



**Maine Department of Agriculture, Conservation and Forestry
Division of Animal and Plant Health
LIVESTOCK GENERAL BEST MANAGEMENT PRACTICE GUIDE*
Revision Date: April 2024**

***The information in this document is presented as a guideline for management practices for the included livestock species. These guidelines represent acceptable standards that are subject to change as livestock industries and technologies evolve. Additional references from credible sources have been provided to help guide further study. This document is updated periodically; however, it is the responsibility of the livestock producer to verify that they are following up-to-date standards of animal care.**

General Livestock Management Guidelines: All Species

Waste Management

A waste management plan should be in place before acquiring livestock. Accumulation or improper storage of animal wastes can negatively impact animal, human, and environmental health. When managed appropriately, animal wastes can be a beneficial source of soil fertility. When managed improperly, animal wastes can be a source of disease, environmental contamination, and odor.

1. Nutrient Management for Small Farms, University of Virginia;
[BSE-241.pdf \(vt.edu\)](#)
2. Guidelines for using Manure on Vegetable Gardens;
[Resource002114_Rep3119.pdf \(unh.edu\)](#)
3. Maine Nutrient Management Act;
[title7ch747.pdf \(mainelegislature.org\)](#)

Biosecurity

Farm biosecurity practices are the first line of defense against the introduction or spread of diseases, for both livestock and people. Developing a biosecurity plan for your farm is an inexpensive and very effective method for preventing, containing, or eliminating many diseases. The three main components of a biosecurity plan are 1) isolation, 2) control of the movement of people, animals, and equipment, and 3) sanitation and animal husbandry.

Please see the references below for specific recommendations and protocols that you can implement on your farm. Your veterinarian is also a good resource for determining which biosecurity practices will be most beneficial for your farm's goals and management practices.

1. Biosecurity Guidelines UMass Extension:
<https://ag.umass.edu/sites/ag.umass.edu/files/fact-sheets/pdf/BiosecurityGuidelinesforAnimalIndustries08-13.pdf>
2. Disinfection of livestock production premises:
<https://doc.woah.org/dyn/portal/digidoc.xhtml?statelessToken=Y4I5XWrfqiYzOA4Neb2kFcv6y1ww1kaxDC7NvLPqExg=&actionMethod=dyn%2Fportal%2Fdigidoc.xhtml%3AdownloadAttachment.openStateless>



3. Isolation/Quarantine protocols for livestock (see page 2 section **Movement and Quarantine**):https://www.aphis.usda.gov/animal_health/nahms/smallscale/downloads/Small_scale_is_Biosecurity.pdf
4. Zoonotic disease- Center for Food Safety and Public Health Website:
<http://www.cfsph.iastate.edu/Zoonoses/>
5. Record keeping for Livestock Farmers (MOFGA Article):
<https://www.mofga.org/resources/livestock/record-keeping-for-livestock-farmers/>
6. Rodent control UMass Extension: <https://ag.umass.edu/sites/ag.umass.edu/files/factsheets/pdf/RodentControl08-44.pdf>

Euthanasia

An animal or group of animals may need to be humanely destroyed due to debilitating disease or condition, the need to control animal disease and/or to protect public health. The most humane and practical method of euthanasia may vary, depending on the age, species, number and management situation of the animals requiring euthanasia. It is important to be aware of acceptable humane methods of euthanasia and plan for that situation before the need arises, particularly if specialized equipment or veterinary assistance will be needed.

Euthanasia is the expedient termination of an animal's life in a way that minimizes pain and distress. Information regarding approved methods of euthanasia (according to the American Veterinary Medical Association or AVMA) are detailed for each species in the following sections. If there is any question as to whether the procedure is warranted or how to carry out humane euthanasia, veterinary guidance should be sought. Regardless of the method employed to euthanize an animal, death must be confirmed before disposal.

- 1) AVMA Guideline for the euthanasia of animals 2013 Edition:
<https://www.avma.org/KB/Policies/Documents/euthanasia.pdf>
- 2) Procedures for Humane Euthanasia (multiple livestock species):
<https://vetmed.iastate.edu/sites/default/files/vdpam/Extension/Dairy/Programs/Humane%20Euthanasia/Download%20Files/EuthanasiaBrochure20130128.pdf>

Emergency Preparedness

An unforeseen event that is beyond your control may prevent you from properly caring for your animals. If you are unexpectedly unavailable, if you must travel, or if you are hurt, your animals will still need access to food, water, adequate clean shelter and management. The livestock owner should always have a backup contact that is familiar with the animals and facility and is willing to step in and assist with providing animal care.

Natural disasters, extreme weather events, or other unforeseen circumstances may prevent you and many others in your area from accessing and caring for livestock. In this case, you may not be able to recruit additional help and you may need to rely on your emergency supplies on hand. Developing a plan for continuity of care and keeping an updated contact list of emergency numbers is the responsibility of every livestock owner.

Some key contacts to keep current are local law enforcement, local fire and rescue, local Veterinarian (be sure they offer emergency coverage and that you are an active client), State Animal Health Officials and someone who can stand in to care for your animals if you are unavailable.



Some key information you should have on hand: Your GPS location, types of animals on site, numbers of animals on site, animal identification numbers and management records.

1. FEMA Animals in Disasters- The care of Livestock and Horses in Disasters: https://training.fema.gov/emiweb/downloads/is10_a-8.pdf
2. The Humane Society- Disaster Preparedness for Livestock: <https://www.humanesociety.org/resources/livestock-disaster-preparedness>
3. Livestock Emergency Preparedness plan: <http://www.prep4agthreats.org/Assets/Factsheets/livestock-emergency-preparedness-plan.pdf>
4. Dairy and Livestock Farm Disaster Preparedness and Recovery Guide for Maine Farmers: <https://extension.umaine.edu/publications/1211e/>
5. Farmers response to disease outbreaks like Covid19: <https://extension.umaine.edu/livestock/poultry/poultry-covid-19/>

General Agricultural Resources

- 1- Body Condition Scoring Handbook (bottom of webpage; pdf with various livestock species with pictures): <https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/livestock/animal-health-and-welfare/body-scoring-f>
- 2- Veterinary Feed Directive: <https://www.fda.gov/animalveterinary/developmentapprovalprocess/ucm455413.htm>
- 3- Left overs for livestock- A Guide for Using Food Scraps for Animal Feed: https://www.chlpi.org/wp-content/uploads/2013/12/Leftovers-for-Livestock_A-Legal-Guide_August-2016.pdf
- 4- How to read a feed tag: <https://pubs.extension.wsu.edu/feedology-how-to-read-a-feed-tag>
- 5- Idaho Forage Handbook: <http://animalrangeextension.montana.edu/forage/documents/ID%20forage%20handbook.pdf> and UMaine Forages and Pastures Publications: <https://extension.umaine.edu/publications/home/agriculture/forages-and-pastures/>
- 6- Humane Handling Guideline (North American Meat Institute): https://www.meatinstitute.org/sites/default/files/original%20documents/Animal_Handling_Guide_English.pdf
- 7- Animal Welfare Assessment for Sheep: <https://www.farmhealthonline.com/US/health-welfare/sheep/sheep-welfare-assessment/>
- 8- Winter Barn Management for Pest Exclusion: <https://www.canr.msu.edu/news/preparing-your-barn-for-winter-pest-management-series-part-one>
- 9- Maine Red Meat and Poultry Inspection (includes information about Rabbits): https://www.maine.gov/dacf/qar/inspection_programs/red_meat_poultry_inspection.shtm
- 10- AVMA Animal Welfare Principles (General): <https://www.avma.org/resources-tools/avma-policies/avma-animal-welfare-principles>
- 11- Carcass Disposal Rules (Chapter 11)(immediately downloads to your device): <https://www.maine.gov/sos/cec/rules/01/001/001c211.doc>
- 12- Composting resources UMAINE: <https://extension.umaine.edu/gardening/manual/composting/>
- 13- University of Maine Veterinary Diagnostic Lab: <https://extension.umaine.edu/veterinarylab/>



- 14- Maine Farm Bureau: <https://www.maineighbureau.us/>
- 15- Mental Health: <https://www.namimaine.org/>
- 16- UMaine Extension Homepage: <https://extension.umaine.edu/>
- 17- Hay directory: <https://extension.umaine.edu/livestock/hay/>
- 18- Animal Health Homepage for Maine Department of Agriculture Conservation and Forestry: https://www.maine.gov/dacf/ahw/animal_health/index.shtml
- 19- ME DACF AH – Livestock and Poultry Production Market Assistance: https://www.maine.gov/dacf/ahw/animal_health/livestock_production.shtml
- 20- Animal Welfare Homepage for Maine Department of Agriculture Conservation and Forestry: https://www.maine.gov/dacf/ahw/animal_welfare/index.shtml
- 21- Northeast Livestock Expo: <http://www.northeastlivestockexpo.com/>
- 22- Maine Large Animal Veterinarians (DACF Animal Health homepage, right panel “Related resources”): https://www.maine.gov/dacf/ahw/animal_health/index.shtml

Species Specific Guidelines

The remainder of this document provides information and resources for further investigation for various livestock species and is organized as follows:

Housing
Nutrition
Handling
Health Management
Euthanasia
Additional Resources

Dairy

FARM (National Dairy Farmers Assuring Responsible Management) is an excellent and comprehensive resource for dairy farm management guidelines that maximize animal welfare. The program webpage can be found here: <https://nationaldairyfarm.com/what-is-farm/> The information below supplements the recommendations put forth by the FARM program.

Housing

The shelter provided to dairy cattle can be constructed, natural or a combination of both. All animals should be able to be sheltered comfortably without crowding or causing injury. Good air quality must be preserved by preventing accumulation of ammonia and moisture. All animals should be able to access a clean, dry area and footing should be maintained in a manner to prevent slipping or tripping. Fences and gates should be in working order to contain the animals without posing a risk for injury to animals or handlers. Holding pens, calf pens and bull pens should be maintained in the same standard of safe, sanitary condition.

- 1. Dairy Calf Housing and Environment (includes reference for trailering of dairy calves): <https://pubs.extension.wsu.edu/dairy-calves-and-their-environment-improving-health-welfare-and-performance>



2. Small Scale Dairy Calf and Cattle Housing: <https://ag.umass.edu/crops-dairy-livestock-equine/fact-sheets/small-scale-dairy-calf-cattle-housing> Socially Raised Calves (Penn State webinar) <https://extension.psu.edu/socially-raised-calves-group-housing>
3. Hoof Health and Housing: <https://fyi.uwex.edu/dairy/files/2016/11/Hoof-Health-Housing-Factsheet-Blonde-2.pdf>
4. Dairy Housing Layout Options (Pros and Cons): <https://www.ontario.ca/page/dairy-housing-layout-options>

Nutrition

Calves should receive an adequate volume of quality colostrum or replacer in the first 12 hours after birth. The calf management program should require this step for all calves, regardless of their ultimate purpose on the farm or the length of time they will remain on the farm. Following delivery of colostrum, calves should be fed a volume of milk or milk replacer that will promote health and continued growth. All calf feeding equipment must be sanitized regularly to prevent development or spread of disease.

Heifers, transition cows, dry cows and lactating cows all have slightly different dietary requirements. There are guidelines in the links below which describe the unique nutritional needs of each class of dairy animal. Working with a dairy nutritionist will ensure that the most appropriate diet is fed to each group based on the forages and finances available.

Feeding a consistent, high-quality ration will promote a stable rumen environment and overall metabolic health. The ration should be provided in a sanitary feeding area, where all animals will have the opportunity and the ability to access the feed. Animal feeds should be stored in a manner that prevents contamination by wildlife, manure, water runoff, chemicals or other non-feed ingredients.

It is important to regularly evaluate the Body Condition Score (BCS) and production indicators of groups of cows to determine if the ration being offered is appropriate, or if individual animals are performing poorly.

1. Dairy Cattle Nutrition and Feeding (older): <https://www.yumpu.com/en/document/read/11742077/dairy-cattle-nutrition-and-feeding> (newer technical): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7153313/>
2. Forage Sampling Team Forage University of Wisconsin: <https://fyi.uwex.edu/forage/feeding/>
3. Total Mixed Ration Management: <https://afs.ca.uky.edu/content/managing-total-mixed-ration-prevent-problems-dairy-cows>
4. Total Mixed Rations for Cows (Penn State): <https://extension.psu.edu/total-mixed-rations-for-dairy-cows>
5. University of Minnesota Extension- Formulation Rations for Cows: <https://extension.umn.edu/dairy-nutrition/formulating-dairy-cow-rations>

Handling

Moving or handling animals is a potentially stress inducing event and must be done with human and animal safety and welfare in mind. Approved animal handling devices such as flags or



paddles should be utilized rather than yelling, using electric prods or other forms of physical contact. Excessive physical force should never be used. Alleyways should be clear and constructed of sturdy, non-slippery flooring to allow animals to move smoothly and willingly.

Equipment in the milking parlor should be clean and in good working order to prevent injury or discomfort to the cow during use. Damaged equipment may promote the spread of infection between cows by harboring pathogens or damaging the tissues it contacts. Milking time is an opportunity to observe cows closely for any signs of illness or injury.

All equipment used for trailering cows should also be maintained in working order to be safe for animal containment and road travel. Trailers should be cleaned regularly to prevent transmission of pathogens. Environmental conditions will affect the number of animals that should be loaded into a trailer compartment as well as the length of travel. For example, when the weather is hot or humid, fewer animals should be loaded into each compartment.

It is never appropriate to beat, drag or otherwise mistreat animals during handling. For small calves that are being transported, they can be picked up around the legs if they will not walk on their own. If an animal is unable to walk on their own, they must be considered as a debilitated animal and treated according to the established guideline provided below.

1. Master Cattle Transporter Guide: http://www.livestocknetwork.com/master_cattle_transporter_guide/master_cattle_transporter_guide.pdf
2. AVMA Position on Disabled Livestock: <https://www.avma.org/KB/Policies/Pages/Disabled-Livestock.aspx>
3. Minnesota Dairy Cattle Low Stress Handling: <https://extension.missouri.edu/media/wysiwyg/Extensiondata/Pro/Dairy/Docs/conference/2011/PaulRapnicki.pdf>

Health Management

A highly productive dairy herd is an indicator of good nutritional and husbandry management, and a strong preventative healthcare plan. The herd is evaluated as a whole, assessing data trends within a group that suggest animal health management procedures are successful, or that a modification is needed. Markers of productivity such as conception rates, calving rates or milk production, are interpreted based on daily or annual numerical values. Other indicators of animal health and wellbeing are periodically evaluated and given a score. For instance, body condition, udder hygiene and lameness are scored based on a spectrum of clinical signs of disease. These numeric evaluations can highlight a herd health trend and allow for monitoring or improvement over time.

Different age groups of dairy animals are vulnerable to slightly different forms of disease. This fact determines which vaccinations are necessary, and when they should be given for maximum benefit. The resources below describe the most common bacterial and viral diseases of dairy cows, and your herd veterinarian can recommend a vaccination schedule based on the dairy herd's risk factors and goals.



Pharmaceuticals and other health management tools should be secured in a designated space where animals or unauthorized individuals cannot access them.

1. Dairy Grazing:Herd Health: <https://extension.missouri.edu/publications/m179> ; Parameters useful to monitor health and production of dairy herds: <https://www.merckvetmanual.com/management-and-nutrition/health-management-interaction-dairy-cattle/the-health-management-program-in-dairy-cattle>
2. Dairy Herd Vaccination Program: <https://www.uaex.uada.edu/publications/PDF/FSA-4012.pdf>
3. Welfare Implications of Tail Docking in Cattle (AVMA) : https://www.avma.org/KB/Resources/LiteratureReviews/Documents/tail_docking_cattle_bgnd.pdf
4. Udder Hygiene Evaluation Guideline: https://www.researchgate.net/publication/237580204_A_Tool_Box_for_Assessing_Cow_Udder_and_Teat_Hygiene
5. Lameness in Dairy and Beef Herds (AABP): http://www.aabp.org/resources/aabp_guidelines/lamenessguidelines-03-11-2014.pdf
6. AVMA Veal Calf Husbandry: https://www.avma.org/KB/Resources/LiteratureReviews/Documents/veal_calf_husbandry_bgnd.pdf
7. Biosecurity Practices for Dairy Operations: <https://texashelp.tamu.edu/wp-content/uploads/2016/02/Biosecurity-Practices-For-Dairy-Operations.pdf>
8. University of Wisconsin Calf Health: <https://thedairylandinitiative.vetmed.wisc.edu/wp-content/uploads/2018/07/Mcguirk-managing-the-calf.pdf>
9. Colostrum protocol: <https://thedairylandinitiative.vetmed.wisc.edu/wp-content/uploads/2018/07/Mcguirk-managing-the-calf.pdf>

Euthanasia

Several approved methods of euthanasia are available for use in dairy cattle. Approval for any given euthanasia method means that the procedure has been determined to cause loss of consciousness without unreasonable distress or suffering, and subsequent cessation of vital activity. These approved euthanasia methods achieve this goal when applied correctly. For this reason, it is crucial that the guidelines be adhered to. A plan for euthanasia of dairy cattle should be developed and implemented at each farm, based on the skills and resources available.

The document cited below, published by the American Association of Bovine Practitioners, provides an excellent discussion of the decision-making process surrounding euthanasia of cattle. The document also compares the various approved methods of cattle euthanasia with regard to effectiveness, human safety, and ease of application.

1. Practical Euthanasia of Cattle (AABP): Considerations for the Producer, Livestock Market Operator, Livestock Transporter and Veterinarian: <http://www.aabp.org/resources/euth.pdf>

Additional Dairy Resources



1. FAO Guide to Good Dairy Farming Practices:
<http://www.fao.org/docrep/014/ba0027e/ba0027e00.pdf>
2. Secure Milk Supply: <http://securemilksupply.org/>
3. University of Wisconsin Agricultural Extension Dairy Homepage (links to various articles):
<https://dairy.extension.wisc.edu/>
4. Washington State University Agricultural Extension Dairy Homepage (links to various articles): <https://vetextension.wsu.edu/dairy/>
5. University of Maine Agricultural Extension Dairy Homepage (links to various articles):
<https://extension.umaine.edu/livestock/dairy/>
6. SARE Dairy Your Way (Introductory Summary of Multiple Styles of Dairy Farming):
<https://www.sare.org/Learning-Center/SARE-Project-Products/North-Central-SARE-Project-Products/Dairy-Your-Way>

Beef

Housing

Shelter for beef cattle should provide the conditions needed to support animal health and welfare. This requirement should be met in all seasons, which may necessitate more than one type of management system or housing structure. Whether the shelter provided is constructed or a combination of natural features, the beef producer must provide the resources that cattle require in their area of confinement. It is important to consider the usability of the shelter provided to beef cattle and account for the effect that animal use will have on the overall environment of the confined space. Providing appropriate shelter includes planning for maintenance of these spaces when in use, such as removal of animal wastes.

While beef cattle are well adapted to living out on pastures and range without constructed shelter, they remain vulnerable to weather extremes in these environments, and may require shelter to survive and be productive in these circumstances. The impact of weather extremes on livestock can be minimized by providing access to shade, good ventilation and adequate drinking water in hot weather, and clean, dry areas with protection from moisture and strong winds in cold weather. Age, production status, health and other factors will impact an individual animal's ability to tolerate weather extremes. Temperature extremes and weather conditions should also be considered when transporting animals in open trailers.

1. Beef Cattle Housing (Focused on New England style, smaller scale beef herds):
<https://ag.umass.edu/crops-dairy-livestock-equine/fact-sheets/beef-cattle-housing-equipment>
2. Animal welfare concerns for cattle exposed to adverse environmental conditions (abstract only): <https://academic.oup.com/jas/article-abstract/92/12/5319/4703148?login=false>
Bedded Hoop Barns for Beef Cattle:
https://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1183&context=leopold_pubspapers
3. Comparison of Housing Systems for Finishing Beef Cattle:
<https://dr.lib.iastate.edu/entities/publication/88ff8665-f5bd-40b7-a81f-9b1ab63a7b22>
4. Heat Stress:
https://drought.unl.edu/archive/Documents/DMD/LivestockHeatStressManagement_NDSU.pdf
5. Cold Stress: <https://extension.psu.edu/cold-stress-and-beef-cattle>



Nutrition

Large ruminants such as beef cattle can extract nutrients from many different types of forages and concentrates, due to the balance of microorganisms in the rumen. Beef cattle will require a changing balance of energy, protein, vitamins and minerals throughout the year as their production class shifts. Late gestation and early lactation are phases of high energy demand. Likewise, cold weather increases the energy demands of cattle as metabolic rate increases to generate body heat.

The ruminant's diet should be based on a foundation of forages. This can be standing forages or harvested forages in hay or fermented forage products. Depending on the quality of the forages available, time of year, stage of production and local soil composition, supplementation of the forage based diet may be necessary. Forages that are high in non-digestible fiber, such as late season grasses, tend to be bulky and occupy a large amount of space in the rumen while delivering less energy and protein than a more digestible feed. While ruminants can make use of a low quality forage, it is important to continue to meet their nutritional needs by providing supplemental nutrients as necessary. The beef cattle producer should work with their local feed company or beef cattle nutritionist to determine which combination of locally available feedstuffs will meet the herd's nutrient requirements. The feed delivery system must be designed to provide appropriate nutrition to all animals at all times of the year, even though the feed components may vary. All animals must be able to access feed and water, which should be provided in a sanitary location.

A good general indicator of adequate nutritional status over time is the body condition score (BCS). Body condition score is not useful as a daily indicator of adequate nutrients or energy but is an effective tool for general assessment of overall well-being and nutritional status.

1. Cycle Nutrition:
<https://www.webpages.uidaho.edu/range456/readings/Nutrition%20and%20Feeding%20of%20the%20Cow-Calf%20Herd-%20Production%20Cycle%20Nutrition%20and%20Nutrient%20Requirements%20of%20Cow%20Pregnant%20Heifers%20and%20Bulls.pdf>
2. Nutrient Requirements of Beef Cattle (thorough discussion of beef cattle nutrition and digestion): <https://extension.okstate.edu/fact-sheets/nutrient-requirements-of-beef-cattle.html>
3. Alternative Feeds for Beef Cattle:
https://pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/400/400-230/400-230_pdf.pdf
4. University of Nebraska Nutrition Management Archive (page of links to articles for more in-depth study): <https://beef.unl.edu/cattleproduction-archive/cowcalfbull>
5. Basic Beef Cattle Nutrition: <https://www.ontario.ca/page/basic-beef-cattle-nutrition>

Handling

An adequate animal handling system will allow for the safe, efficient, and humane delivery of treatments such as castration, dehorning, vaccination, deworming, weaning, pregnancy examination, ear tagging or other observation. When designing an animal handling system, it is



important to consider what types of animals will be handled, for what purpose, how often and the number of animals to be handled at once. It is important to ensure that the materials used to construct the handling system are safe for both human and animal use. Broken, sharp or rusted materials should not be used.

1. Ohio State Animal handling Systems:
<https://agmr.osu.edu/sites/agmr/files/imce/pdfs/Beef/CattleFacilities.pdf>
2. Handling Beef Cattle (Extensive review including handling system design):
https://afs.ca.uky.edu/files/id-108_2021_the_kentucky_beef_book_-_chapter_4.pdf
3. Beef Cattle Behavior and Handling:
<https://extension.msstate.edu/sites/default/files/publications/publications/p2801.pdf>

Health Management

A working relationship with a large animal veterinarian is an important component for the beef herd health management program. A veterinarian must be well acquainted with the herd animals and manager to properly and legally offer advice and prescribe animal medications. A veterinarian can also play a crucial role in establishing a medical diagnosis for conditions causing losses in the herd. Managing cattle health based on the specific diseases or conditions present in your herd will minimize the use of inappropriate medications and streamline the response to a disease event. Your herd veterinarian is a good partner for developing a preventative herd health plan and can share information about regional disease occurrences and food animal regulatory requirements. Animal medications and tools should be contained in a controlled-access location and disposed of following proper instruction from the product manufacturer or prescribing veterinarian.

1. Designing Preventative Herd Health Management Programs for Cattle Producers:
<https://fyi.uwex.edu/wbic/files/2010/11/Designing-Herd-Health-Programs-for-Cattle-Producers.pdf>
2. Health Management of Beef Cattle (Power Point presentation from University of Tennessee Extension- general concepts and specific diseases): <https://sullivan.tennessee.edu/wp-content/uploads/sites/196/2020/10/BCP-Chapter-08-Health-Management-of-Beef-Cattle.pdf>
3. Beef Herd Vaccinations: <https://www.uaex.uada.edu/publications/pdf/FSA-3009.pdf>
4. Beef Herd Production Records:
<http://www2.ca.uky.edu/agcomm/pubs/asc/asc150/asc150.pdf>
5. AABP Castration and Dehorning Guidelines:
https://www.aabp.org/Resources/AABP_Guidelines/Castration_Guidelines-2019.pdf
https://aabp.org/Resources/AABP_Guidelines/Dehorning-2019.pdf
6. University of Nebraska Biosecurity Basics:
<http://extensionpublications.unl.edu/assets/pdf/g1411.pdf>
7. Identifying Sick or Injured Cattle:
<http://extension.msstate.edu/sites/default/files/publications/publications/p2551.pdf>

Euthanasia

There are three physiological mechanisms for inducing euthanasia in cattle. These include physical disruption of the brain activity caused by direct destruction of brain tissue (gunshot,



penetrating, captive bolt), drugs that directly depress the central nervous system, and agents that induce unconsciousness followed by mechanisms that induce hypoxia. The American Association of Bovine Practitioners published the guidance document referenced below, which summarizes the options available for euthanasia of cattle. As with all other species of livestock, it is best to consider this responsibility before the need arises so that the necessary equipment or training can be procured.

1. Practical Euthanasia (AABP): <http://www.aabp.org/resources/euth.pdf>

Additional Beef Cattle Resources

1. Beef Quality Assurance Program BQA Manual includes section on biosecurity): <https://www.bqa.org/resources/manuals>
2. University of Nebraska Beef Cattle Health Page (Dashboard of links to multiple articles): <https://beef.unl.edu/cattle-production>
3. Dairy Beef: <https://extension.psu.edu/dairy-beef-production>
4. Bison Production: <https://extension.psu.edu/bison-production>

Bison

Housing

Bison require more space and more secure housing structures when compared to cattle. The design of the shelter should provide the conditions needed to support Bison health and welfare year-round. It has been demonstrated that Bison benefit from wind breaks and 3 sided structures to shield them from the elements. Whether the shelter provided is constructed or a combination of natural features, the bison producer must provide the resources that bison require in their area of confinement. It is important to consider the usability of the shelter provided to bison and account for the effect that animal use will have on the overall environment of the confined space. Providing appropriate shelter includes planning for maintenance of these spaces when in use, such as removal of animal waste.

Due to their competitive nature, bison have larger square foot area requirements both inside housing and out in pastures and feeding areas. It is best to house bison by age group. Mixing age groups and other species is not recommended due to the increased risk of bullying behavior and injury.

While bison are well adapted to living out on pastures and range without constructed shelter, they remain vulnerable to weather extremes in these environments, and may require shelter to survive and be productive in these circumstances. The impact of weather extremes on livestock can be minimized by providing access to shade, good ventilation and adequate drinking water in hot weather, and clean, dry areas with protection from moisture and strong winds in cold weather. Age, production status, health and other factors will impact an individual animal's ability to tolerate weather extremes. Bison are generally considered cold tolerant but not heat tolerant. Temperature extremes and weather conditions should also be considered when transporting animals in trailers. The use of open top trailers is not recommended due to the significant public safety risks should a bison escape associated with their use.



Key points:

- Calculate space allowances for bison in feed areas in relation to group size as well as animal age, sex, and weight to prevent bullying and increased competition for food and space.
- Extreme heat over 86F is detrimental to bison and sources of shade and fresh clean water greatly aid in their comfort and wellbeing.
- Avoid mixing species in feeding areas to avoid aggressive interactions.
- Well-designed feeder pens allow for a minimum of 250 square feet per head.
- Provide a minimum bunk space of 3 feet per animal if bunk feeding is being used.
- Secure fencing is essential to contain bison. Bison are unlikely to challenge fencing if they have sufficient grass, minerals, water, and room to evade more dominant animals.
 - Fences should be a minimum of 6 feet tall and fence lines should closely follow the topography of the ground to prevent escapes.
 - All perimeter gates must have secure latches and locks.
 - Fence water courses, as bison are good swimmers. Water is an ineffective barrier to bison.
 - Keep bison away from dugouts and natural water bodies during periods when ice is not thick enough to be considered safe.
 - All fences should be inspected and repaired as needed regularly. Additional inspections may be required immediately after a windstorm, snow blizzard, heavy blowing snow, or after escaped animals have returned.

Nutrition

A goal in keeping bison is to have well fed animals that maintain body condition to allow for optimized rates of gain for growth and reproduction. A relationship with a nutritionist well versed in the nutrient requirements of bison is encouraged. Many feed suppliers employ nutritionists and trained staff to aid in feed selection as well and may be consulted.

The bulk of the bison diet should be good quality hay or pasture. This can be standing forages or harvested forages in hay or fermented forage products. Depending on the quality of the forages available, time of year, stage of production and local soil composition, supplementation of the forage-based diet may be necessary. Forages that are high in non-digestible fiber, such as late season grasses, tend to be bulky and occupy a large amount of space in the rumen while delivering less energy and protein than a more digestible feed. While ruminants can make use of a low-quality forage, it is important to continue to meet their nutritional needs by providing supplemental nutrients as necessary.

Grain supplementation should be considered depending on the forage quality. However, bison will not eat enough grain to diminish their intake of forage, and therefore should not be a major portion of the anticipated feed intake.

Nutritional mineral deficiencies are not uncommon. These deficiencies can result in low conception rates, weak calves, increased parasite loads and increased morbidity & mortality. Supplementation with a well-balanced mineral is recommended.

Key points:



- Work with an animal nutritionist to formulate an appropriate mineral and feed concentrate supplement based on forage analysis results quarterly.
- Forage should be the base of all bison diets due to their limited palate for grain concentrates.
- Average daily water consumption for a 1100 lb. Bison is approximately 10 gallons. Water intake will vary with dry matter intake and environmental factors.
 - Water testing provides valuable information for formulating the diet and identifying mineral supplementation or water filtering needs.
- Winter, late gestation and lactation all increase energy needs of bison and will change the nutrient requirements of bison. This should be accounted for in the management plan.
- Metabolic rate is impacted by daylight length and will change the nutrient requirements of bison. Monitoring Body Condition Score regularly to assess the efficacy of the management plan is best practice.
- Make sure all animals always have adequate access to feed. Provide a minimum bunk space of 3 feet per animal if bunk feeding is being used. Overcrowding can result in bullying and loss of condition in bullied animals due to reduced feed intake.
- Bison are susceptible to the detrimental effects of poisonous plants. Pastures should be monitored during the grazing period for poisonous plants to prevent the animals from eating them. It is recommended producers should be knowledgeable of poisonous species in their area.

Handling & Safety

An adequate animal handling system will allow for the safe, efficient, and humane delivery of treatments such as castration, dehorning, vaccination, deworming, weaning, pregnancy examination, ear tagging or other observation. When designing a bison handling system, it is important to consider what types of bison will be handled, for what purpose, how often and the number of animals to be handled at once. It is important to ensure that the materials used to construct the handling system are safe for both human and animal use. Broken, sharp or rusted materials should not be used. Mechanical hazards, such as farm machinery and scrap metal should not be in areas accessible to the bison for the health and safety risks they present.

Emergencies may arise and compromise bison welfare. Preplanning will assist in both avoiding and responding to such events. Preparing contingency plans for risks such as fires, power outages, severe storms, vandalism, drought, damaged fences, and water source failures is highly recommended.

Key points:

- Avoid handling bison in temperatures greater than 86°F because they are easily heat stressed.
- Ensure that a plan is in place to assist animals not coping with their environment.
- Fences should be free of corners and areas that animals could become trapped/bottlenecked or pushed causing them to panic and escape.

Health Management



A working relationship with a large animal veterinarian is an important component for the bison herd health management program. Your herd veterinarian is an essential partner for developing a preventative herd health plan and can share information about regional disease occurrences and food animal regulatory requirements. The chosen herd veterinarian must be well acquainted with the herd and manager to offer advice and prescribe animal medications properly and legally with development of a Veterinary Client Patient Relationship (VCPR). A VCPR is required for the prescription of all extra-label usage medications. Note that most all drugs used in bison medicine are extra-label and require a veterinary prescription for use.

The herd veterinarian can play a crucial role in establishing a medical diagnosis for conditions causing losses in the herd. Bison are prone to diseases that affect bovine species, especially internal parasitism. Treating bison once they become sick can be more difficult than other species thus, recognition and prompt treatment to address health issues is preferential. Managing bison health based on the specific diseases or conditions present in your herd will minimize the use of inappropriate medications and streamline the response to a disease event. Animal medications and tools should be contained in a controlled-access location and disposed of following proper instruction from the product manufacturer or prescribing veterinarian.

Key points:

- A VCPR with an annual onsite veterinary visit is highly recommended. A written herd health plan to include deworming strategy, desired vaccination protocol, withdrawal periods for treatments of common use medications is encouraged.
- Animal health records should be kept for 5 years. They should include treated animal ID's, ailment, medications delivered, corresponding withdrawal periods where applicable and outcome of treatment.
- Recognize and address health concerns in time to allow for ease of assessment/treatment
- More frequent monitoring of bison may be necessary during calving and post-weaning periods, and when multiple stressors occur such as at weaning, during transportation and when groups of animals are mixed.

Euthanasia

The American Association of Bovine Practitioners published the guidance document below, which summarizes the options available for euthanasia of cattle. As with all other species of livestock, it is best to consider this responsibility before the need arises so that the necessary equipment or training can be procured.

1. Practical Euthanasia (AABP): <http://www.aabp.org/resources/euth.pdf>

Additional Bison Resources

- 1- National Bison Association. Bison Producers' Handbook, 2nd Edition. 2015.
- 2- Getting Started with Bison Ranching
<https://extension.sdstate.edu/getting-started-bison-ranching>
- 3- National Bison Association
[Home Page - National Bison Association \(bisoncentral.com\)](http://bisoncentral.com)
- 4- Eastern Bison Association
- 5- Bison Production



<https://extension.psu.edu/bisonproduction#:~:text=Ideal%20land%20for%20bison%20would%20have%20boulders%2C%20rocks%2C,almost%20no%20barrier%20can%20stop%20a%20hungry%20bison.edu>

Cervids

Four species of deer are permitted for farming in Maine: red deer, sika deer, fallow deer and elk (including hybrids). The farming of deer is restricted due to concerns regarding the introduction and spread of a contagious prion disease called Chronic Wasting Disease (CWD). Possessing captive cervids in Maine requires a current license issued by the Department of Agriculture, and an annual farm facility inspection. Please contact ME DACF for further information.

1. Title 7 Part 3 Chapter 202 Cervids:

<http://www.mainelegislature.org/legis/statutes/7/title7sec1333.html>

Housing

Cervids maintained in captivity need access to natural or constructed shelters to find protection from extreme weather conditions. Where the natural environment in the area of confinement does not provide adequate shelter, a constructed shelter must be provided for overhead protection and wind breaks. The cervid producer must provide a clean, dry living environment that is free of accumulated wastes and debris, and which does not pose a hazard to the animals resulting from poor construction or lack of maintenance. The shelter, whether natural or constructed, must be able to accommodate all confined animals.

The size and location of the paddock should be based on the captive cervid species' natural behavior patterns (i.e. browsing versus grazing or social versus solitary). The stocking density of the confinement area must be light enough to allow members of the group adequate access to feed and water, and to move freely and avoid conflict. As crowding increases, the opportunity for animal injury, stress and disease transmission also increase. Crowding of mixed age or species groups may lead to intense competition and aggression, especially during the breeding season, or rut.

It is advisable to maintain multiple paddocks to allow for rotational grazing of the animals and to rest unused paddock areas. This allows vegetation to rebound, prevents excessive soil compaction and breaks the cycle of many infectious diseases.

The minimum fencing requirements for compliance with the captive cervid program are outlined in Chapter 204: Rule for the Licensing Requirements for Farmed Cervids. Any farm initially licensed to contain cervids after 2006 must maintain a fence line that is a minimum of eight feet tall.

The fence line should represent a physical barrier to animal movement, therefore electrified fencing alone is not recommended. Charged wires do not represent enough of a barrier to cervids to be utilized as the sole perimeter fence line. Hollow guard hairs of the winter coat can insulate deer from the shock of an electric fence. An internal hot wire may be an effective deterrent to prevent cervids from rubbing against fence lines or bucks attempting to fight or



demonstrate in adjacent paddocks. Ideally, bucks in rut would not be housed in close proximity to each other. Separation by at least one laneway will preserve fencing integrity.

For maximum longevity, fences should be straight, tight and free from vegetation overgrowth. Including a cleared laneway between the deer fence and the closest tree line will help to prevent damage from falling trees and branches.

Newborn Cervidae will require a paddock that provides cover for hiding, and protection from harsh weather and predators. Fencing for the calving pen should utilize a smaller grade mesh at ground level to prevent calves from moving under the fence line or getting entangled. This will also provide more effective predator control. Gates should be solid, visible to deer and capable of being locked.

The Deer Farming Handbook: Australia (Fencing): <https://www.deerfarming.com.au/wp-content/uploads/2016/11/DFH06-Fencing.pdf>

New Zealand Deer Industry Stocking Density Chart and Spread Sheet:

<https://www.deernz.org/deer-hub/feeding/feeding-tools/deer-stock-unit-calculator/>

New Zealand Deer Industry Paddock Layout: <https://www.deernz.org/deer-hub/handling-and-welfare/handling/property-and-paddock-layout/>

Nutrition

Cervids must be provided with access to adequate food and water supplies for the type and number of animals confined. Regular evaluation of production records and body condition score (at both the individual and herd level) is a practical method of determining if the herd's nutrition program is meeting the animals' needs.

The nutritional needs of the cervid herd will change in relation to season, environmental conditions and production class. For example, stags in rut can lose a significant amount of body condition, and must be supplemented with a high-quality feed in a non-competitive feed delivery system before the cold weather challenges of winter set in. Does in heavy lactation will also lose body condition and should be returned to a productive weight between weaning and rebreeding.

Cervids are ruminants, meaning they have four "stomachs" that work together to digest plant material and require a healthy population of gut microorganisms. The cervid species permitted for farming in Maine demonstrate an intermediate type of feeding behavior; meaning they take advantage of both pasture roughage and browse concentrates in their diet. This tendency makes them relatively flexible in their ability to tolerate and benefit from mixed feed sources.

The higher the digestibility of the feed, the higher the energy or calorie density of that feed. Fibrous, mature forages are generally less digestible, and therefore more of this type of feed must be consumed to meet the energy needs of the animal. The volume of feed an animal can reasonably eat in a day is limited by the size of the rumen and the grazing patterns of the animal. Offering a mix of digestible forages will adequately provide the energy, protein, and fiber resources cervids require. When low quality feeds with low digestibility and energy concentration are fed, a high-energy supplement should be added. This is especially important as nutrition needs increase for lactating animals, growing fawns or stags recovering from rut.



- 1) Body Condition Scoring of Elk (Comprehensive, can apply these concepts to all species of captive cervid): <https://nagonline.net/wp-content/uploads/2017/03/bcs-elk.pdf>
- 2) The Deer Farming Handbook- Nutrition: <https://www.deerfarming.com.au/wp-content/uploads/2016/11/DFH09-Nutrition.pdf>
- 3) Copper requirements for Deer: https://deernz.org.nz/assets/Deer-Facts/DeerFact_Copper_Web.pdf ; <https://deernz.org.nz/deer-hub/health/major-issues/trace-element-deficiencies/>

Handling

Before acquiring deer, it is important to plan for their containment and handling. Deer may need to be handled or sorted for many reasons, including application of ear tags, medical treatments or evaluation, recording of production benchmarks and for loading for transport. In many respects, deer can be managed similarly to other livestock species; however, it is important to keep in mind that deer are not domesticated livestock. Cervids are a high alert and flight inclined species, and they possess immense athletic ability. Under pressure, many cervid species could clear a 6-foot fence, push through a weak area of a fence line, or fatally injure themselves in an attempt to escape. During reproductive times of the year, adult stags can present significant danger to their handlers and to other deer in their confinement area. Despite these challenges, cervids can be acclimated to handling and can be safely and efficiently moved through well-designed stock yards. The needs and budget of the farm operation will determine what style of animal handling device is warranted, some examples are found in the links below.

If an effective yarding system does not exist, chemical restraint of cervids may occasionally be warranted. There are several drawbacks to relying on chemical restraint as the sole method of animal handling. This method is inherently risky, even for animals that appear to be healthy. The risks include induction injuries, post capture myopathy, cardiorespiratory depression, and bloat. Animals recovering from anesthesia should receive appropriate reversal medications, propped into a sternal position to prevent ruminal gas build up, and monitored for return to awareness. Chemical immobilization is expensive, time consuming, requires the services of a skilled administrator, and a prescription from a licensed veterinarian to obtain the medications. If cervids are being raised for venison, it is imperative to prevent the introduction of drug residue from the use of these medications into the food supply. For routine cervid management and husbandry interventions, chemical immobilization is not the preferred method.

Cervids can be safely transported in livestock trailers without specific modifications. The same considerations that would be given to transporting other classes of livestock apply here. There must be enough space for the animals to stand or lay down comfortably, and the grouping of animals loaded together must be compatible. For example, yearlings and does could be safely transported together, but a mature stag should travel alone, especially if in antler. Attention must be paid to footing, ventilation, temperature, humidity and food and water needs. Handling at loading and unloading should be planned to minimize stress as well as chances for escape.

- 1) Capture Myopathy:
<https://www.fourthcrossingwildlife.com/files/CaptureMyopathy-AnneFowler.pdf>
- 2) FAO Farm Layout and Fencing:
<http://www.fao.org/docrep/004/X6529E/X6529E09.htm>



3) Safe Practical Deer Yards:

<https://www.yumpu.com/la/document/read/38685151/safe-practical-deer-yards-agriquality-2005>

Health Management

Some production indicators that can be measured on the cervid farm are pregnancy rates, calving rates, fawn weights, antler production and venison production.

The cornerstone of maintaining a healthy herd is avoiding introduction of disease. Employing sound biosecurity principles will prevent exposure of healthy animals to new pathogens, thereby avoiding losses in the form of animals, products, time, and money spent responding to disease outbreaks.

Vaccination prepares the animal's body to fight disease caused by pathogens. There are no USDA licensed vaccine products currently designed for use in the cervid species farmed in Maine. All vaccines used in cervid species are therefore considered an "off-label" use of a product that has been approved for use in another species. Use of a veterinary pharmaceutical in an "off-label" manner is only permitted when used under the direction of a licensed veterinarian in the context of a current veterinary-client-patient- relationship (VCPR). The cervid producer should consult with their veterinarian for recommendations on herd vaccination schedules dependent on their herd's specific risk factors. Some independent companies will produce and sell autogenous vaccines (a vaccine made from a piece of the infecting organism specific to your farm), or commercially prepared vaccines for specific diseases of deer. Use of autogenous biologicals is restricted to USDA licensed products that are administered under the supervision of a prescribing veterinarian.

Livestock experiencing physiologic stress are at an increased risk for developing disease caused by infectious organisms . Some factors that can result in physiologic stress are poor nutrition, heat or cold extremes, inadequate shelter and crowding. Providing an appropriate environment for captive cervids and practicing good biosecurity principles will negate most disease risks in well-bred herds. Medications administered to individual animals or groups of animals should be recorded to assist in observation of appropriate medication withdrawal periods before an animal is harvested for food.

One infectious disease of deer, Chronic Wasting Disease (CWD), is caused by a different type of infecting agent. CWD is caused by a misfolded protein called a prion, which causes disease of the central nervous system (brain and spinal cord). The infectious prion is spread in most tissues and fluids from an infected deer, persists well in the environment outside of the deer host, and often takes many years to cause disease in the host it has infected. Because of these qualities, the CWD prion can contaminate a large area before the disease is even suspected. By the time an animal appears sick and is diagnosed with CWD, many of the herd mates have already been exposed. For these reasons, CWD is a disease of concern for captive cervids, and is the main reason for restrictions on live deer movements around the country.

- 1) Cervid Diseases- Center for Food Safety and Public Health: <http://www.cfsph.iastate.edu/Species/cervids.php>
- 2) Cervid Diseases- Cervid Health Handbook: <https://www.deerfarming.com.au/wp-content/uploads/2016/11/DFH17-Health.pdf>
- 3) Deer Weaning Tips: <https://www.deernz.org/deer-hub/feeding/weaning/>



- 4) Scours in fawns: <https://www.researchgate.net/publication/341622955> Diarrhea in Farmed White-tailed Deer Fawns
- 5) USDA APHIS Chronic Wasting Disease: https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/sa_animal_disease_information/sa_alternate_livestock/sa_cervid_health/sa_cwd
- 6) FARAD (Approved* drug list for cervid species): <http://www.farad.org/vetgram/cervids.asp>
- 7) Cervid Solutions Autogenous Vaccines: <http://www.cervidsolutions.com/life-cycles/vaccine-service-package>
- 8) White-tailed Deer Health and Production: <https://extension.psu.edu/white-tailed-deer-production>
- 9) Deer Health Planning for Welfare and Profit:: https://www.deernz.org/assets/Deer-Facts/DeerFact_DeerHealthPlanning_Web.pdf

Euthanasia

Sick or debilitated animals that are unlikely to survive or receive treatment should be immediately and humanely euthanized. The individual carrying out the procedure should be familiar with the anatomy of deer and comfortable using the required equipment. Several methods of euthanasia of deer are approved by the American Veterinary Medical Association, and include both physical and chemical means. The AVMA guidelines are provided at the beginning of this document (Reference section 7.6.1). A second reference is provided below.

- 1) Iowa State (page 8): Procedures for Humane Euthanasia (see page 8) <https://vetmed.iastate.edu/sites/default/files/vdpam/Extension/Dairy/Programs/Humane%20Euthanasia/Download%20Files/EuthanasiaBrochure20130128.pdf>

Additional Resources

- 1) Anesthesia of North American Deer: <https://www.ivis.org/library/zoological-restraint-and-anesthesia/anesthesia-of-north-american-deer>
- 2) Penn State Husbandry Document: <https://extension.psu.edu/red-deer-production>
- 3) Concepts to Consider for Remote Drug Delivery: <https://www.researchgate.net/publication/319910354> Introduction to Technical Aspects of Remote Drug Delivery Systems RDDS with Telemetric Support in Free-Ranging Wildlife RDDS Remote Drug Delivery System
- 4) North American Deer Farmer's Association: <http://www.nadefa.org/>
- 5) New Zealand Deer Industry: <https://www.deernz.org/>
- 6) General husbandry and health management resources: Haigh and Hudson; *Farming Wapiti and Red Deer*; Mosby; St. Louis, Missouri; 1993. The Management and Health of Farmed Deer. H.W. Reid, editor, Springer, Edinburgh, Scotland. 1988

Equine

Housing

There are many designs for adequate equine housing and confinement which provide a clean, dry, safe environment. The particular design of the housing structure will likely be based on finances, terrain, and intended use of the horse. Animal welfare regulations in the state



of Maine specify minimum shelter requirements for equines. The link is provided in the references at the end of this section. At minimum, horses should be able to find shelter from weather extremes within their area of confinement, and a clean dry space must be available.

Fencing should adequately contain equines in all seasons, should be visible to equines and in good repair. Some fence types are considered safer and more effective for equine pastures because this species is naturally athletic and prone to flight. For example, high tensile wire is often used for fencing cow paddocks but is frequently associated with equine limb injuries from collision accidents. High visibility fencing such as electric tape, pipe gates or panel fencing may be more effective.

The number of equines contained in a designated space should be appropriate to the carrying capacity of that paddock. "Carrying capacity" describes the number of individual animals that can be supported in a given area without overwhelming or degrading the natural resources of that space. Crowding of equines can cause increased stressful interactions and injuries, especially to subordinate individuals in the herd. Crowding also increases disease transmission and can result in environmental damage (reference *pasture management* links in the **Nutrition** section below).

- 1) Purdue Introduction to Housing for Horses: <https://www.extension.purdue.edu/extmedia/AS/AS-553-W.pdf>
- 2) UMass Housing for Horses- Contains specific space allotment guidelines: <https://ag.umass.edu/crops-dairy-livestock-equine/fact-sheets/housing-for-horses>
- 3) Fence Planning for Horses: <https://extension.psu.edu/fence-planning-for-horses>
- 4) Penn State Horse Stable Manure Management: <https://extension.psu.edu/horse-stable-manure-management>
- 5) Minimum Housing Requirements for Equines (Maine Revised Statutes Title 7): <http://legislature.maine.gov/statutes/7/title7sec4015.html>

Nutrition

A significant number of commercially produced equine diets and supplements are readily available. It is the responsibility of the equine owner to evaluate the quality and utility of these products before incorporating them into their equine nutrition plan. A veterinarian or feed company nutritionist can make recommendations for your equine nutrition plan based on knowledge of the individual animal, management style, age, health status and use. The nutritional needs of the equine will change as these factors and seasons change.

Many horses can be sustained on a foraged based diet and supplemented with a balanced vitamin and mineral product formulated for equines, as necessary. Some populations such as high performance horses, breeding animals or senior horses with chronic health conditions will need to be fed a grain-based concentrate in addition to high quality forages to provide the calories and increased nutrition needed to support that animal's health and welfare. An equine nutritionist or veterinarian can assist with specific feed recommendations for those animals whose lifestyle or condition requires advanced dietary management.

- 1) Kentucky Equine Research- Pasture stocking density: <https://ker.com/equinews/stocking-rate-many-horses-pasture/>



- 2) Penn State- Basic Pasture Management for the Equine Owner: <https://extension.psu.edu/basic-pasture-management-for-the-equine-owner>
- 3) Kentucky Equine Research- Ration Balancer Pellet: <https://ker.com/equinews/ration-balancer-pellets/>
- 4) Pasture and Hay for Horses - UMaine Cooperative Extension: <https://extension.umaine.edu/publications/1006e/>
- 5) Purdue Extension Introduction to Body Condition Scoring Horses and MAD Barn: <https://www.extension.purdue.edu/extmedia/as/as-552-w.pdf>; <https://madbarn.com/body-condition-scoring-your-horse/>
- 6) University of Kentucky general Equine Nutrition/ Forages for horses: <http://www2.ca.uky.edu/agcomm/pubs/asc/asc120/asc120.pdf>

Handling

Equines are a herd-oriented flight species. This means that their instinct is to escape from a threat rather than confront it. Though there is variation among individual equines, this instinctive behavior can make this species unpredictable and highly reactive. When working with equines in close quarters or high stress situations, such as trailering or working with a mare and foal, injury to both equines and humans is a risk. In the links provided below there are several descriptions of safety precautions, effective equine restraint methods and recommendations for how to safely work with equines.

- 1) The Basics of Equine Behavior- Rutgers University : https://esc.rutgers.edu/fact_sheet/the-basics-of-equine-behavior/
- 2) Safely trailering and loading your horse- UCONN: https://animalscience.cahn.uconn.edu/wp-content/uploads/sites/3396/2022/06/articlesByFaculty_2_2813244827.pdf
- 3) Donkey Behavior Michigan State University: https://static1.squarespace.com/static/52f6e70ae4b09d0c250122c6/t/5323ba5be4b0c9379cfe30d7/1394850395832/What+to+do+when+your+donkey+balks_ amy022108.pdf
- 4) Penn State University- Safe Horse Handling : <https://extension.psu.edu/safe-horse-handling>
- 5) UPenn Vet Field Service Equine Restraint Recommendations: https://vettechprep.com/_pps/SOROKFBYGHROYN29008.PDF OR https://ouv.vt.edu/content/dam/ouv_vt_edu/sops/large-animal/sop-equine-restraint.pdf

Health Management

There are many acceptable strategies for maintaining a healthy horse or herd; no two equine owners will approach this task the same way. Some principles to abide by for the successful horse keeper are: close observation of the animals on a daily basis; implementation of a thorough preventative care program; consultation with a veterinarian or other qualified source of information; and continuing education.

Equines require specific management adjustments based on age, use category, health status and season. Routine preventative care for all equines may include an annual exam by a veterinarian, appropriate vaccination as advised by your veterinarian, internal and external parasite management, dental care and hoof care. All horses require hoof maintenance care, though not all horses require regular shoeing. A qualified farrier can be employed in the evaluation of equine hoof needs. Each equine is a unique individual and may do quite well with



minimal intervention in the above categories; however, this determination should be made based on regular reevaluation of the animal's condition by a qualified person.

Any equipment applied to equines for work or sport must be in good repair such that it is safe and comfortable for the animal to tolerate. Equipment should ideally be fit to the animal that it is intended for, and the fit of the equipment should be re-evaluated throughout use. It is the responsibility of the horse owner, trainer and keeper to consider the factors that may impact equine safety during performance.

- 1) AAEP External Parasite and Vector Control Guidelines:
<https://aaep.org/sites/default/files/Guidelines/AAEP-ExternalParasites071316Final.pdf>
- 2) AAEP Parasite Control Guidelines:
https://aaep.org/sites/default/files/Guidelines/AAEPParasiteControlGuidelines_0.pdf
- 3) AAEP Vaccination Guidelines for Horses:
<https://aaep.org/sites/default/files/Guidelines/VaccinationGuideExeSummary1.pdf>
- 4) University of Minnesota Extension- Caring for horses in hot weather:
<https://extension.umn.edu/horse-care-and-management/caring-horses-during-hot-weather>
- 5) Caring for the Older Horse:
<https://extension.uga.edu/publications/detail.html?number=B1368&title=Caring%20for%20the%20Older%20Horse:%20Common%20Problems%20and%20Solutions>
- 6) Oklahoma State Extension- Managing young horses for sound growth:
<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2088/ANSI-3977web2016.pdf>
- 7) Routine health care for Horses: <https://www.merckvetmanual.com/horse-owners/routine-care-and-breeding-of-horses/routine-health-care-of-horses>
- 8) Herd Health For Donkeys:
https://static1.squarespace.com/static/52f6e70ae4b09d0c250122c6/t/55839d9de4b0c29e1bf19988/1434688925528/herd_health_for_donkeys.pdf

Euthanasia

Euthanasia is appropriately considered for any equine that is chronically ill, painful, suffering from lack of basic care, or facing a poor prognosis for a productive, healthy life.

Euthanasia of equines presents several species-specific challenges that must be considered before the need arises. Familiarity with equine anatomy and the tools needed to carry out the procedure humanely and effectively is crucial. A plan must be in place to remove or otherwise appropriately dispose of the euthanized equine.

- 1) AVMA: https://ebusiness.avma.org/files/productdownloads/EquineEuthanasia_En.pdf
- 2) CDFA: https://www.cdfa.ca.gov/ahfss/animal_health/pdfs/EquineEuthanasiaBrochure.pdf
- 3) AAEP: <https://aaep.org/euthanasia-guidelines>

Additional Resources

- 1) Management recommendations for Donkeys and Mules, Ontario, CA:
http://www.omafra.gov.on.ca/english/livestock/horses/facts/info_mule.htm
- 2) USDA Missouri Pasture Management Guide for Horses:



- <https://www.coffey.k-state.edu/crops-livestock/livestock/Horse%20Pasture%20Management.pdf>
- 3) AAEP Recent Development in Equine Nutrition with Farm and Clinic Applications:
https://www.researchgate.net/publication/242496548_Recent_Developments_in_Equine_Nutrition_with_Farm_and_Clinic_Applications
 - 4) Guidelines for Equine Rescue and Retirement Facilities:
<https://aaep.org/sites/default/files/Guidelines/AAEPCareGuidelinesRR2012.pdf>
 - 5) OIE Welfare of Working Equids:
https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_aw_working_equids.pdf
 - 6) Equestrian Australia Hot Weather Policy:
http://www.equestrian.org.au/sites/default/files/EA_Hot_Weather%20Policy_26092017.pdf

Small Ruminant

Note: ALL Sheep and Goats are required to participate in the National Scrapie Eradication Program. Scrapie is a prion disease of small ruminants. The function of the National Scrapie Eradication Program is to conduct slaughter surveillance testing for this disease with the goal of disease eradication in the United States. This aim is greatly facilitated by a national system of animal identification and tracking of animal movements. All small ruminant species must be identified by a nationally unique identification number before they leave their farm of origin for any reason. This rule applies to all small ruminants in the United States, even if they are not raised for any commercial purpose. The nationally unique identification number, called an "official ID" can be provided by the State Department of Agriculture or they can provide the information you will need to purchase your own. More information about the Scrapie Eradication Program, animal identification options and contact information for the State Animal Health officials is linked below:

1. Maine State Animal Disease Traceability Technician (Contact information at bottom of page): https://www.maine.gov/dacf/ahw/animal_health/adt/index.shtml
2. USDA Scrapie Program Page:
<https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/sheep-and-goat-health/national-scrapie-eradication-program>
3. Resources for Scrapie Program Animal Identification:
https://www.aphis.usda.gov/animal_health/animal_diseases/scrapie/downloads/fs-scrapie-recordkeeping.pdf

Housing

There are many different management options for housing sheep and goats, dependent on the climate, terrain, breed and production goals of the flock owner. Some basic principles of small ruminant husbandry apply regardless of the management system utilized or the food or fiber products produced. Adult sheep and goats are relatively adaptable and can often make good use of hill sides and other natural wind breaks and vegetation to create their own shelter. Adult sheep are well insulated by their wool as long as it remains dry. Adult goats are less hardy in cold, windy conditions; however, they fare better in warm weather than do fully fleeced sheep. Lambs and kids require more shelter for optimal performance, and will need a clean, dry,



sheltered environment to prevent disease and grow. Small ruminants sheltered in barns need clean dry bedding, good ventilation and appropriate manure management to prevent environmental contamination.

Special consideration: Remote populations of sheep

In many areas of the world, small ruminants are raised on range lands and remote hillsides and islands where they roam and graze during the growing season. These populations of animals have been selected for their hardiness and adaptation to living in these conditions. Animals grazed on wide expanses of land often walk long distances to meet their nutritional needs, and often acquire hydration through forage or incidental pools of water or dew. Some terrains are not well suited to this, or seasonal extremes can change the resources of the land. In these instances, shelter, water and forage must be supplemented.

- 1) Improving sheep production and welfare in extensive systems through precision sheep management (free PDF download- remote sheep management guidance):
https://www.researchgate.net/publication/258505743_Improving_sheep_production_and_welfare_in_extensive_systems_through_precision_sheep_management
- 2) Oregon Extension Sheep Production Guide:
<https://extension.oregonstate.edu/catalog/pub/em-8916-sheep-production-guide>
- 3) Maryland Small Ruminant Webpage- Housing for Sheep:
<http://www.sheep101.info/201/housing.html>
- 4) UMass Housing and Working Facilities for Sheep:
<https://ag.umass.edu/sites/ag.umass.edu/files/fact-sheets/pdf/Housing%20and%20Working%20Facilities%20for%20Sheep%2008-01.pdf>

Nutrition

Small ruminants must be fed to meet their changing nutritional needs throughout the year. An animal's nutritional needs will vary with age, gender, stage of production, pregnancy, weight and the environmental conditions they are exposed to. Formulating a diet that provides adequate nutrition year-round is important for maintenance of flock health and welfare.

Regular evaluation of production records and physical assessment of the herd body condition will indicate if the nutrition program is adequate. Body condition score guidelines have been developed for multiple species. An example evaluation for sheep is included in the references below. Visual assessment of body condition score can be accomplished quickly, for the herd and for individual animals. In the case of animals with heavy fleeces, it is important to handle each animal and feel for indicators of body condition such as fat cover on the ribs, spine and pelvis.

Animal feeds should be stored in a manner that protects them from moisture, sunlight, rodents and contamination. Feed and watering systems should be kept in sanitary condition and allow all animals adequate access.

- 1) Water quality (Penn State Extension): <https://extension.psu.edu/have-you-tested-the-water-lately>
- 2) Livestock Water Requirements (North Dakota State University):
<https://www.ag.ndsu.edu/publications/livestock/livestock-water-requirements>



- 3) Forage Quality (Penn State Extension): <https://extension.psu.edu/determining-forage-quality-understanding-feed-analysis>
- 4) Forage Laboratory Services – About the Forage Laboratory:: Dairy One (click on “Analytical Service Package” Menu): <https://dairyone.com/services/forage-laboratory-services/about-the-forage-laboratory/>
- 5) Nutrient Requirements of Sheep and Goats: <https://www.slideshare.net/schoenian/nutrient-requirements-of-sheep-and-goats> OR http://esgpiip.langston.edu/sites/default/files/Chapter%207_%20Nutrition%20and%20feeding%20of%20Sheep%20and%20Goats.pdf
- 6) Copper for Small Ruminants: <https://www.merckvetmanual.com/toxicology/copper-poisoning/copper-poisoning-in-animals> , <https://www.lsuagcenter.com/articles/page1587399349851> , Dairy goat copper toxicosis: <https://pubmed.ncbi.nlm.nih.gov/17696861/>
- 7) Cornell Sheep Program (Several info sheets including “How to Formulate a Diet”, “Nutritional Value of Kelp” and other practical tools: <http://blogs.cornell.edu/newsheep/management/feeding/>
- 8) University of Arkansas: Body Condition Scoring of Sheep FSA 9610 <https://www.uaex.uada.edu/publications/PDF/FSA-9610.pdf>
- 9) Langston University: Body Condition Scoring of [Goats](https://goats.extension.org/goat-body-condition-score/) <https://goats.extension.org/goat-body-condition-score/>
- 10) Dairy Goat Body Condition Scoring (ADGA): <https://adga.org/dairy-goat-body-condition-scoring/>
- 11) Body Condition Scoring for Camelids (Alpacas and Llamas- Australian Alpaca Association): <http://foothillmobilevet.com/wp-content/uploads/2011/03/Body-Condition-Score-Alpacas.pdf>

Handling

As a prey species, sheep and goats have only two options to avoid a predator: flock and flee. This instinct is strong and makes working with sheep very difficult if you do not have a plan to harness this behavior. Both sheep and goats can become anxious when confined in small spaces, especially if they are separated from the group. Sheep and goats have been known to fatally injure themselves trying to escape from an enclosure. Small ruminants and camelids should not be dragged or picked up by the fleece.

If livestock must be confined to a yarding facility for longer than 6 hours, they should be provided with access to water. If confinement periods are longer than 12 hours, feed should be offered as well. Yarding systems that are in frequent use or that are also utilized as holding facilities will need regular cleaning and sanitation. A manure management plan for these areas should be implemented to prevent waste accumulation from interfering with efficient, safe, low stress animal handling.

- 1) Safe Sheep Handling Guide: <https://www.worksafe.govt.nz/topic-and-industry/agriculture/working-with-animals/working-with-sheep/safe-sheep-handling-gpg>
- 2) Efficient handling of meat goats: <https://www.sheepandgoat.com/handling>
- 3) Facilities and Fencing for dairy goats: <https://www.aces.edu/blog/topics/sheep-goats/preparing-your-property-for-dairy-goats-sheep/> ; UNH Extension John Porter: <http://dawog.net/Goats/Dairy%20Goat%20Housing%20&%20Milking%20Facilities.pdf>; A



Guide to starting a commercial goat dairy -Section 3 Facilities (Carol Delaney):

<https://www.sare.org/wp-content/uploads/Starting-a-Goat-Dairy.pdf>

- 4) OMAFRA Factsheet: Lowering stress in transported goats:
<https://www.ontario.ca/page/lowering-stress-transported-goats>

Health Management

While small ruminants are adaptable animals and certain genetic lines or breeds are known to be hardy, it is important to keep records of production indicators to monitor the health and wellbeing of your flock. This is especially important for remote populations of livestock, as frequent visual inspection is usually not an option. Some reliable, measurable and scientifically validated markers of well-being in a production small ruminant herd are: reproductive performance, body condition score or weight, fleece weight and pounds of milk per lactation.

Many vaccines are approved for use in small ruminants for prevention of common diseases, including respiratory and diarrheal diseases. When purchasing new animals, it is very important to purchase animals from a reputable source with a flock that you know to be healthy, based on performance and whole herd disease screening tests. Your herd veterinarian can advise you about commonly carried diseases of small ruminants and vaccination protocols appropriate for your herd.

Internal parasites are one of the most common health challenges for small ruminants. It is important to develop a grazing plan that allows sheep and goats to graze clean pastures. Low stocking density also helps prevent exposure of sheep and goats to infection with internal parasites. There are several ways to monitor internal parasite burden for small ruminants, including fecal exams and FAMACHA card evaluation of mucous membranes and the white portion of the eye (sclera). Your herd veterinarian can assist with parasite risk assessment and development of a monitoring and prevention plan for your flock.

Several links below provide information about other common health related topics for small ruminants:

- 1) FAMACHA- About the parasite control system and certification program:
https://docs.wixstatic.com/ugd/6ef604_eb5a26c7fb6b4d75bdaf32b6d36d67c9.pdf
And <https://web.uri.edu/sheepgoat/famacha/>
- 2) American Consortium for Small Ruminant Parasite Control- Review of internal parasite biology and control strategies:
https://docs.wixstatic.com/ugd/6ef604_ab5a15767f9b4bccb019edc319f70a3c.pdf
- 3) Zoonotic diseases of sheep and goats (not all conditions present in the US):
https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/sa_animal_disease_information/sheep-goat/zoonotic
- 4) Small Ruminant Vaccine Program Considerations (Ohio State University) (Consult with your veterinarian for flock specific recommendations):
<https://u.osu.edu/sheep/2020/02/25/small-ruminant-vaccine-program-considerations/>
- 5) Biosecurity at Shearing (UMaine Extension) Bulletin #1039, The Shearer's Role in Reducing Disease: <https://extension.umaine.edu/publications/1039e/>
- 6) Maryland Sheep Page Predator Control:
<http://www.sheep101.info/201/predatorcontrol.html>



- 7) Urolithiasis in Small Ruminants:
<https://www.acvs.org/large-animal/urolithiasis-small-ruminants>
- 8) Indicators of Animal Welfare (Sheep and Goat focused studies):
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5732139/>
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8614408/>
- 9) UMaine- Sheep Foot Health Project-Eliminating the effects of foot rot on sheep flocks in the Northeast: <https://extension.umaine.edu/livestock/sheep-and-goats/sheep-foot-health/>
- 10) Tail docking in Sheep- AVMA Position Paper:
https://www.avma.org/KB/Resources/LiteratureReviews/Documents/lamb_tail_docking_bg_nd.pdf

Euthanasia

Sick or debilitated animals who are unlikely to survive or receive treatment should be immediately and humanely euthanized. It is best to consider this possibility before the need arises, so that the procedure can be carried out quickly once the decision to euthanize an animal has been made. The procedure will require proper restraint for the animal, as well as properly functioning equipment and someone trained in humane methods of euthanasia. A farm plan should be developed and communicated to all farm workers, so that decisions and actions can be taken quickly if needed.

Recommendations for approved methods of euthanasia for sheep and goats are available from the American Veterinary Medical Association and are cited earlier in this document. An additional resource has been provided in this section.

- 1) The Emergency Euthanasia of Sheep and Goats:
https://ucanr.edu/sites/UCCE_LR/files/228031.pdf

Additional Resources

- 1) American Sheep Industry Association (Resource Center):
<https://www.sheepusa.org/resources>
- 2) USDA Scrapie Eradication Program :
<https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/sheep-and-goat-health/national-scrapie-eradication-program/nsep> ; Update 2024: https://www.sheepusa.org/wp-content/uploads/2024/01/Scrapie-Program-Update-2024_Sutton.pdf
- 3) UMaine Livestock Page (Sheep and Goats) : <https://extension.umaine.edu/livestock/sheep-and-goats/>
- 4) Cornell Sheep Program: <http://blogs.cornell.edu/newsheep/>
- 5) Maryland Small Ruminant Page: <https://www.sheepandgoat.com/>
- 6) Langston University Goat Research with links to nutrient requirements calculator:
<https://www.langston.edu/goat-research>
- 7) American Association of Small Ruminant Practitioners: <http://www.aasrp.org/>

Poultry

The focus of this section is backyard or small scale production of layer chickens. Much of the information available here is applicable to broiler chickens or other species of poultry and fowl. In the links found at the end of the Poultry section ("Additional Resources"), you will find references for broilers, waterfowl,



game birds and ratites. Please reference the ME DACF Commercial Production BMP document for large flock guidance (>10,000 layer chickens).

Housing

The housing infrastructure chosen for poultry needs to provide shelter from unfavorable weather and predators, a clean environment to lay eggs, access to food and water, a comfortable and safe place to roost, and needs to be easily accessed by caretakers for cleaning and monitoring the flock. There are many different designs and building materials for poultry housing depending on the species and intended use of the birds. In general, the birds should be grouped by age, species and purpose (e.g., exhibition birds vs breeder birds vs production birds). Some housing decisions may be affected by the purpose of the poultry type. For example, exhibition poultry may be individually housed to allow for close monitoring of body condition, growth, feather quality, isolation protocols, and to prevent birds from damaging each other.

All types of poultry should be separated from wildlife species such as rodents and wild birds and should have access to enough space to express their natural behaviors and remain productive and healthy. Crowding of birds can encourage behaviors such as feather picking and aggression. There are published species-specific space recommendations available for most types of poultry (see links below).

The materials chosen to construct the poultry house should be selected for their ability to be cleaned and disinfected. Porous materials, such as unpainted wood, are very difficult to clean. Bedding, or litter, should be an absorbent organic material that is frequently removed and replaced with clean litter. Nest boxes for laying hens should be kept clean and checked regularly to prevent eggs from becoming dirty or cracked.

Prevention of disease introduction to the poultry flock begins with housing design, management decisions and thoughtful handling of birds by the caretaker. Birds that are removed from the flock for exhibition should not be immediately returned into the home flock. Any bird that has been exposed to poultry outside of the home flock should be quarantined in a physically separate enclosure and observed for a period of four weeks before reintroduction. This period of time will allow the producer to be assured that contagious disease is not being introduced to the rest of the flock by new arrivals or returning birds. Below are several links to specific housing resources for many classifications of poultry:

1. ATTRA Range Poultry Housing and Alternative Production Systems:
<https://attra.ncat.org/publication/range-poultry-housing/> ,
<https://attra.ncat.org/publication/alternative-poultry-production-systems-and-outdoor-access/>
2. Penn State: Small Scale Poultry Housing: <https://extension.psu.edu/small-scale-poultry-housing>
3. University of Maine Extension- Best Management Practices for Small Scale Poultry Producers in Maine Pub# 2220: <https://extension.umaine.edu/publications/2220e/>
4. Hot weather management of Poultry: <https://extension.psu.edu/hot-weather-management-of-poultry>
5. UMaine Pub# 2217 Winter Care of Laying Hens: <https://extension.umaine.edu/publications/2217e/>



6. Pastured Poultry Shelter and Housing from American Pastured Poultry Producers Association: <http://appa.org/shelters>

7. Brooding and Space Requirements of Poultry: <http://extension.colostate.edu/docs/pubs/livestk/02502.pdf>

8. **Broilers:** Many of the same guidelines for other classes of poultry apply to broiler breed birds. Modern, fast-growing breeds are more dependent on environmental conditions to reach their full growth potential. They require more space per bird than layers and can be particularly sensitive to heat stress. University of Nebraska Brooding and Rearing the Home Meat Flock: <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2286&context=extensionhist>

9. Cornell University Duck Housing and Management: <https://www.vet.cornell.edu/animal-health-diagnostic-center/programs/duck-research-lab/housing-and-management>

10. **Game Birds:** Be sure to consult with the appropriate wildlife and agricultural offices before acquiring certain species of game bird. Importation of certain species is regulated for disease control or conservation purposes.

a. University of Connecticut Game Bird Management Practices:

https://animalscience.cahn.uconn.edu/wp-content/uploads/sites/3396/2022/06/articlesByFaculty_2_1173233825.pdf

b. University of California Raising Game Birds (extensive review):

<https://anrcatalog.ucanr.edu/pdf/8155.pdf>

11. **Ratites:** Ostrich and Emu are large, flightless birds that require sufficient outdoor space to exercise, graze and browse. Fencing for these species must be sufficiently tall to contain them, but also visible to the bird and strong enough to withstand collision. Ratites are social birds, and housing them in groups of 2-3 is generally recommended. Housing design for ratites must provide for an easy and safe method for caretakers to supply food and water.

a. Northern Ireland Environmental Agency Guidance on the Keeping of Ostrich and Emu:

<https://www.readkong.com/page/guidance-on-the-keeping-of-ostrich-and-emus-3940076>

b. J.C Hermes Raising Ratites- A comprehensive review of Ostrich, Emu and Rheas:

<https://extension.oregonstate.edu/sites/default/files/documents/pnw494.pdf>

Handling

It may be necessary to handle chickens to sort them, examine them or remove them for processing. When handling poultry, some priorities to keep in mind are poultry and human safety and minimizing stress for the birds. If catching birds by the legs, they should be grabbed by both legs at the level of the hock joint and then supported upright once in-hand or quickly placed into a carrying crate. Birds should not be held by the head, neck or one wing or one leg.

When transporting birds, they should be secured in a carrier with adequate ventilation on multiple sides. The sides and floor of the carrier should be designed to prevent any part of the bird from becoming trapped or protruding during transport. Birds in carriers should be able to lay down without having to lay on top of another bird (ie- single layer). Crowding will lead to increased stress and can result in death losses prior to slaughter and compromise to animal welfare. During travel, it is important that birds are not exposed to severe weather conditions such as high humidity, very high or very low temperatures or wind. Cages/crates should be cleaned and disinfected between uses.



1. How to pick up a chicken:
<https://www.petcoach.co/search/?query=how%20to%20pick%20up%20a%20chicken>
2. National Chicken Council Animal Welfare Guidelines for Broilers:
<https://www.nationalchickencouncil.org/wp-content/uploads/2017/07/NCC-Welfare-Guidelines-Broilers.pdf>
3. Common Sense Safe Handling of Chicks for Human Health:
https://afs.ca.uky.edu/files/safe_handling_of_chicks.pdf

Nutrition

Different species of poultry and stages of growth have specific nutritional requirements or feeding system needs that should be met to optimize bird performance. Some dietary components to be aware of that should be matched for species and age are protein content and calcium and phosphorus. For example, a starter turkey or pheasant diet will have a higher protein content than that for a starter chickens. Ducks may be more successful if fed a pelleted feed rather than a ground “mash” style feed. It is crucial for poultry keepers to read and understand feed labels before offering feed to the flock. If feeding a medicated feed to poultry, be sure that the treated food is intended for use in the species and age group to which you are offering it. You must observe the medication “withdrawal period,” which is a specified amount of time that must pass between administration of the last dose of a medication and using any part of, or product from, a treated animal.

Complete feeds are feeds that have been formulated to meet the complete requirements of the species and age for which the food is labeled. You may supplement these feeds with a small amount of “scratch,” or whole grains, but this volume should be kept to a minimum to prevent birds from filling up on scratch rather than consuming the correct portion of a balanced diet. Birds may also be supplemented with access to pasture and foraging for insects in the environment. If supplemented with chopped forages, be sure to supply short-stem forage to avoid crop impaction.

1. Feeds and Feeding of Free-Range Turkeys (Livestock Conservancy):
<https://livestockconservancy.org/wp-content/uploads/2021/01/ConservancyTurkeyManual-4.pdf>
2. University of Maine Extension Chicken Nutrition Pub#2222:
<https://extension.umaine.edu/publications/2222e/>
3. Nutrient Requirements of Poultry: <https://www.nap.edu/read/2114/chapter/1>
4. Pastured Poultry Nutrition and Forages: <https://www.sare.org/wp-content/uploads/Pastured-Poultry-Nutrition-and-Forages.pdf>

Health Management

One of the most important strategies for ensuring the health of the poultry flock is preventing introduction of disease in the first place. This is done by minimizing exposures between healthy birds and sick birds, or between healthy birds and unknown birds. Whenever possible, it is a good investment to establish a relationship with a local veterinarian and develop a preventative health care plan. Many vaccinations are available for poultry, however it can be impractical to use these on a smaller scale of production. When purchasing healthy chicks from certified hatcheries, you can often request a few basic vaccines to be administered before they are shipped to you. Marek’s Disease and coccidia are two common vaccine options.



Some of the more common health challenges of backyard poultry are parasitic disease, nutritional disease, and contagious diseases that are best prevented by avoiding contact with other backyard flocks, wild birds or rodents.

Wild birds can harbor diseases such as Avian Influenza or Salmonella and not show any symptoms of illness. Wild birds can spread disease when they gain access to the poultry house, share an outdoor environment or contaminate poultry feeds and water with droppings. Rodents can transport infectious organisms in much the same way and are notoriously difficult to exclude once present. You can minimize the rodent population on your farm by storing poultry feed in thick plastic or metal containers, securing the poultry house with quality building materials and design, and clearing away hiding places like overgrown vegetation and trash piles.

Some important parasites of backyard poultry are coccidia, roundworms, mites and lice. These parasites, both internal and external, contaminate the birds' environment, and can re-infect birds and spread to new, susceptible hosts. A well-managed poultry house and environment is key to interrupting the cycle of these parasites.

1. Internal Parasites of Poultry:
 - i. Blackhead in Turkeys: <https://attra.ncat.org/product/parasite-management-for-natural-and-organic-poultry-blackhead-in-turkeys/>
 - ii. Coccidia and pasture management: <https://attra.ncat.org/product/parasite-management-for-natural-and-organic-poultry-coccidiosis/>
 - iii. Worms in small flocks: <https://extension.umd.edu/resource/recognizing-and-preventing-internal-parasites-worms-small-flocks>
2. External Parasites of Poultry: <https://boulder.extension.colostate.edu/wp-content/uploads/sites/7/2021/04/Poultry-External-Parasites.pdf>
3. Nutritional Diseases of Poultry:
 - i. Investigation of Nutritional Disease at the Veterinary Diagnostic Lab: (Contains post-mortem images): <http://midwestpoultry.com/wp-content/uploads/Porter.-Robert-Investigation-of-Nutritional-Disease-at-the-Veterinary-Diagnostic-Laboratory.pdf>
4. University of Kentucky Common nutrition related problems of poultry: <https://afs.ca.uky.edu/poultry/common-nutrition-related-problems-poultry>
5. Non-Infectious Disease of Poultry: https://nt.gov.au/_data/assets/pdf_file/0016/233062/non-infectious-diseases.pdf
6. UNH/UConn Small Flock Poultry Management Series: <https://extension.unh.edu/resource/poultry-health-management-small-flock>
7. University of Maine Animal Health Diagnostic Lab: <https://extension.umaine.edu/veterinarylab/poultry/>
8. Medications in Poultry: <https://extension.umaine.edu/livestock/poultry/drug-use-in-layers-and-other-livestock/>
9. Sources of healthy birds: <https://poultry.extension.org/articles/getting-started-with-small-and-backyard-poultry/obtaining-birds-for-small-and-backyard-poultry-flocks/>

Euthanasia

The focus of this section is humane disposal of one or a few debilitated chickens. You may apply some of the approved methods for chicken euthanasia to similar sized birds. If you must



ethanize more than a few birds, please consult with your veterinarian or extension office to develop a depopulation and disposal plan.

Before selecting a euthanasia technique, you must be sure that the method will render the animal unconscious and induce death rapidly and cause minimal pain and distress. You should seek advice from your veterinarian or other professional networks if you are unsure of how to euthanize your birds or are unfamiliar with the technique. Some approved methods of euthanasia require specialized equipment and are not practical for the use on a small scale. These methods will not be covered here.

For on-farm, small flock poultry euthanasia, the following methods of euthanasia are acceptable examples:

- Rapid cervical dislocation
- Rapid decapitation
- Injectable euthanasia by a licensed veterinarian

1. Poultry Euthanasia: <https://www.poultryindustrycouncil.ca/downloads/practical-guidelines-for-on-farm-euthanasia-of-poultry.pdf>

Additional Resources

Listed below are a few quality resources for finding more information about a variety of poultry topics.

1)Resources for small scale poultry keepers from UMaine Extension:

<https://extension.umaine.edu/livestock/poultry/resources/>

2)Pasture Raised Poultry Nutrition (a breakdown of feed ingredients):

<https://attra.ncat.org/wp-content/uploads/2019/05/chnutritionhpinew.pdf?>

3)Raising Ducks as a 4H Project: <https://livestock.extension.wisc.edu/articles/raising-commercial-ducks-as-a-4-h-or-ffa-project/>

4) Maine NPIP certification:

https://www.maine.gov/dacf/ahw/animal_health/documents/backyardpoultry/npip-maine-faq-feb2020.pdf

5) University of Minnesota Small Scale Poultry Homepage:

<https://extension.umn.edu/poultry/small-scale-poultry>

6) Best Management Practices for Backyard Poultry Keepers: <https://www.mass.gov/doc/best-management-practices-for-poultry/download>

Rabbits

Housing

A variety of housing systems for rabbits exist based on their intended purpose. Whether the rabbits are raised in a pasture-based system or hutch style system, rabbit housing must provide protection from predators and weather extremes, especially heat and humidity. The housing facility must be easy to clean, as rabbits are sensitive to respiratory irritation caused by ammonia, humidity, and drafts. A well-ventilated housing structure will help to minimize illness



related to poor air quality and overheating. Rabbits can be housed in groups or individually, dependent on age group, gender and stage of production.

1. University of Maine overview of meat rabbit production (Disclaimer: *cervical dislocation* technique for rabbit slaughter not routinely recommended. Please see euthanasia section for alternatives) <https://extension.umaine.edu/publications/1044e/>
2. Penn State Rabbit Production (overview): <https://extension.psu.edu/rabbit-production>

Handling

Rabbits are a prey species; therefore, they can be timid and prone to panic. In addition, they are susceptible to spinal injury from rough handling, so it is important to be careful when handling rabbits. Do not pick rabbits up by the ears. You can safely restrain a rabbit by picking it up by the scruff behind the neck and shoulders while supporting the hind end. You may need to secure the hind feet between your fingers rather than simply supporting them with your hand. Aggressive or frightened rabbits may attempt to bite, or scratch with their powerful hind feet.

- 1) University of Washington Rabbit Lab Handout that describes and demonstrates ways to hold and restrain a rabbit (pages 8-11): https://depts.washington.edu/auts/materials/Rabbit_Lab_Handout_5-13-16.pdf

Nutrition

Rabbits are non-ruminant herbivores, meaning they primarily consume forage but lack a rumen (like a cow or sheep would have). Instead of a rumen, rabbits have an organ called the cecum, which functions to ferment and break down forages. Soft pellets, called cecotropes, are passed each day and are re-ingested for further extraction of nutrients. Fully formed, normal rabbit manure is a dry, firm pellet.

A rabbit's diet is primarily forage-based; however, grains can be supplemented to balance the diet and provide additional calories for growth. In a production style setting, rabbits are often provided with a formulated pellet, which includes a forage component, to provide a complete and balanced feed. It is important not to overload the rabbit's digestive system with high carbohydrate feeds, as this can result in diarrhea from improper balance of sugars and bacteria in the cecum.

Rabbits can be selective feeders, meaning they pick through their food for the softer, more palatable grasses. This can cause waste of foodstuffs and contribute to buildup of material on the floor of the cage. This must be taken into consideration when designing a management plan.

Like most species, there are variations in nutritional requirements depending on the stage of growth and production. For example, young growing fryers will require a different balance of vitamins and minerals than a nursing doe. A clean supply of water should be always available and accessible to all rabbits.

1. Nutrient Requirements by Rabbits eXtension: <https://companion-animals.extension.org/nutrients-required-by-rabbits/>
2. Nutrition of Rabbits Merck Veterinary Manual: <https://www.merckvetmanual.com/exotic-and-laboratory-animals/rabbits/nutrition-of-rabbits>
3. Mississippi State Commercial Rabbit Production, including Health and Nutrition: https://www.poultry.msstate.edu/pdf/extension/rabbit_production.pdf



Health Management

Many health challenges of rabbits can be controlled with good observation and record keeping, adherence to basic biosecurity principles, and practicing good sanitation. Record keeping is facilitated by identifying individual animals by an ear tattoo or tag. This allows the producer to track individual productivity and genetic trends. High quality records may include data about breeding, kindling, weaning, harvest, vaccinations, treatments, additions of new animals, deaths and sales.

Some common health concerns of rabbits are pneumonia, diarrheal disease, dental disease and both internal and external parasites. Respiratory diseases can be caused by introduced infectious organisms, such as *Pasturella*, or by environmental irritation from ammonia or humidity. Cages and nest boxes should be sanitized after each use. Maintaining a secure, sanitary environment will also help prevent diarrheal diseases such as coccidiosis. Conditions such as sore hocks and overgrown teeth can be mitigated with management changes and genetic selection for hardier individuals.

1. Routine Health Care of Rabbits Merck Vet Manual: <https://www.merckvetmanual.com/all-other-pets/rabbits/routine-health-care-of-rabbits#v3229483>
2. ATTRA Rabbit Production Bulletin with page on reproduction : <https://attra.ncat.org/wp-content/uploads/2019/05/rabbitproduction.pdf?>
3. Michigan State Extension Breeding Techniques and Schedules for Rabbits: [https://www.canr.msu.edu/uploads/resources/pdfs/4h1464_4-h_rabbittracks_breeding_techniques_\(1\).pdf](https://www.canr.msu.edu/uploads/resources/pdfs/4h1464_4-h_rabbittracks_breeding_techniques_(1).pdf)

Euthanasia

This section is not meant to serve as a guide for the humane slaughter of rabbits. For information regarding on-farm slaughter and AVMA slaughter guidelines, please see additional references below. This focus of this section is euthanasia of sick, debilitated or diseased rabbits being raised for food or fiber.

Rabbits may be euthanized via physical or chemical means. The method chosen will depend on several factors, including the resources of the producer and method of carcass disposal. For chemical euthanasia of rabbits, the assistance of a licensed veterinarian is required. Intravenous or intraperitoneal injection is a safe and effective means of euthanasia; however, it may require an animal to be accustomed to prior handling. Physical methods of euthanasia include the use of a penetrating captive bolt or assisted cervical dislocation. The latter method is technically challenging and should only be performed by individuals fully competent in the procedure.

1. Euthanasia Guide for Ontario Commercial Meat Rabbit Producers: [https://ovc.uoguelph.ca/sites/default/files/users/n.lemieux/files/Ontario%20Rabbit%20Handbook\(1\).pdf](https://ovc.uoguelph.ca/sites/default/files/users/n.lemieux/files/Ontario%20Rabbit%20Handbook(1).pdf)
2. PubMed On Farm euthanasia practices: <https://www.ncbi.nlm.nih.gov/pubmed/28774942>

Additional References:

1. Food and Agriculture Organization (FAO) of the United Nations: The Rabbit: Husbandry, Health and Production: <https://www.fao.org/publications/card/en/c/a465f8f1-79dc-585b-8ca5-fa06486e4d71/>



2. AVMA guidelines for the Humane Slaughter of Animals: 2016 Edition
<https://www.avma.org/KB/Resources/Reference/AnimalWelfare/Documents/Humane-Slaughter-Guidelines.pdf>

Swine

Housing

Pigs are housed successfully in enclosed barns, woodland, pasture, open hoop structures, and various combinations of the above. At minimum, swine housing for all life stages and production classes should provide protection from extreme weather and should be maintained in sanitary condition so as not to expose animals to temperature extremes, inadequate ventilation, high humidity, or animal wastes.

Pigs should not be confined to an area where they cannot find shelter from direct sunlight or persistent wet conditions. Pigs are uniquely sensitive to heat and humidity because they have limited ability to cool themselves through panting or sweating. Though they may choose to wallow in shallow water when available, pigs need regular access to a clean dry environment for optimal health.

The environment of the pig should be free from sharp objects and debris. Pigs are naturally curious, omnivorous, and active; these qualities can cause them to be destructive to their surroundings. Housing systems for swine must take this into account to preserve the health of the pigs, their caretakers and local environmental resources. The confinement method should be reliable in order to keep domestic pigs contained in all seasons. While challenging to exclude wildlife from many outdoor swine management areas, caretakers should take steps to discourage incursions from wildlife. This includes practices such as secure feed storage, preventing buildup of feed attractants in management areas and proper disposal of animal wastes and mortalities.

There are many models for swine housing design available from private industry groups, state extension agencies and university websites. A few examples are provided at the end of this section. Some factors to consider are budget, material availability, waste management, biosecurity and handling needs. Regardless of the housing design, facilities should be kept clean and in good repair to provide a safe environment for both pigs and caretakers.

1. Swine Housing Environment: <http://porkgateway.org/resource/the-environment-in-swine-housing/>
2. Swine Housing Options: <https://www.ipic.iastate.edu/publications/220.HousingOptions.pdf>
3. Swine Farrowing Units: A comprehensive review of the factors involved in a successful farrowing environment. Many of these principles apply regardless of the specific design chosen: <http://porkgateway.org/resource/swine-farrowing-units/>
4. ATTRA/NCAT site for raising pigs and hogs: <https://attra.ncat.org/topics/pigs-and-hogs/>
4. Biosecurity for Alternative Pig Farms: <http://porkgateway.org/resource/biosecurity-for-alternative-pig-farms/>



Nutrition

Many factors influence the nutritional requirements of pigs, including stage of growth and production, ambient temperature, housing environment and health status. To maximize the genetic potential of the swine herd, they should be provided with appropriate nutrition in each stage of production. Ideally, for optimal growth and efficiency, pigs should be fed a commercially prepared complete diet that meets the specific nutrition requirements of their production class. These diets are often available as pellets or mash (crumble) and can be purchased in individual feed sacks or in bulk.

Nutrition requirements for swine will change with age and production class. A young feeder pig is quickly growing bone and lean muscle, while a finisher hog is slowly growing and strengthening bone and starting to put down fat. For this reason, calcium, phosphorus and lysine are especially important in the young feeder pig's diet. A lower percentage of these nutrients are needed in later life stages. Another example is the lactating sow compared to a gestating sow. After farrowing, the lactating sow will require large increases in energy and calcium, depending on the size of the litter she is nursing.

Some factors that affect feed intake are ambient temperature, environmental pressures, energy density of feed and bulk character of the feed. High temperatures or humidity, crowding, high energy feeds and bulky fibrous feeds will all result in decreased intake. Low environmental temperatures will increase the energy needs of the pig and increase feed consumption, however increased gain may not result. Similarly, in herds with chronic illnesses in circulation, increased feed consumption may not lead to increased gains. This inefficiency is due to the energy depleting effects of environmental stress and chronic illness.

Swine have a high dietary requirement for the amino acid lysine. This amino acid, along with several others, is used as a building block for protein synthesis in growing animals. Dietary protein sources provide varying amounts of amino acids, including lysine, as a portion of the total crude protein content. It is important to evaluate feed components with this in mind.

Clean drinking water can be provided in several ways: open troughs, water cups or nipple waterers are a few of the more common watering systems. These can be adapted for different ages and sizes of pig. Pigs tend to spill out their water supply when it is provided in open troughs, so adaptations such as protective fencing or a tire surrounding the bottom of the trough may be necessary to prevent this behavior.

There are many different feed systems designed for pigs. The system you choose will be based on your management style, budget, production goals and type of feedstuffs offered. Meal feeding or free feeding is acceptable, and you may employ a combination of styles based on production groups. Regardless of how or what pigs are fed, their body condition should be scored and recorded on a regular basis to be sure that their needs are being met and that mature pigs are not being overfed. Obesity and nutrient wasting into the environment are negative consequences of overfeeding. A guideline for assessing body condition is provided in the links below.

Proper storage of feed is crucial for several reasons. Compromised feed may harbor molds and/or their toxins and may have lower digestible concentrations of essential components, especially fat-soluble vitamins. Feeds that have spoiled may be refused by pigs, cause



reproductive issues, decreased feed efficiency, illness and even deaths. In addition, improperly stored feed can attract wildlife such as rodents and birds which have been associated with spread of disease and increased food waste. Pig feeds should always be stored in a fashion that excludes wildlife, moisture, air and light.

Many people enjoy having pigs as a way to reduce waste from home gardens or from their home kitchen. There are state and federal laws that apply to feeding these materials to pigs due to the risk of introducing or spreading disease among pigs or the humans that will eventually consume them. More information about feeding byproducts to pigs is provided in the links below.

1. Nutrient Requirements of Swine
 - a. Dense: <https://animalscience.unl.edu/Extension/Swine/swinenutrition.pdf>
 - b. Less Dense (Table 2 outlines basic pounds/day based on live weight group): <http://porkgateway.org/resource/growing-finishing-swine-nutrient-recommendations-and-feeding-management/>
 - c. Less Dense Understanding Nutritional Guidelines: <http://porkgateway.org/resource/understanding-the-nutrient-recommendations-in-the-national-swine-nutrition-guide/>
2. General Nutrition Principles for Swine (Factors the effect nutrient needs):
 - a. Dense: <https://www.bookstore.ksre.ksu.edu/pubs/MF2298.pdf>
 - b. Less Dense: <https://porkgateway.org/resource/factors-affecting-nutrient-recommendations-for-swine/>
3. Mycotoxins: <http://porkgateway.org/resource/mycotoxins-and-swine-performance/>
4. Feeding Systems for Swine: <http://porkgateway.org/resource/feeding-systems-for-swine/>
5. Nutritional effects on Pork Quality: <http://porkgateway.org/resource/nutritional-effects-on-pork-quality-in-swine-production-2/>
6. Body Condition Scoring Swine (UNC Extension): <https://research.unc.edu/files/2012/11/Body-Condition-Scoring-Swine.pdf>
7. Feeder pig consumption chart: <https://www.agrifarming.in/pig-feed-chart-and-pig-weight-chart-for-beginners>
8. Risks associated with feeding garbage to swine: https://www.cdfa.ca.gov/ahfs/Animal_Health/pdfs/GarbageFeedingFactsheet.pdf
9. Maine Law Title 7 Chapter 305 License to Feed Garbage: <https://legislature.maine.gov/statutes/7/title7sec1814-A.pdf>

Handling

Pigs can be difficult animals to move through handling systems, or onto and off of trailering equipment. They are large animals and do not demonstrate as strong a herding instinct as animals like sheep or cattle. However, there are certain behaviors of pigs that can be used to your advantage when attempting to handle them. Large pigs may need to be handled and moved for management purposes such as sorting production groups, moving sows and gilts into breeding or farrowing facilities, or for medical treatments and testing. Smaller pigs may need to be handled for piglet processing, weaning or other inspection.

Pigs are naturally curious and will move into a well-lit area with solid, dry footing especially if moved in groups. Barriers used as alleyways should be solid so that pigs cannot see other travel options or groups of pigs they have been separated from. Solid pig boards are a handy tool to



direct pigs towards or away from an opening to an alley or trailer. Frequent vocalizations or falling in the handling system indicates that the animals are stressed, and your handling system is not effective. Electric prods and physical contact with pigs is rarely necessary if the handling system is set up and utilized correctly. Excessive use of any form of physical contact is not acceptable.

Small pigs, such as nursery pigs or weaner pigs, can be picked up by a hind leg and then supported under the chest with the other hand. If procedures such as castration, ear tagging or vaccination are to be carried out, the animal should be properly restrained in a sling, cradle or properly supported by a competent handler.

Adult pigs can be restrained temporarily for procedures in a hog crate, or with firm pressure between a solid wall and pig board. A snare can also be safely and humanely utilized if the handler applying the snare is well informed of its use and maintenance.

1. Swine Handling (Finisher Pigs): <http://porkgateway.org/resource/handling-and-loadout-of-the-finisher-pig/>
2. Temple Grandin: Minimizing Stress in Pig Handling in the Research Lab: <https://www.grandin.com/references/minimizing.stress.in.pig.handling.html>
3. Iowa State Animal Behavior and Restraint: <http://www.cfsph.iastate.edu/Emergency-Response/Just-in-Time/08-Animal-Behavior-Restraint-Swine-HANDOUT.pdf>

Health Management

Practicing good biosecurity on your farm is the best way to keep your pigs healthy. This consists of preventing exposure of your pigs to wildlife, other pigs, or tools and feed that could have been contaminated by pigs outside the herd. When bringing new animals into the herd, it is recommended that they are quarantined for 14-21 days at minimum. Selecting hardy, healthy individuals for breeding will increase the natural health of your herd and feeding your pigs an appropriate well-balanced diet will support their potential to grow and thrive on your farm. Keeping good records of management interventions and production events will help the pig producer make informed decisions about the herd. Individual animal identification is important for good record keeping, especially in the breeding herd.

Despite good biosecurity practice, some diseases remain endemic (or common) in most swine herds. To prevent illness from these diseases, vaccines are readily available from your veterinarian or farm supply store. If you experience regular losses or a sudden increase in animal mortalities, you should consult with your farm veterinarian to attempt to determine a cause of death. Vaccination or management level changes may be recommended. See below for injection site guidelines for vaccinations and information about common diseases of swine.

Internal and external parasites can cause production losses in swine, particularly those raised outdoors. This environment is more difficult to clean, and generations of parasites can persist in the soil, manure piles and porous infrastructure. Keeping mixed age groups of pigs and continuous use of a barn or pasture contributes to high parasite loads in the environment. In contrast, using an “all-in, all-out” flow of animals isolated by age or production class helps to decrease the concentration of parasites in the environment. More information is provided below about specific parasites, their lifecycle, and treatment strategies.



1. Vaccination Strategies for Pigs Raised on Small Farms (Michigan State University) : <https://www.canr.msu.edu/resources/vaccination-strategies-for-pigs-raised-on-small-farms>
 2. Proper Injection Techniques for Pigs: <http://porkgateway.org/resource/proper-injection-techniques-for-pigs/>
 3. Processing procedures for Piglets- Penn State Home Study Course Page: <https://extension.psu.edu/courses/swine/reproduction/processing-procedures-for-baby-pigs>
 4. Castration of piglets (background and procedure): https://www.sites.ext.vt.edu/newsletter-archive/livestock/aps-08_01/aps-0111.html
 5. External Parasites: <https://edis.ifas.ufl.edu/pdf/IG/IG13800.pdf>
 6. Internal Parasites: <https://extension.missouri.edu/publications/g2430>
 7. What does a sick pig look like? Tips from Pork Information Gateway: <https://porkgateway.org/resource/observations-to-improve-the-welfare-of-the-sick-or-compromised-pig/>
 8. Care of the Sow during farrowing and lactation: <https://swine.extension.org/care-of-the-sow-during-farrowing-and-lactation/>
- *Note* Please check with your veterinarian and/or consult label instructions for OTC medications to be sure current rules and regulations are followed.*

Euthanasia

Approved euthanasia methods for swine vary with the age and size of the animal. Please see the link below for a summary of approved methods based on age of the animal and relative risks and benefits for each procedure. Your farm veterinarian, State Extension Service or State Department of Agriculture can help answer questions or address concerns about the humane treatment of farm animals.

1. American Association of Swine Veterinarians-On-Farm Euthanasia of Swine: <https://www.aasv.org/documents/2016EuthRec-EN.pdf>

Additional Swine Resources

General farm management and business organization resources:

- 1) Pork Information Gateway: <http://porkgateway.org/categories/>
- 2) USDA SARE Profitable Pork: <https://www.sare.org/Learning-Center/Bulletins/Profitable-Pork>
- 3) Penn State Swine Production and Management Home Study Course (error when click on title on website so just click on chapter titles) <https://extension.psu.edu/programs/courses/swine/basic-production/introduction-to-swine-production/types-of-swine-production-enterprises>
- 4) ATTRA Hog Production Alternatives: https://parasitology.cvm.ncsu.edu/vmp991/swine/supplement/hog_production_alternatives.pdf
- 5) Swine Health Protection Act (Information about feeding food waste to swine): https://www.aphis.usda.gov/animal_health/animal_dis_spec/swine/downloads/interim_rule_pro-products.pdf
- 6) By-product Feed Ingredients for Swine: <http://porkgateway.org/resource/by-product-feed-ingredients-for-use-in-swine-diets/>
- 7) Introduction to Raising Pigs: A basic overview of general principles of swine husbandry <http://porkgateway.org/resource/introduction-to-raising-pigs/>