Exhibits obvious stiffness
- Difficulty taking steps
- Obvious limp and/or discomfort
- Lags behind normal cattle walking as a group

Cattle with a mobility score 3 should be strongly scrutinized and evaluated for their ability to make the full trip to their end destination and in shape to walk into the processing plant. These are considered compromised cattle, and it is likely for them to deteriorate and go from a mobility score 3 to a mobility score 4 on the trip or become non-ambulatory (downer). If mobility score 3s must be transported, travel the shortest distance possible and consider building a relationship with a local packing plant as a marketing outlet.

4

Mobility Score 4

- **Not fit for transport**
- Extremely reluctant to move even when encouraged by a handler
- Statue-like

Fitness For Transport

Compromised Cattle

A compromised animal is an animal with reduced capacity to withstand transportation, but when transported with special provisions its condition is less likely to deteriorate.

- Special needs/compromised animals that have conditions that increase the likelihood of becoming non-ambulatory (downer) because of commingling in transport should be either left at the farm or transported in a separate compartment without contact with other animals.
 - Special needs/compromised cattle should be protected on the trailer and be loaded on the back of the trailer to make it easier for them to unload (loaded last/unloaded first). Additionally, take measures to ensure the journey is made more comfortable, this may include adding bedding and putting the animal in its own compartment of the trailer.
- If injured cattle that are still able to walk and stand must be transported, they should not be mixed with other cattle. Injured cattle should only be transported to a veterinary facility or for emergency slaughter at a packing plant capable of handling such animals.



Scan this code to view an instructional video on mobility scoring for cattle.
The Meat Institute



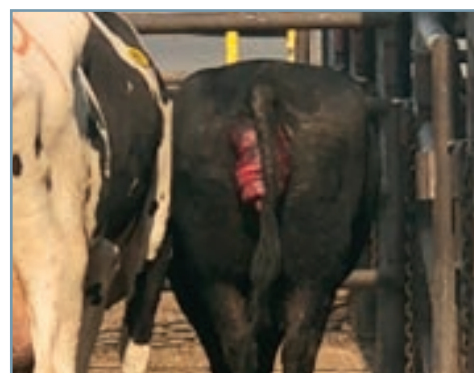
See **Chapter 7: Nutrition** to learn more about Body Condition Scores and to see photos.

DO NOT

- Transport heifers or cows that are close to calving. Stress from transportation may cause early labor.
- Transport cattle that require mechanical assistance (e.g., hip lifts or hobbles) to rise and walk except for veterinary treatment. When using any handling device, abuse is not tolerated.
- Transport cattle with significant bone fractures or injuries (e.g., broken limbs, injured spine, broken jaw). Animals suffering from these injuries should be humanely euthanized.
- Transport cattle to a packing or processing facility until all proper treatment withdrawal times have been followed.
- Transport cattle that pose a public health threat, such as animals showing neurological signs or zoonotic disease symptoms.
- Transport cattle with conditions that will not pass pre-slaughter inspection at a packing or processing facility or cattle that have not met withdrawals.²²
- Transport of any cattle that appear to be exhausted or dehydrated until the animal is rested, fed, and rehydrated.
- Transport cattle with a BCS of 2 or less (≤ 2).
- Transport cattle that are mobility score of 1 or 2.



Advanced Cancer Eye



Prolapse

DO NOT transport cattle with a BCS of 2 or less.



BCS 1



BCS 2

DO NOT Transport Non-Ambulatory Cattle. When Handling Non-Ambulatory Animals: NEVER ...

- Drag non-ambulatory animals.
 - In some emergency situations it is necessary to drag animals a short distance to protect human and animal safety. However, it should only be done according to an approved protocol where animal welfare is considered.
- Drag a non-ambulatory animal off the trailer.
- Use an electric prod to stimulate an injured or disabled animal to get up.
- Use chains, rope, or cables to lift, suspend, or move the animal unless necessary to prevent further injury or death, if allowed by state/federal regulations.
 - Always use straps under the front legs/chest and hind legs/flank to lift animals.
- Let a non-ambulatory animal remain in any area where they may get walked on or trampled.

Emergency Slaughter

Emergency slaughter may be considered for animals where recovery is unlikely or incomplete, treatment facilities are inadequate or there is insufficient time available for effective treatment and full recovery.

Transport Direct to Emergency Processing

- Bloat
- Hardware disease with localized signs
- Intestinal accidents
- Recent injury
- Urethral blockage (acute)
- Broken jaw

Key Considerations for Emergency Slaughter

- Destination is equipped to handle a compromised animal for emergency slaughter.
- Develop a relationship with a local locker in advance to potentially take cattle for emergency slaughter.
- The animal has been deemed fit for transport; consult with a veterinarian to make these decisions.
- The animal can withstand further handling after transport.
- Carcass condemnation is unlikely.

Non-Ambulatory (Downer) Cattle²³

- Promptly diagnose non-ambulatory animals and determine whether the animal should be humanely euthanized or receive treatment.
- Provide adequate fresh feed and water to non-ambulatory cattle that is easily and readily accessible at least twice daily.
- Move downed animals using acceptable methods to avoid compromising animal welfare.
 - Acceptable methods of transporting downers include a sled, low-boy trailer, or in the bucket of a loader. Animals should not be scooped into a front-loader bucket but rather humanely rolled into the bucket and restrained by caretakers. Hip lifts should only be used to help an animal rise, not to move the animal.
- Humanely euthanize animals who refuse to eat or drink and/or are unable to sit up unaided (i.e., lie flat on their side) for 24-36 hours.
- Euthanize downed animals that do not respond to treatment and their condition continues to deteriorate.



Non-Ambulatory (Downer)



The Beef Quality Assurance Transportation (BQAT) program is the transportation standard for the entire cattle industry. Anyone hauling cattle is encouraged to get BQAT certified.

Transportation

Loading and Unloading Guidelines²⁴

- Do not ship cattle that are unable to withstand the rigors of transportation.
- NEVER knowingly inflict physical injury or unnecessary pain on cattle when loading, unloading, or transporting them.
- Properly design and maintain loading facilities for easy and safe animal movement.
- Ensure sorting and holding pens are suitable for herd and load size.
- Ensure sorting and holding pens have non-slip footing.
- Provide water for cattle in the holding pens especially during times of heat stress.
- Ensure all vehicles used to transport cattle provide for the safety of personnel and cattle during loading, transporting, and unloading.
- Ensure ramps and chutes are strong and solid, provide non-slip footing, and have sides high enough to keep cattle from falling or jumping off — a ramp angle of 25 degrees or less will improve cattle movement.
- Ensure there is not a gap between the ramp, its sides, and the vehicle that would allow injury to an animal.
- Ensure vehicle doors and internal gates are sufficiently wide to permit cattle to easily pass through without bruising or injury.
- Strictly adhere to safe loading density levels with regard to animal weight and space allocation.
- Load, unload, and move cattle through facilities with patience and as quietly as possible to reduce stress and injury.
- Use cut gates in trailers and in trucks to provide stability for the cattle and the vehicle.



**Calf Hauling Loading
Density Guidelines**
BQA.org



**Mature Cattle Hauling
Loading Density Guidelines**
BQA.org



**Transportation
Regulations by State**
InterstateLivestock.com

Emergency Transport Situations

Being prepared for an accident before it happens will keep the driver and the livestock safe. When accidents occur with a loaded trailer, the accident can turn more serious if animals escape onto the roadway.

- When able, immediately call 911.
- Assess the situation to determine if it is life threatening for the driver, any other party involved, bystanders, or the livestock.
- Put out emergency triangles showing an accident has occurred.
- Document the incident with photographs to provide to the insurance company and employer.
- NEVER open a contained trailer to release livestock unless animal containment and an alternate livestock transportation method is in place.

Pre-Planning Checklist

Driver

- ☐ Be adequately rested, healthy and alert
- ☐ Know hours-of-service regulation
- ☐ Know livestock state import requirements

Route Planning

- ☐ Consider traffic and road conditions
- ☐ Communicate route and approximate arrival times
- ☐ Anticipate weather during travel

Paperwork Needed

- ☐ Specific locations of load pickups and drop-offs
- ☐ Health and animal ID paperwork, when required
- ☐ List of important phone numbers

Equipment Inspection

- ☐ Fuel up before loading
- ☐ Review relevant legal requirements
- ☐ Clean trailer
- ☐ Check fluid levels (including fuel)

Trailer Inspection

- ☐ Ensure ramps function properly
- ☐ Check for sharp edges/protrusions
- ☐ Clean out traps and trailer
- ☐ Inspect safety chains
- ☐ Inspect lights
- ☐ Inspect brakes
- ☐ Inspect safety latches and gates
- ☐ Inspect axles and tires

Weather

- ☐ Check the weather and plan accordingly
- ☐ Add weather-specific provisions to trailer

Transporting Cattle Regulations

It is the hauler's responsibility to know and understand the most current state and federal laws. All workers at the processing facility are required to adhere to the USDA Federal Handling Regulations. A cattle hauler needs to understand the plant's expectations of animal handling.

Federal Transportation Regulations

- On the Road²⁵
 - ☐ Cattle can only be on the trailer for 28 hours without feed, water, or space to rest – provide 5 hours of rest time after 28 hours of confinement.

Record Keeping Reminders

- Keep herd health papers if selling livestock or transporting across state lines.
- Maintain brand inspection papers.



CHAPTER 7

NUTRITION



An excellent reference and guide with details on beef cattle requirements and nutritional concepts is available in the 2016 National Academies of Sciences, Engineering, and Medicine Nutrient Requirements of Beef Cattle.



Beef BCS tutorial video.
American Angus Association



Dairy BCS information.
National Dairy FARM Program



Objectives

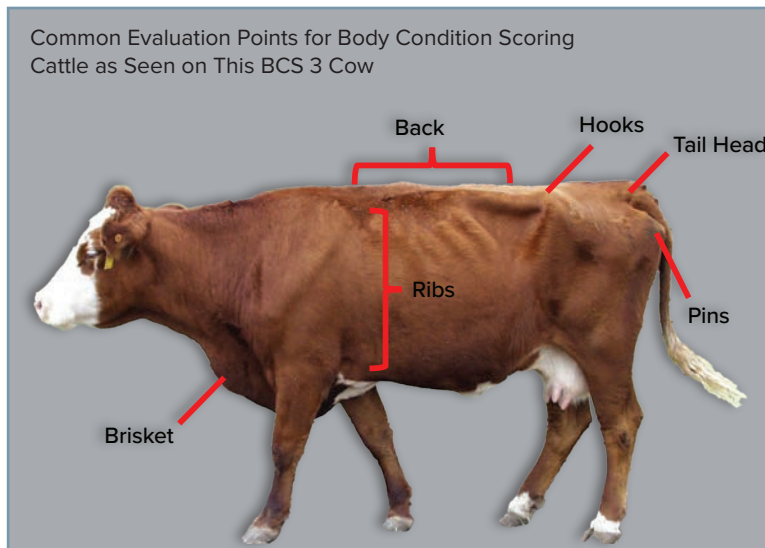
- Ensure cattle have access to an adequate and quality water supply, as well as appropriate nutrition. Avoid feed or water interruption for longer than 24 hours.
- Test feedstuffs - especially those suspected feedstuffs that could be detrimental to cattle well-being, such as nitrates, prussic acid, mycotoxins, etc.
- Only use feedstuffs and feed ingredients of satisfactory quality that are USDA, FDA, and EPA approved products for use in cattle; these products must be used in accordance with the approved product use guidelines.
- Do not feed ruminant-derived protein sources per FDA regulations.

Cattle excel at converting human inedible feeds (e.g., forage and byproducts from other industries) to a human-edible protein with a greater biological value. To do this, cattle require access to adequate nutrients. Cattle nutrition is a broad category involving management of cattle's energy, protein, vitamins, minerals, and water intake. Properly managing these things is important because an animal's nutritional status has a direct impact on production efficiency, immunity, and carcass characteristics.

Many factors affect an animal's nutrient requirements such as breed, type, weight, body condition, sex, age, environment, health, reproduction status, and purpose in the beef supply chain. As such, feeding strategies vary greatly across the U.S., but each should fit the animal's nutrient requirements and performance expectations. For local recommendations and advice, contact a state agricultural extension agent or nutritional consultant.

Cow Body Condition Scoring

Nutritional management of the cow herd includes utilizing a scientifically proven method called Body Condition Scoring (BCS) to monitor herd nutritional status. A cow's BCS reflects the amount of energy stores in her body (i.e., fatness) at a given point in time. BCS in beef cattle range from 1 (emaciated) to 9 (obese). Targeting a BCS between 5 and 6 for cows at calving promotes optimum reproduction and calf health. Cows that calve in lower BCS can have reduced pregnancy rates and may produce a lower volume and quality of colostrum and less milk which can result in reduced disease resistance and growth in the calf.



Critical Nutrients for Beef Cattle²⁶

Energy

Energy is the most important nutritional consideration that constitutes the majority of diets. Energy can be provided through carbohydrates (starch and fiber), oil or fat, or can be from protein (diet or muscle degradation). The energy calculations are usually expressed as total digestible nutrients (TDN) and/or net energy (NEm: net energy for maintenance; NEg: net energy for gain).

Macrominerals

¹¹ Na Sodium	¹² Mg Magnesium
¹⁵ P Phosphorus	¹⁶ S Sulfur
¹⁷ Cl Chlorine	¹⁹ K Potassium
²⁰ Ca Calcium	

Microminerals

²⁶ Fe Iron	⁴² Mo Molybdenum
³⁴ Se Selenium	³⁰ Zn Zinc
²⁹ Cu Copper	²⁷ Co Cobalt
²⁵ Mn Manganese	⁵³ I Iodine

Protein

Cattle require protein and it is the second most important nutrient. Protein nutrition is a bit complex for beef cattle as there are actually two requirements to consider when evaluating dietary supply relative to requirements — those of the animal and also the requirements of the rumen microorganisms. Feed sources provide one of two sources of protein, to either the microbes in the rumen (rumen degradable protein; RDP) or protein that 'bypasses' the rumen and is not degraded or changed in the rumen (rumen undegradable protein; RUP).

Diets may need supplementation and the source of the protein supplement matters as sometimes RDP is needed and sometimes feeds that are a source of RUP are required. Understanding which type and amount of protein is necessary for supplementation is important to manage costs and productivity.

Minerals and Vitamins

Minerals and vitamins have various roles in the body and need to be considered after sufficient energy and protein are supplied. To make that decision, producers must determine the amount supplied by the diet and whether that supply alone is sufficient to meet the cattle requirements at their stage of production.

Macrominerals

Minerals are classified into two different categories: macro- and microminerals. Macrominerals are required by the animal in a larger concentration and are usually included as a percentage of the diet. Calcium (Ca), Chloride (Cl), Magnesium (Mg), Phosphorus (P), Potassium (K), Sodium (Na), and Sulfur (S) compose the macrominerals.

Microminerals

Microminerals, also known as trace minerals, are required in the diet at small concentrations, usually as parts per million. Cobalt (Co), Copper (Cu), Iodine (I), Iron (Fe), Manganese (Mn), Molybdenum (Mo), Selenium (Se), and Zinc (Zn) are trace minerals and considered essential for beef cattle due to the fact that they play a role in various functions within the body.²⁷

Mineral Antagonists

A mineral interaction or antagonist is when one mineral prevents the absorption or use of another mineral. There are several different types of interactions which include competition for absorption sites in the body, negative effects on ruminal absorption, or the formation of insoluble complexes preventing absorption. In the situation where antagonists exist, mineral supplementation is usually warranted. Excesses of certain minerals can reduce availability of others, so balanced diets are important.

Vitamins

Vitamins are classified as either fat soluble or water soluble. The fat-soluble vitamins include vitamins A, D, E, and K. The water-soluble vitamins include vitamin C and B-complex vitamins. Generally, actively growing forages contain many of the vitamins that cattle need. However, when cattle are grazing dormant pastures or stored forages, supplementation of vitamins A and E may be necessary.

Feeding Guidelines for Classes of Cattle

Dietary requirements for cattle are affected by a multitude of factors, including age and sex. Find feeding guidelines for beef cows and heifers, bulls, stocker and backgrounding cattle, and feeder cattle in the *BQA National Manual*.

Preconditioning Calves

Preconditioning is the process by which calves are weaned and conditioned before moving them to grass or a backgrounding yard for growing or sending them straight to a feedyard for finishing. The preconditioning process improves the likelihood that a calf can deal with future stressors and exposure to pathogens without health complications. See *Chapter 5: Herd Health* for more information.

One of the most stressful periods in a calf's life occurs during the weaning process. Stress suppresses the immune system. Removal from the cow, introduction to a new environment, and commingling with cattle of different origins are stressful events.



**Micromineral Requirements
and Maximum Tolerable
Levels for Beef Cattle.**
University of Georgia

Diet Formulations Tools

Oklahoma State University Cow-culator: Tool for Nutritional Management of Mature Cows

<https://extension.okstate.edu/fact-sheets/cowculator-v2-0-beef-cow-nutrition-evaluation-software.html>

Iowa Beef Center Beef Ration and Nutrition Decisions Software (BRaNDS)

<https://www.iowabeefcenter.org/software.html>

University of Georgia Basic Balancer

<https://extension.uga.edu/publications/detail.html?number=B1371&title=uga-basic-balancerOthers>

Feed Quality and Safety

Bovine Spongiform Encephalopathy (BSE): Ruminant Protein Ban²⁸

Bovine spongiform encephalopathy is a progressive and fatal disease of the nervous system in cattle. The FDA adopted the Animal Proteins Prohibited from Ruminant Feed regulation to prevent the spread of BSE in the United States through feed and, thereby, minimize any risk to animals and humans. The regulation prohibits the use of protein derived from mammals in ruminant animal feed. There are, however, certain exceptions to the rule including:

- Pure porcine or pure equine protein
- Gelatin
- Blood and blood byproducts
- Milk products (e.g., milk and milk protein)
- Inspected meat products which have been cooked and offered for human food and further heat-processed for animal feed use

For more information, visit www.FDA.gov and www.bqa.org.

Feed Additives

The federal veterinary feed directive (VFD) stipulates that medically important antibiotics are prohibited for use as growth promotants and cannot be fed without a veterinary prescription.²⁹ An explanation and overview of what a VFD is and how it is utilized in a cattle operation are included in the *BQA National Manual*. The following feed additives are available over-the-counter, which means no direct veterinary prescription is required, unless labeled for feeding in combination with a VFD medication: ionophores, prebiotics, probiotics, fermentation products, enzymes, and coccidiostats.

Potential Feed Toxins

Forages used for grazing and hay can contain potential toxins. High levels of nitrates in grazed or fed forages can be lethal to cattle. Certain feeds such as small grains, warm season annuals (such as sorghum, some millets, corn plants) and broadleaf weeds can have nitrate levels that are detrimental to cattle. Forages that have been stressed, such as by frost or hail, are more likely to contain high nitrate levels. High nitrogen levels in the soil (from fertilization or manure application) can also lead to forages being high in nitrates. High nitrate feeds can be diluted in cattle diets with forages or other feed ingredients low in nitrates to result in a safe ration for cattle.

Prussic acid (hydrogen cyanide poisoning) in certain forages can be lethal to cattle. Grain sorghums, certain millets, sudan grass, or sorghum-sudan hybrids are known to potentially contain prussic acid. Events that cause plant stress can cause elevated levels of prussic acid. Managing timing of grazing and testing forages (both grazed and harvested) for potential toxins is the best way to avoid toxicity issues.

Endophyte-infected tall fescue can be an issue in grazed forages in certain regions. There are many resources available from local extension offices and other sources on management of cattle in areas where endophyte-infected fescue is an issue.

Mycotoxins are naturally occurring chemicals produced by molds. Mycotoxins can be found in grains and forages prior to harvest or during storage. If present in sufficient concentrations, mycotoxins can cause reduced feed consumption, poor production, abortions and other adverse health effects. It is important to keep in mind that mycotoxins can be present in feeds without visible mold growth and, conversely, visibly moldy feed may not always contain detectable mycotoxins. Many laboratories can test for the presence of mycotoxins in high-risk feedstuffs.

Learn more about nitrates in livestock feeding.
University of Nebraska - Lincoln



Learn more about managing endophyte-infected fescue.
Virginia Cooperative Extension



Feed Contaminants Prevention

- Maintain a quality control program for incoming feed ingredients in an attempt to eliminate contamination resulting from molds, mycotoxins, chemicals, and other contaminants.
- Store feed in a manner that prevents development of molds and mycotoxins and exposure to chemicals and other potential contaminants.
- Submit any feed ingredient suspected of contamination for analysis by a qualified laboratory prior to usage.
- Maintain records of any pesticide use on pasture or crops that could potentially lead to violative residue in cattle.
- Treat all chemicals as potential hazards. Never store chemical products where leakage or breakage can contaminate feed products or where cattle can directly consume a contaminant. For example, do not store batteries, fuel containers, or paint in the same location as feedstuffs.
- Regularly check all feed-handling equipment for fluid leaks.
- Clean up spills to prevent potential contaminants from causing residues, illness, or death in cattle.
- Contact a diagnostic laboratory for assistance in confirming the suspicion of a feed-related poisoning.
- Monitor purchased fats and oils for potential contamination. Letters of guarantee from companies supplying these materials may be requested that state these materials have been tested.



Learn more about mycotoxin-contaminated feeds.
University of Nebraska - Lincoln



Water Quality and Safety

Water is the most important nutrient for general animal well-being. If water or water tanks are not clean, cattle may refuse to drink from them. Cattle that don't drink will be stressed, dehydrated, and have decreased feed intake. This is a preventable problem through the regular monitoring and cleaning of water tanks.

While rare, stray voltage may inhibit water consumption and should be monitored if cattle stop drinking. The first sign of water consumption problems is dramatic decreases in feed consumption (50% or more decrease in intake with a day or two and little-to-no feed consumption within a few day period).



Producers should check water supply for total dissolved solids, fecal coliforms, and any potential toxicities from sulfur, nitrate or other minerals.

Desired And Potential Levels of Pollutants In Livestock Water Supplies

Substance	Desired Range	Problem Range
Total bacteria per 100 milliliters	<200	>1,000,000
Fecal coliform per 100 milliliters	<1	>1 for young animals >10 for older animals
Fecal strep per 100 milliliters	<1	>3 for young animals >30 for older animals
pH	6.8 to 7.5	<5.5 or >8.5
Dissolved solids, milligrams per liter	<500	>3,000
Total alkalinity, milligrams per liter	<400	>5,000
Sulfate, milligrams per liter	<250	>2,000
Phosphate, milligrams per liter	<1	not established
Turbidity, Jackson units	<30	not established

Note: 1 milligram per liter (mg per L) is approximately equal to 1 part per million (ppm). *Agricultural Waste Management Field Handbook, pages 1 to 16.*



Water Quality Guideline Resources

University of Nebraska - Lincoln Water Requirements for Beef Cattle

<https://extensionpubs.unl.edu/publication/g2060/2025/pdf/view/g2060-2025.pdf>

North Dakota State University Extension Livestock Water Quality

<https://www.ndsu.edu/agriculture/sites/default/files/2022-08/as1764.pdf>

University of Missouri Extension Water Quality for Livestock Drinking

<https://extension.missouri.edu/publications/eq381>

Record Keeping Reminders

- Maintain copies of all purchase invoices for all feeds received that contain animal protein.
- Maintain copies of feed labels containing animal protein products that are received.
- Make copies of the invoices and labeling available for inspection and copying by the FDA.
- Maintain the records for a minimum of one year from the date of the receipt of the product.
- Maintain records of any pesticide or other contaminant used on pastures or crops that could potentially lead to violative residue in cattle.

Additional Resources



U.S. Roundtable for Sustainable Beef Grazing Management Module



USDA Natural Resources Conservation Service (NRCS) Range & Pasture



NCBA Grazing Management Planning Workbook

CHAPTER 8

ENVIRONMENTAL STEWARDSHIP



Objectives

- Discuss how to manage natural resources responsibly while providing for cattle nutrition needs.
- Recall how to properly use, store and dispose of all pesticides, in accordance with label instructions.
- Recognize how to properly dispose of a mortality.

Forages and Grazing

Current best practices seek to optimize cattle production in a manner that conserves and/or enhances environmental conditions in a socially responsible and economically viable manner. Grazing production systems vary across the country; therefore, every grazing management plan should be site-specific.

Key Aspects of Forage Management

Stocking rate is the relationship between the number of animals and the grazing management unit utilized over a specific time period. It can be expressed as animal units per unit of land with regard to forage health and production. An animal unit is a 1,000-pound cow—dry or with a 6-month-old calf—with an average dry matter forage intake of 26 pounds per day. Of all the aspects associated with livestock production (under the control of the manager), stocking rate is the most important.

Successful beef cattle operations depend upon healthy, productive grazing lands and cattle that are well adapted to their environment. Well-adapted cattle paired with proper grazing management can reduce variable input costs, such as herbicide, fertilizer and purchased feed.

Consider developing a written grazing management plan to assist in challenges on the operation, and observing,

Proper Grazing Management Outcomes

- Improved soil health and water quality.
- Reduced erosion.
- Increased animal nutrition and efficiency.
- Improved animal health and well-being.
- Better ranch productivity.
- Improved biodiversity.

monitoring and tracking pasture or range improvements over time. Obtain input from a team of professionals that may include livestock and/or forage extension personnel, range management experts in the operation's state or region, and/or public land managers.

- Use soil testing to determine the level of nutrients required for the optimum production of the target forage species or crops.
- Apply fertilizer materials based only on soil test recommendations.

The use of soil testing to determine fertilizer requirements reduces the potential for both soil and surface water contamination due to over-application of fertilizer nutrients.

Soil Conservation

Erosion is the loss of topsoil because of rain or wind. The more bare soil present, the larger raindrop impact and the more erosion the land will experience. Likewise, bare soil exposed to wind reduces air quality as soil particles are detached and transported away by wind currents (dust). Topsoil forms at extremely slow rates, often requiring hundreds of years. Thus, the loss of topsoil due to erosion can affect site productivity for several generations. Besides loss of topsoil itself, important soil nutrients, such as Nitrogen, Phosphorus and Potassium, are also removed.

Pesticide & Herbicide Use

It is important to monitor products applied to the land and products applied directly to the animal. An area of concern is accidental or negligent exposure to feed, water, soil, or other materials contaminated with hazardous materials. Animals that consume forage or feedstuffs that have had a pesticide or herbicide applied could have meat residue if labeled guidelines are not followed. Remember that the label is the law and adhere to the instructions and gain clarification to prevent residues. Deviating from the product label can lead to residue contamination, feed contamination, byproduct contamination and environmental damage. Only EPA, FDA, and USDA approved pesticides can be used for cattle treatment. The following are chemical residue prevention guidelines.

EPA and FDA require all hazardous chemicals be stored away from feed and feed storage areas. Specifically, insecticides must be stored separately from feed additives.^{30,31}

- Use only agricultural chemicals approved for their intended use: directly to livestock, to land grazed by livestock, or on land where feedstuffs are grown.
- Follow label directions and observe grazing restrictions.
- Prevent accidental exposure to agricultural chemicals by properly storing and disposing of containers.
- Do not use the same sprayer to apply agricultural chemicals to pasture or rangeland that is used to apply livestock pesticides directly to cattle.
- Only use approved products for control of internal and external parasites of cattle in a control program with guidance from a veterinarian or parasite specialist.
- Document usage and observe all appropriate withdrawal times before marketing cattle.
- Prevent consumption of hazardous chemicals and heavy metals by proper storage and disposal.
- Prevent contamination of feedstuffs by chemical compounds through proper storage of chemicals and proper treatment of stored feed products with insecticides and fungicides — these should not be stored in the same location as approved animal-use products.
- Record dates of application, areas, animals and/or feedstuffs treated, products used, product serial and lot numbers, appropriate withdrawal periods, etc.
- Producers may want to request a letter of guarantee from the feed supplier that the feed is below violative levels for residues and mycotoxins.
- Request more pesticide/herbicide information from local extension educators or university beef specialists as needed.
- Know and understand state and federal regulations pertaining to pesticide/herbicide application.

Internal and external parasites are a constant economic threat to beef production. Parasites directly affect animal performance, transmit disease, and affect the wholesomeness of beef produced. Use these products in compliance with label directions.



Additional EPA training for pesticide handlers is available through the pesticide applicator certification process.

Keep a record of pesticide use including product ID, serial/lot number, date used, amount used, person who administered the pesticide, the animal or animals exposed to the pesticide, and withdrawal time. When using a pesticide, such as a pour-on used at processing, the record of its use can be included

on the processing record for the group of cattle. If a premise pesticide is used, a record of its use can be included on a Premise Pesticide Use Record. Restricted Use Pesticides require records be kept for two years after application date.³²

Several incidents of deadly feed contamination have resulted from careless handling and storage of pesticides or herbicides. These chemicals must be stored in original containers or in properly marked storage bins.³³

Additional information on soil management can be found through USDA NRCS Soil Facts.



Steps for Triple-Rinsing Pesticide Containers³⁴

1. Remove the cap or lid from the pesticide container, measure the pesticide as the container is emptied into the sprayer tank, and let the container drain into the sprayer tank for 30 seconds.
2. Fill the container 10-20% full of water.
3. Secure the cap or lid on the container and shake to rinse the inside.
4. Remove the cap or lid and add the rinse water from the container to the sprayer tank.
5. Let the container drain into the sprayer tank for 30 seconds or more.
6. Repeat steps 2-4 two more times.
7. Put the cap or lid back on the pesticide container and dispose of the container according to label directions. Do not use empty containers to store any other liquids.

Pesticide & Herbicide Storage and Disposal Guidelines

- Do not stockpile products because they will lose efficacy over time.
- Always store products in their original containers.
- Store products out of reach of children and pets.
- When disposing of products, check with the local landfill, solid waste management authority, local health department, or state department of agriculture to find out whether the community has a hazardous waste collection program for getting rid of unwanted chemicals.
- Contact the state department of agriculture if there is any doubt about proper product use and disposal.
- Do not pour leftover chemicals down the drain, and never dump water that is used to rinse pesticide or herbicide containers on the ground or down a drain, it must be added back to the sprayer tank and used on the site in a manner for which the pesticide is labeled.

Pesticides may interfere with wastewater treatment systems or pollute waterways. Many municipal systems are not equipped to remove pesticide residues. If pesticides reach waterways, they can harm fish, plants, and other living things.

Water Quality Guidelines

- Use elemental scans to determine which salts are potential problems if high levels of total dissolved solids are detected.
- Limit cattle access to streams/riparian areas by developing water sources and strategic use of fencing.
- Provide vegetative filter/buffer strips between corrals and streams.
- Divert runoff around livestock holding areas or corrals.
- Consider installing sediment ponds to control runoff into streams/riparian areas.
- Seal all old/abandoned wells and protect active wells from being a source of contamination to groundwater.
- Provide windbreaks and/or shade, which draw animals out of riparian areas.

Water Quality Properties

Biological: bacteria, viruses, protozoa, and worm eggs

Physical: color, turbidity, sediment, temperature, odor, algae (blue-green can produce deadly toxic effects)

Chemical: pH, total dissolved solids (TDS), nitrates/nitrites, phosphates, sodium, sulphates



Feedlots or Other Dry Lot System

If a facility is classified as a concentrated animal feeding operation (CAFO),³⁵ runoff control and manure (whether liquid, solid or slurry) management plans may be required by state and federal guidelines. Adequate control and monitoring of runoff ponds is required for CAFOs and usually includes water utilization through irrigation and provides valuable nutrients for crop production.³⁵ In addition, manure nutrient management plans may be required to ensure excess nutrients are not building up on crop acres thus increasing risk for nutrient loss through leaching or surface runoff.

For operations classified as animal feeding operations (AFO) where cattle are housed in pens and devoid of vegetation or cover for more than 45 days per year,³⁶ developing runoff control systems to prevent surface water contamination is important. Avoid constructing pens or corrals in any man-made conveyance or surface water flows.

Mortality Disposal

Whenever feasible and possible, rendering is the preferred option for a mortality disposal given the benefits of utilizing those carcasses. In cases of necessary euthanasia, the method of euthanasia should be evaluated to ensure carcass utilization is allowable. If barbiturates or barbiturate derivatives are used to euthanize an animal, the carcass cannot be rendered.³⁷ When rendering is not plausible, several options for carcass disposal are available including burial, incineration, and composting. Cooking carcasses for animal feed is illegal because of the ban on feeding ruminant-derived proteins back to ruminants.³⁸

Timely disposal of mortalities is an environmental concern. On-site burial of carcasses may be the best disposal option for cow-calf producers currently available due to a lack of rendering facilities in many communities. Some municipal solid waste landfills will accept dead animals. However, regardless of the size of the operation, no dead animal is to be buried on-site unless local and state regulations have been checked to determine what is allowed. Many state land grant universities or state departments of agriculture provide education on allowable methods in their states.



**Nutrient Management
Planning Resources**

Livestock and Poultry
Environmental Learning Community



**USDA NRCS Conservation
Resources by State**

Record Keeping Reminders

- Keep a record of pesticide use including application date, areas, animals and/or feedstuffs treated, products used, product ID, serial/lot number, date used, amount used, person who administered the pesticide, the animal or animals exposed to the pesticide, and withdrawal times.
- When using a pesticide, such as a pour-on used at processing, the record of its use can be included on the processing record for the group of cattle.
- If a premise pesticide is used, a record of its use can be included on a Premise Pesticide Use Record.
- Restricted Use Pesticides require records be kept for two years after application date.
- Record all applications (rate and nutrient composition) of fertilizer, regardless of source, and the area to which it was applied.

CHAPTER 9

WORKER SAFETY



Objectives

- Learn about safety precautions on beef production operations.
- Train employees and others working on the operation on safe practices when using equipment, handling cattle, handling animal health products, and around potentially hazardous areas.
- Customize training protocols to each operation.
- Develop a safety culture and mindset that begins with leadership on each operation.

It is the responsibility of each operation to cultivate a culture of safety and to provide training and support from managers to feeders to family members, including children. Incorporating worker safety training on a monthly, semi-annual, or annual basis can include many aspects of cattle care such as how to improve human interaction with animals and equipment in a safe work environment. Workers in the agriculture, forestry, fishing and hunting industry experienced one of the highest fatal injury rates of any industry.

Safety on Beef Production Operations

Worker Training

Communication about safety and the importance of safe work environments should be developed for the specific routines on the farm or ranch.

- Safety trainings should be held at least annually for all cattle caretakers including owners, managers, employees, family members, neighbors, or anyone in the operation.
- Trainings should be provided in a language that the employee understands and multiple ways of providing that information, such as written, oral communication, or video.

Ensuring worker safety and providing appropriate training is critical to every cattle operation.



“Nothing we do is worth getting hurt over.”

Jerry Wulf, Riverview LLP/Wulf Cattle

Training and Record Keeping

Training is recommended for every employee at least once a year and must be verified by a trainer. Additional training may be needed with written materials, online videos, veterinarian or nutritionist discussion, or continuing education events. Employees should receive documented training in the area(s) of their responsibility.

General Safety

First Aid & CPR

Safety training is an investment in the employees and operation. A first-aid kit should be available, easily accessible, and regularly inspected to ensure it is fully stocked with items that have not exceeded expiration dates. All employees should know basic first aid, CPR, and how to use an automated external defibrillator (AED). These should be easily accessible on the operation. Recertification on an annual basis is recommended.

Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) is equipment worn to minimize exposure to hazards in the workplace. These hazards may vary based on risk and operation. The regular use of PPE can reduce the likelihood of workplace illness or injury.



Stress and Mental Health

Farming and ranching are inherently demanding jobs that are affected by weather, economics, and isolation. It is important to understand how the stress of working on a cattle operation can be mitigated or managed. Many mental health resources are available for the agricultural community. Check with state extension offices for state-specific resources.

If you or a loved one is experiencing a crisis, dial 988. The Lifeline provides 24/7, free and confidential support for people in distress, prevention and crisis resources.

Working with Livestock

Animal Handling Safety

- Document training for animal handlers using BQA cattle behavior and handling guidelines.
- Ensure animal handlers always consider human safety first when handling cattle and horses.
- Evaluate temperament of animals before handling. Give excited or aggressive animals time to calm down or come along with calmer animals.
- Animal handlers should avoid entering small and confined areas with excitable animals.
- Ensure working facilities allow employees the ability to escape enclosed areas should an animal become aggressive.
- Handle cattle in groups rather than as individuals when possible.
- Caretakers expected to ride horses should be trained on basic equine behavior and handling prior to riding. Riding experience and instruction should try to match the horse's experience and temperament.

Equipment and Facility Safety

Facility design, as well as understanding how cattle move through the system, is important for work efficiency and human safety. Prior to handling cattle or processing, these points can help train and prepare the crew.

- Facility walk-through: look for human passageways, protrusions in gates or fences, defects in floor or sides of facility.
- Chute: evaluate neck access, adjust equipment width and height, and test before animals enter.
- Maintenance of equipment: ensure parts are greased/oiled, and gates are functioning correctly.
- Ensure that gates are placed to work with the flow of cattle and that they are conducive with working facilities while prioritizing human safety.

Gate Safety³⁹

Gates, and the improper use of gates, when moving livestock are far too often a major source of injury to employees and livestock. The following guidelines and best practices can reduce risk of injury.

Learn the importance
of gate safety by
watching this video.



- Gates should be in good working order, swinging, with no obstruction.
- Modify sharp corners and repair any broken welds, boards, loose nails, bolts, or other objects that may result in sharp edges or protrusions.
- Never throw a gate to stop an animal. Throwing gates can cause bruising and injury to animals and the risk of bounce back is a major risk factor for injury to employees.
- Do not stand directly behind a gate while loading a pen. Even if latched, gates may break free and result in injury.
- Do not stand at the end of a gate where it is possible to get caught between the gate and an opposite fence or structure as it may result in being crushed.
- Stand clear and do not hook an arm or elbow in the gate.

Communication is key! Before the cattle handling event, prepare all employees and team members who will be helping that day.

Firearm or Captive Bolt Safety and Maintenance

- Using a firearm or captive bolt are common methods for euthanasia of cattle.
- Persons who perform this task must be trained, know the relevant anatomical landmarks, and understand the protocols used for humane euthanasia of animals.
 - Refer to the *Chapter 5: Herd Health* for euthanasia protocols.
- Ensuring human and animal safety during the process is most important.
- Best practices include:
 - At least two trained individuals should be identified to euthanize with firearm or captive bolt in any given work shift.
 - At least two firearms or approved euthanasia tools should be identified and appointed to use for euthanasia purposes.
 - Firearms or captive bolts should be cleaned regularly and maintenance logs of cleaning should be kept.
 - Firearms and captive bolt guns should be responsibly and securely stored when they are not in use.



Manure and Commodity Storage

It is critical to regularly review safety plans with everyone working near manure and commodity storage areas. This includes having specific PPE available for each area. More guidance for different types of storage is discussed below.

■ Managing Silage in Bunker Silos or Drive-Over Piles⁴⁰

- ☐ To prevent being crushed or suffocated by collapsing silage:
 - ▶ Follow the 'buddy rule' and never work alone in a bunker or pile.
 - ▶ Do not fill bunkers and build piles more than 12 feet unless safety precautions are taken.
 - ▶ When filling bunker silos, do not exceed the height of the safety rail on the walls or the maximum height at which unloading equipment can remove silage from the feed-out face safely.
 - ▶ The feed-out face is highly unstable; use caution when removing plastic, tires, or gravel bags.
 - ▶ Never allow people to approach the feed-out face closer than three times its height.
 - ▶ Building the feed-out face at an angle may reduce risk of collapse.
 - ▶ Never park vehicles or equipment near the feed-out face.
 - ▶ Never drive the unloader parallel to and in close proximity of the feed-out face in an over-filled bunker or pile.



Keith Bolsen Silage Safety Institute

■ Manure Pits and Lagoon Safety

- ☐ Post signs and barriers indicating the area is a hazard zone.
- ☐ Provide and document training for employees working around manure pits.
- ☐ Inform employees about potential atmospheric hazards of manure pits including toxic gases, engulfment potential and configurations that could trap or asphyxiate a worker.
- ☐ Employees should use PPE and be trained to identify signs of injury or illness including eye/nose/throat irritation, headache, dizziness, drowsiness/confusion, nausea/vomiting, or difficulty breathing.
- ☐ Keep flotation devices readily accessible for emergencies.
- ☐ Follow state and national regulations pertaining to management of manure pits and lagoons.



■ Grain Storage

- ☐ Aim for zero entry into the grain bin.
- ☐ Post warning signs on bins and at all entry points to identify hazards.
- ☐ Work from outside the bin and above the grain.
- ☐ To reduce injury or death from falls, upgrade ladders with cages or use staircases, wear a safety belt when working around or going inside a grain storage facility, and work in pairs if possible.

■ Fumes in Areas With Poor or No Ventilation

- ☐ Inform all employees that:
 - ▶ poorly ventilated areas (pits, grain bins, silos, etc.) may contain toxic fumes.
 - ▶ exposure to toxic fumes can occur when working with chemicals, such as pesticides.
 - ▶ handling dusty/moldy feed can be harmful to the respiratory system.
- ☐ Train employees how to work safely in poorly ventilated areas.
- ☐ Properly ventilate bins before employees enter.
- ☐ Provide proper respiratory protection gear (e.g., respirators) to all employees if entry into poorly ventilated areas is necessary.
- ☐ Ensure individuals wear dust masks or respirators when exposed to molds, dusts, or chemical fumes.

PRODUCT TYPE	DESCRIPTION	MINIMAL RISK	DANGEROUS RISK	SAFETY ACTION IF EXPOSED
Vaccines	Modified Live Vaccines (MLV) or Killed (virus/bacterial)	Most fit in this category.	None	- Wash exposed/injected area and treat with a topical antibacterial ointment. - See a doctor if swelling or pain develops.
	Modified Live Bacterial	None	All have potential to cause disease in humans.	- See a doctor immediately and take the label/bottle of vaccine with you. - The doctor will likely begin treatment with an antibiotic.
Medications (antibiotics, reproductive hormones, supplements, others)	Injectable & Oral	- Most fit in this category. - A potential allergic reaction in some individuals.	Tilmicosin (Micotil)* – HUMAN INJECTIONS HAVE BEEN ASSOCIATED WITH FATALITIES - Do not load syringe until the animal is properly and adequately restrained. - Use the “one hand” SQ tented technique for giving injections.	- If Micotil* is accidentally injected, this is an extreme emergency – CALL 911, apply ice to injection site, rush person to Emergency Room and take label to ER. - There is no known antidote.
	PRODUCTS WITH INCREASED RISK FOR PREGNANT WOMEN AND WOMEN OF CHILDBEARING AGE - Can be absorbed through skin. - Pregnant women and all women should not handle bottles or touch equipment that has been contaminated. - All people should wear gloves when handling.		Prostaglandin – PREGNANT WOMEN CAN/WILL ABORT OR GO INTO LABOR IF EXPOSED Readily absorbed through skin and may cause abortions and/or respiratory problems.	- Spillage on the skin should be washed off immediately with soap and water. - Wash exposed/injected area and treat with a topical antibacterial ointment and see a doctor if swelling or pain develops. - Pregnant women see a doctor immediately.
			CIDR (and other prostaglandins)	- Spillage on the skin should be washed off immediately with soap and water. - Wash exposed/injected area and treat with a topical antibacterial ointment and see a doctor if swelling or pain develops.
			Dexamethasone (steroid) – PREGNANT WOMEN CAN POTENTIALLY ABORT OR GO INTO LABOR IF EXPOSED.	- Wash exposed/injected area and treat with a topical antibacterial ointment and see a doctor if swelling or pain develops. - Pregnant women see a doctor immediately.
Antiparasitic (dewormers, lice control, ear tags, others)	Injectable	- Most fit in this category. - No known allergies.	None	Wash exposed area and contaminated clothing.
	- Pour-On - Topical - Oral	- Most fit in this category. - Wear protective gloves when using all of these products. Organophosphates potentially can be a serious hazard if handled improperly.	Only organophosphates are considered dangerous unless an allergic like response develops.	- Newer generation synthetic pyrethroids can cause a severe tingling or numbing in some people depending on location of exposure. - Wash exposed area and contaminated clothing. - Consider applying pour-ons and topical treatments as last activity to prevent human exposure.

Miscellaneous

Chemical Safety

Always read packaging labels on any chemical product, including cleaning products, pesticides, pour-on products, herbicides, and others. Producers possessing a Pesticide Applicator License should follow all guidelines pertaining to that certification. Refer to *Chapter 8: Environmental Stewardship* for more on chemical safety.



Find CDC resources on handling tilmicosin and safety precautions here.

- As required by the federal Worker Production Standard, proper training for pesticide handling should be available to all who work with these products. OSHA requires that all employees be made aware of any hazardous chemicals to which they may be exposed. In addition, all chemicals used on the operation should have an accompanying Material Safety Data Sheet (MSDS), which contains additional health hazard warnings and handling instructions.
- Check chemical application before use and use appropriate personal protection equipment (PPE) for the product. PPE could include chemical-resistant gloves, closed-toe shoes, coveralls, hats, respirators, goggles, face shields, or others. Clothing with chemicals on them should be washed separately from other laundry.
- Regular training updates (at least annually) are important for all employees whose work is associated with pesticide use.

Record Keeping Reminders

- Keep proper records for employees, training completed, and details within those training sessions per state and federal regulations.
- To help ensure overall care of cattle, consider having those working with cattle sign the BQA Cow Care Agreement. This resource can be found in Resources on www.bqa.org or the inside front cover of this guide.
- Record keeping is an important piece to a successful cattle operation. Training records ensure that all members of the team, including family members, are aware of their responsibilities and how to keep themselves safe. Each operation will have different best management practices (BMP) established for minimum training requirements. Employee training logs will help with these requirements.
- Firearms or captive bolts should be cleaned regularly and maintenance logs of cleaning should be kept.
- Keep an inventory of all products and frequently check product expiration dates.
- Biosecurity practices should be listed for the operation for employees to see.
- Provide a guest sign-in sheet to log all visitors.
- Record purchase and use of chemical products. Records of pesticides should be kept for at least two years.
- Regular training updates (at least annually) are important for all employees whose work is associated with pesticide use.
- Emergency Action Plans (EAP) and biosecurity plans should be reviewed when new workers are hired, the plan is developed or changed, or the worker's workplace responsibilities or designated actions under the plan change.

* Before you use any Micotil product, it is important to read the entire product insert, including the boxed human warning. Caution: Federal law restricts this drug to use by or on the order of a licensed veterinarian. Not for human use. Injection of this drug in humans has been associated with fatalities. Keep out of reach of children. Administer only with a tube-fed safety syringe. Do not use in automatically powered syringes, single-use syringes, or other delivery devices. Exercise extreme caution to avoid accidental self-injection. In case of human injection, consult a physician immediately and apply ice or cold pack to injection site while avoiding direct contact with the skin. Avoid contact with eyes. Always use proper drug handling procedures to avoid accidental self-injection. Consult your veterinarian on the safe handling and use of all injectable products prior to administration. For use in cattle or sheep only. Inject subcutaneously. Injection of this antibiotic has been shown to be fatal in swine and non-human primates, and may be fatal in horses and goats. Do not use in lambs less than 15 kg body weight. Do not use in female dairy cattle 20 months of age or older. Use in lactating dairy cattle or sheep may cause milk residues. The following adverse reactions have been reported: in cattle: injection site swelling and inflammation, lameness, collapse, anaphylaxis/anaphylactoid reactions, decreased food and water consumption, and death; in sheep: dyspnea and death. Micotil has a pre-slaughter withdrawal time of 42 days.

CHAPTER 10

EMERGENCY ACTION PLANNING



At a minimum, plans should include a communication tree, emergency escape procedures and routes, a method for accounting for people, and a designated meeting place. Information within an EAP varies based on each operation.



Review the CDC's page on coping with a disaster or traumatic event.

Objectives

- Develop and maintain written emergency action plans specific to the operation.
- Inform and train everyone involved in the operation what to do in case of an emergency.

Emergency Action Plan (EAP) – Why is it Needed?

Emergency action plans and preparedness are important to overall business continuity during emergencies, such as natural disasters, biological emergencies, technological interruptions and other threats. All operations should have a written EAP. Keeping family members and employees safe is the responsibility of the operation and extra preparedness also helps first responders. EAPs serve as prevention steps to minimize the occurrence of an emergency and help teams act quickly through preparation. These plans can enable business continuity after the emergency resolves and employees return to work.

Creating a Plan

Using the five W's, assess the risk for the operation considering the region of the country, time of year, and business type.

- **Who:** Who should be involved? Who is most at risk in case of an emergency? Who needs to receive and who will conduct training?
- **What:** What do you need to do? What will employees need to be safe, protected, and supported?
- **Where:** Where should you go? Where can employees learn about these plans?
- **When:** When should you plan? When should employees be trained? When should they be alerted to a disaster?
- **Why:** Why are you implementing these policies?

Communication

Communication is key before, during, and after an emergency. All family members and employees should be trained on the operation's EAP, in a language they understand, and know where to find important information. During the planning process, work with local first responders and other organizations to help the operation cover various situations. Written plans should be easily accessible and posted in visible areas where they can be quickly accessed.

Operation Map and Layout

Operations may choose to add information such as a site map/layout of the operation and a diagram that shows where equipment, controls, and potentially hazardous items such as medicines, chemicals, and fuel are located. These details are valuable to emergency response teams.

The premises map that is part of the operation's biosecurity plan can also be used for the EAP. These should be printed and saved digitally to be made available for employees or first responders in case of an emergency.

Building layouts should include locations of emergency exits, fire extinguishers, severe weather shelter areas, and emergency equipment (e.g., AEDs, first-aid kits, others). The operation layout should include a diagram, with a legend or key, showing the location of:

- | | | |
|-------------------------------------|---|--------------------------------|
| ■ Buildings | ■ Medicines | ■ Severe weather shelter areas |
| ■ Equipment (portable fence/panels) | ■ Chemicals | ■ Safe meeting point |
| ■ Livestock trailers | ■ Animal locations (including number and purpose) | ■ Property lines, fences |
| ■ Electric/utility controls | | ■ Roads or access points |

Employee Information and Training

It is the responsibility of each operation to ensure there is emergency contact information for each employee. A list of workers or work schedule can be used to provide a head count during a response and should be readily available. Employee training on EAPs should occur upon hiring and at least annually to adapt to changing conditions.

Suspect a Foreign Animal Disease such as Foot-and-Mouth Disease?

All producers are encouraged to know who the State Animal Health Official (SAHO) is and how to contact them.

Report a suspected or diagnosed disease to the SAHO or the USDA APHIS Assistant Director for the state at www.aphis.usda.gov/nvap/area-vet.

Producers can also call the USDA Emergency numbers at **(800) 940-6524** or **(866) 536-7593** (24 hours).

Information will be kept confidential during the investigation.

Record Keeping Reminders

- Develop an emergency action plan (EAP) for the operation. An EAP is a written framework that guides producers through the planning, actions, and documentation of an emergency response plan for unexpected and emergency events.
- Written plans should be easily accessible and posted in visible areas where they can be quickly accessed. For example, a copy should be in the office and where employees are frequently working. A copy should also be available in remote locations and in the glove compartment of vehicles.
- Up-to-date records and copies of the identification either on paper or electronically aid in returning animals during a foreign animal disease outbreak.
- The Secure Beef Supply plan provides guidance to producers and transporters who have cattle with no evidence of FMD infection prepare to meet movement permit requirements.



Watch this video and learn how to make a premises map.



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