A Guide to Livestock & Rural Living in Gilpin County

Colorado State University Extension
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Table of Contents

Introduction

A Guide to Livestock & Rural Living in Gilpin County was created for new residents of Gilpin County and all residents interested in raising livestock. Rural living is significantly different than living in the city or even the suburbs. Gilpin County is known for its spectacular views and quiet living; however, the conveniences of living near a city seldom apply when living in Gilpin County. Additionally, raising livestock in the mountains has its own challenges. This guide aims to help new residents and those interested in livestock understand and better prepare for the challenges that lay ahead.

For more information on any of the topics covered in this program, please visit the Gilpin County Extension website at http://www.extension.colostate.edu/gilpin/.

For more information about Gilpin County, please visit http://co.gilpin.co.us/.

For the Commissioner's Gilpin CountyPrimer For Living In The HIGH COUNTRY please visit http://co.gilpin.co.us/Newsletter%20and%20Primer/NewslettersPrimer.htm.

Fires & Burning

When building or living in a rural community like Gilpin County, there are a few unique issues residents need to be aware of. Some matters that need to be addressed are accessibility, limited water, preparedness, and wildfires.

Accessibility
Unlike urban areas that have fire and ambulance service within a short distance of the population, emergency services in Gilpin County can be far away from your residence. The most important assistance you can give emergency crews is to make sure your residence is clearly marked with the correct address number and that it is visible from the main road.

Another important detail is to construct your driveway so a large fire truck or ambulance can gain access under all weather conditions. Contact your local fire district office for specifications on road dimensions, grades, turning radius, etc. Not only is it important to have a way in, but a second method of escape is recommended for residents and emergency personnel. Remember, this access needs to be maintained year round in all conditions of weather. The bottom line—if emergency crews cannot reach you, they cannot help you.

Limited Water
A second very important factor is water needed to fight a fire at your property, whether structure or wildfire.

Water is still the best and most affordable agent known to extinguish fire. In a rural community it may be extremely hard to get water to the fire. Fire departments have water tanker trucks to transport water to the scene, but again, distance and access may pose a problem for this equipment.

Preparedness and Fire Safety Tips
Smoke detectors are the most important fire safety tip and the most obvious; make sure your home has working smoke detectors! This means if your smoke detectors are battery operated, make sure the battery is new and the smoke detector is working. Remember, a smoke detector cannot work if you removed the battery to put it in one of the kids' toys. A good habit is to change the batteries every time there is a time change for daylight savings.

Because of increased response times to rural dwellings, safety and human lives are a primary concern of the fire protection districts. The districts have supported the adoption of fire codes requiring the installation of smoke detectors in all dwellings. These codes apply to new home construction as well as the remodeling of older homes.

Fire extinguishers are not only important to own, but you should know how to operate one. A good method for learning is called PASS. You can pass a football or basketball, but it's time to learn to pass a fire extinguisher. That does not mean throwing it around the backyard, but that's the easy way to remember how to use a fire extinguisher.

PASS

· P-pull the pin on your extinguisher,
· A-aim the nozzle at the base of the fire,
· S-squeeze the handle,
· S-sweep the extinguishing agent at the **base** of the fire.

EDITH

Exit Drill In The Home (EDITH). Your children are required to be prepared and go through fire drills at school, why shouldn't they, as well as the rest of the family, be prepared at home?

These drills should not be intended to scare children, rather to inform them of what they should do in the event of a fire occurring in the home. Sit down with the family and draw a floor plan of your home. Explain what to do if there is a fire. Make sure everyone has at least two ways out of the house in case of a fire. Once outside, select a meeting place so everyone can be accounted for and you can inform firefighters when they arrive on the scene whether or not someone is trapped inside the house. Select a meeting place everyone can identify with, like a big tree in the yard or the light post. If you can practice escaping the house when there is not a fire, you should have no problems doing so if there is ever a need.

Wildfires

Wildfires in the urban/wildland interface are very real and a potentially disastrous problem. No area is immune from this threat, and it is particularly true within this community. Contact your local fire district representative for more information. For information on creating a defensible space on your property, refer to the Colorado State Forest Service *Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zone* and remember "Firefighters always do their best to protect rural residents, but ultimately, **it is YOUR responsibility to protect your life, family, animals and property from wildfire.**"

Wildfire Quick Facts

· Wildfires occur in all seasons of the year (not just in the summer).
· Wildfires occur in all fuel types (grass, brush, and trees are all equally susceptible).
· Wildfires occur in all sizes (a small fire can destroy a house as easily as a large fire).
· Wildfire may move with incredible speed (most people are caught totally by surprise with only a few minutes to collect their most prized possessions and evacuate to safety).
· Seldom are there enough trained personnel and necessary equipment to protect every structure.
· Professionals are forced to choose which homes can be defended and which cannot.
· The action taken now to protect a home will make a difference.

Slash Pile Burning

Burning slash can be a cost-effective method of reducing hazardous fuels on private lands. For more information on slash pile burning, contact your local fire department.

Permit requirements

Per Senate Bill 11-110, open slash pile burning for non-exempt burns on private land is prohibited without permits.

Two permits are needed:

· The burn permit for Gilpin County can be found on the county website: www.co.gilpin.co.us, or at the County Courthouse (203 Eureka St, Central City, 303-582-5214).

· The state permit can be found here: www.cdphe.state.co.us/ap/OpenBurning.html.

Burning without a permit will result in a $1,000 fine. Violating the permit conditions will result in a $500 fine for the first offense, and a $1000 fine for the second offense.

Fire Department personnel will schedule and conduct an inspection of your burn site. If pile construction conditions are met, the authorized fire department person will sign and issue the permit. Permits are valid for one year from the date of authorization.

Pile Construction

· Woody materials to be burned include only clean, dry slash (limbs, branches, needles, leaves) less than 6 inches in diameter.

· Do not burn household trash, construction debris (building materials), lumber, tires, fence post, creosote products or wood products containing hazardous chemicals, etc.

· Construct piles so that the maximum size of the pile does not exceed 8 feet in diameter and 6 feet in height. Piles should be further than 10 feet from any adjacent standing tree trunk—make sure tree crowns do not hang over the piles. Piles should be 20 feet apart. Piles should be constructed in openings or clearings whenever possible.

· Do not place piles over or near tree stumps or adjacent to any large down dead or green logs, as they will burn for an extended period of time and will require additional control.

· Build piles at least 50 feet away from any structure.

· Do not place piles near or under power lines or utility poles, drainages or waterways.

Conditions

· Burn ONLY when there's a minimum of 4 inches of snow on the ground.

· Burning slash during a snowfall will reduce smoke, and is recommended.

· Wind speeds at the time of ignitions must be 10 mph or less. If wind gusts exceed 10 mph for a period of 30 minutes or more, extinguish the pile so there is no visible smoke.

· Monitor and attend your burns. One person shall only attend 2-3 piles at one time.

· Keep a shovel or two on the burn site and have a working telephone readily available in case of emergency (land line with adequate range or cellular with reception) .

· Pile burning may only occur after sunrise. Piles must be fully extinguished before sunset (no visible smoke, flames or glowing embers).

· Piles should be visually checked for visible smoke and heat the day following the burn.

It's good etiquette to notify your neighbors of your intent to burn slash piles.

On day of burn

· Notify the Gilpin County Sheriff's Office Dispatch (303-582-5500) when the burn begins and when the burn ends each day.

· If burning within the Timberline Fire Protection District, notify the District Administrator (in addition to contacting Gilpin Sheriff Dispatch) within 24 hours prior to and upon completion of the burn. Please leave a message if the District Administrator is not available (i.e. weekends, holidays, etc.): 303-582-5768.

Drinking Water

The appearance, taste, or odor of water from a well or other source offers some information about obvious contamination, but chemical analysis is needed to detect most contamination in water. Obvious contaminates include silt (turbidity) and hydrogen sulfide, which can be detected by smell. As a rule, the senses will not detect impurities that cause hard water, corrode pipes, and stain sinks. Two types of tests (bacteriological and chemical) are used to assess water quality.

Quick Facts

· Two types of tests (bacteriological and chemical) are used to assess domestic water quality.
· The Colorado State University testing laboratory and other private labs are equipped to determine the chemical constituents of water.
· Local county health departments or the Colorado Department of Health will perform bacteriological tests.
· Chemical tests are needed to detect contaminants in water such as nitrates, sodium, chlorides, and the hardness capacity of water.

Bacteriological Tests

Bacteriological tests are used to determine if water is bacteriologically safe for human consumption. The tests are based on detection of a group of microorganisms (coliform bacteria) that are recognized as indicators of pollution from human or animal wastes. Coliform bacteria are found in the intestinal tracts and fecal discharges of humans and all warm-blooded animals. Anyone wanting a bacteriological test performed on their drinking water should contact Gilpin County Public Health Agency (303-582-5803) to obtain the specially prepared bottles and instructions for taking a water sample. It's important to note that special techniques are required to collect samples because they can be contaminated if improper procedures are used.

Chemical Tests

Chemical tests are used to identify impurities and dissolved substances that affect water used for domestic purposes. Water begins to decrease in palatability when the amount of minerals (e.g., dissolved salts) exceeds 500 to 1000 parts per million (ppm), but this depends on the nature of the minerals. Beyond these limits, the water becomes increasingly unpalatable. The table below lists the constituents and parameters routinely determined with a water test by the Colorado State University Soil, Water, and Plant Testing Laboratory.

Parameters determined for the routine domestic water analysis test	
Recommended Parameter	**Limits (ppm)**
Conductivity (micromhos/Cm)	*
pH (pH units)	6.5-8.5
calcium	*
magnesium	*
sodium	20
potassium	*
carbonate	*
bicarbonate	*
chloride	250
sulfate	250
nitrate	45†
total alkalinity as $CaCO^3$	400
hardness as $CaCO^3$	*
total dissolved solids	500
boron	*

*Limits not established
† Mandatory upper limit for nitrate (NO^3)

The Laboratory Report—What Do the Numbers Mean?
Most testing laboratories report quantities of chemical substances as weight in volumetric units such as milligrams per liter (mg/1). For all practical purposes, 1 ppm = 1 mg/l. The factors on a water analysis report are discussed below and represent the parameters considered in the evaluation of domestic water quality.

pH
pH is a measure of intensity of alkalis or acid contained in the water. Absolutely pure water has a pH value of 7.0. In Colorado the pH of well water is normally between 6.5 and 8.5. Water with pH less than 5 may cause corrosion problems because many metals become more soluble in low-pH waters.

Water with pH levels higher than 8.5 indicate that a significant amount of sodium bicarbonate may be present (see Carbonates and Bicarbonates).

Calcium (Ca) and Magnesium (Mg)
Calcium and magnesium cause water hardness and result from limestone-type materials in underground soil layers. Separate values are of minor concern, but they are combined for calculating hardness.

Hardness
Hardness is the soap-consuming capacity of water (i.e., the more soap required to produce lather, the harder the water). Hard water also causes greasy rings on bathtubs, greasy films on dishes or on hair after washing, and poor laundry results. Problems caused by hard water in bathing or washing may be overcome with the use of synthetic detergents or packaged “softening” compounds. The hardness of water may be removed by a water softening unit containing exchange resins, but this results in the exchange of calcium and magnesium (Ca + Mg) by sodium, so it may be a concern to people on a prescribed low-salt diet. Such water should not be used for gardens, lawns or plants. Hardness is reported as calcium carbonate ($CaCO^3$) in mg/l.

Sodium
Sodium may be a health concern for people on a low-salt diet for medical reasons. Sodium can be reduced or removed by expensive treatment systems, but when calcium and magnesium are removed from water by passing through a water softener, sodium replaces it.

Potassium
Potassium is an essential nutritional element, but its concentration in most drinking water is trivial and quantities seldom reach 10 mg/l.

Carbonates and Bicarbonates
Carbonates and bicarbonates are the major contributors to the "total alkalinity" that may be determined in a routine water test. The alkalinity of a water sample is a measure of its ability to neutralize acids. Naturally occurring levels of total alkalinity up to 400 mg/l as $CaCO^3$ are not a health hazard. Low alkalinity can be associated with low pH values and may indicate potential problems due to corrosion of metal in plumbing systems.

Chloride
Chloride concentrations in drinking water may be important to people on low-salt diets. Most people will detect a salty taste in water containing more than 250 mg/l of chloride. Expensive treatment methods are needed to remove chloride from water.

Sulfate
Sulfate content in excess of 250 to 500 ppm may give water a bitter taste and have a laxative effect on people not adapted to the water. Expensive treatment methods are necessary to remove or reduce sulfate in a private water system.

Nitrate
Nitrate in excess of 45 mg/l (or in excess of 10 mg/l if reported as nitrate-nitrogen) is a health concern for pregnant women and infants under 6 months. High nitrate water should not be used for infant formulas or in other infant foods. Considerably higher nitrate content is apparently tolerated by most adults. Nitrates can be removed from private water supplies, but the equipment is expensive and not commonly used.

Total Dissolved Solids
Total dissolved solids, also called "total mineral content" or "total residue," is the total amount of material remaining after evaporation of the water. Values of less than 500 ppm are satisfactory and up to 1000 ppm can be tolerated with little effect.

Fluoride
Fluoride is important in the development of teeth in infants and youth. The optimum fluoride content to assist in the control of tooth decay is 0.9 to 1.5 ppm. Excessive amounts are rarely found in Colorado waters, but a concentration over 3.0 ppm may cause darkening of the tooth enamel and possibly other undesirable effects.

Iron and Manganese
Iron and manganese are nuisance chemicals that cause troublesome stains and deposits on lightly colored clothes and plumbing fixtures. Iron causes yellow, red, or reddish-brown stains and deposits, while manganese stains and deposits are gray or black. Excessive amounts may also cause dark discoloration in some food and beverages and cause an unpleasant taste. Iron and manganese can be removed or reduced in a softener equipped with special resins or by small treatment systems involving aeration, filtration, and chlorination.

Taste and Odor

Taste and odor problems are difficult to solve. Some inorganic compounds may impart detectable tastes without odor. Hydrogen sulfide (rotten egg smell), when present, will impart an undesirable odor or taste. Generally, undesirable tastes may be caused by any number of organic compounds. These may be present naturally in the water, or maybe because of sewage or other surface contamination sources. These may impart disagreeable tastes and odors in minute concentrations (a few parts per billion or a few milligrams per kiloliter) and specialized chemical tests are needed to detect such small levels. Turbidity in drinking water is caused by suspended sediments from erosion and runoff discharges. The maximum contaminant level in drinking water is 1 to 5 turbidity units.

Some of the minor elements such as lead, arsenic, and molybdenum, also have recommended limits. If you have your water tested for these elements, please make sure they are below the limits and, if not, contact a professional.

For information regarding water that does not meet the standards contact the Gilpin County Extension Office or local companies that specialize in water purification.

Living with Wildlife

Many people who live on large and small acreages in Colorado consider free-roaming wildlife one of the most important assets to their property. As we continue to share their habitat with our homes in rural areas, there are sure to be many more animal encounters. In most situations people and wildlife can coexist. The key to coexistence is usually respecting the "wild" in wildlife.

While wildlife are fascinating and may seem cute, they do not make good pets. Moreover, they cannot fend for themselves after being confined for a length of time. For these reasons, it is illegal to possess most kinds of wildlife. Wildlife in Colorado are property of the State and are managed, preserved, and protected by the Colorado Parks and Wildlife. As a result, many of the things people do with wildlife are regulated.

"Do not feed the animals"—this motto says it best. Intentional or inadvertent feeding is the major cause of most wildlife problems. Well-meaning people will feed wildlife, especially in the winter when they think they are helping the animals. But in Colorado, feeding big game is not only harmful to the animals, it is illegal.

Feeding can result in big game animals congregating, thereby transmitting disease through a population. Congregating can also create traffic hazards when big game animals wander close to roads. When residents feed big game, it may draw animals away from their historic winter ranges or prevent them from migrating. Feeding can draw big game onto private property and ranches where they can become dependent on unnatural food sources like your landscaping or your neighbor's crops.

Remember, most wild animals have evolved over thousands of years to the habitat we share with them and have done very well without our assistance.

Winter is the most stressful time for most wildlife. The most important thing people can do to help wildlife, especially big game, is to keep their dogs from chasing deer and elk. **In Colorado and Gilpin County, it is illegal to let a dog roam free unsupervised.** Most people do not realize that their dogs, even gentle dogs, have a natural instinct to run after wildlife. In the winter, dogs can run on top of the crusted snow, but deer and elk break through, making them easy prey. Deer and elk can use up critical energy reserves trying to escape from dogs. Many times deer and elk end up dying from injuries or exhaustion even though they may have escaped the dogs. Wildlife and law enforcement officers are authorized to shoot dogs chasing wildlife, and the fines for allowing a dog to harass wildlife are substantial. Dogs are a constant threat to all kinds of wildlife throughout the year, so please watch them carefully.

Wildlife, in their abundance and diversity, are usually a pleasure to have around, but occasionally, they can be a nuisance. The key to avoiding problems with wildlife is keeping unwanted wildlife out of our homes and buildings. The most important thing to remember is not to feed the wildlife. Bird feeders are okay, but be sure they are not accessible to other wildlife. Exclusion is the next best way of preventing unwanted animals from being a nuisance. Some tips for excluding unwanted animals are:

· Cover window wells with grates, bubbles, or hardware cloth,
· Close holes around and under foundations, sheds, and outbuildings,
· Cover and keep tightly closed any garbage, pet or animal foods,
· Fence gardens and wrap trees with hardware cloth or plastic pipe,
· Use a portable radio and flood lights to annoy unwanted animals,
· Use moth balls or ammonia-soaked rags to deter pests,
· Often, if you live outside the city limits, the easiest solution to solving nuisance wildlife problems is to simply trap or shoot them.

Most birds are protected; the exceptions are starlings, sparrows, and pigeons. The use of poisons to kill any animal is usually illegal and strictly regulated by the Federal and State governments. Local wildlife officers may advise you about how to handle problem wildlife, but they cannot take the time to assist you. Persons specializing in pest control can assist with many wildlife problems for a fee. Look in the yellow pages for these services.

It is not uncommon for landowners in rural areas of western Colorado to encounter bears and mountain lions. There is no reason to be frightened by them. Lions usually avoid people and encounters with them are only incidental. Bears usually fear people, but will tolerate humans if the bear has become accustomed to eating human food. Precautions should always be taken to avoid attracting bears by removing any source of food, especially garbage. Bears also like hummingbird feeders, so hang them well out of reach and bring the feeders in at night.

Sometimes, small property owners who own or feed livestock must deal with conflicts caused by big game. Usually the problem is elk raiding small haystacks or the feed yards where cattle and horses feed. Land-owners can easily prevent big game from eating their hay by protecting haystacks with tall fencing materials available from any farm and feed or hardware store. In many housing developments this is required, so check your covenants. In some cases the Colorado Parks and Wildlife provides fencing material. Usually, if big game are feeding with livestock, the problem can be solved by altering the time at which livestock are fed. Elk and deer are reluctant to be near human activity during daylight. If livestock are fed in the morning, there is usually very little food left to attract big game after dark. See the Livestock and Wildlife Management Section for more information on this subject.

Outdoor Recreational Etiquette and Safety

Gilpin County offers an array of settings for outdoor enthusiasts including rivers, streams, lakes, rugged back county terrain, mountain meadows, valley floors, draws, and rolling hills. The terrain is a part of the area's history, culture and industry.

Etiquette
When you plan recreation in the high country you need to be aware of rules and etiquette. It is very important to research all the following conditions and situations.

Determine Property Owner
First you must determine if the property you want to access is public or private. If it is public, find out which organization is in charge of managing the property and if it is being leased or otherwise used. Most high country public lands are under the direction of a federally administered grazing permit system, which is critical to preserving mountain ranches. If the property is being leased for grazing, it is extremely important that you leave all gates how you found them (open or closed), give livestock the right-of-way on all trails and paths, and keep pets leashed. You also need to make sure you are aware of the boundaries of the property. Fences are not necessarily property lines. It is your responsibility to know whose property you are on at all times. If you do not have permission to be there, you are trespassing. If you trespass, you may be subject to criminal penalties. When you are in the high country it is your responsibility to know where you are and whose property you are on.

Ask First to Go on Private Land
If you are interested in going on private land, you must first ask the landowner. They may or may not grant you access to the property. It is their right to set the availability of their property to anyone, as well as rules and special circumstances for the property they own. Under no law are they obligated to allow you access to their property. The landowner also has every right to ask you to leave. It is in your best interest to create a good relationship with the landowner because they may be more inclined to give you permission to access their property or let you come back. Some things you may want to let the landowner know before they make their decision are:
· How many people are in your group.
· How long you would like to stay.
· What you would like to do.

Adhere to Directions
If you are granted permission to access private land, you need to find out what type of directions there may be. You should ask the landowner some questions like:

· Where can I go?
· What obstacles/situations do I need to be aware of? (An answer may be that there are 100 head of mother cows with young calves and four bulls in the area where you want to camp.)
· What type of vehicle can I use (e.g., automobile, bike, all-terrain vehicle, snowmachine, etc.)?
· Can I have a camp fire, and if so, is there a special place you would like it to be?
· Can I bring my pet?

Some additional common courtesy questions you should ask are:
· Is there anything you would like me to look for when I am in the area?
· Do you charge for access to your property?
· Can I do anything to help you for letting us on your property?

Always be sure to leave the area the way you found it by removing any items you brought in, this includes trash, equipment, and vehicles.

Follow State Laws
When you are on property other than your own it is mandatory to follow all federal, state, and local laws. If you break the law on someone else's property do not expect to get away with it; the landowner has the right to prosecute.

Please Leave the Gates as You Find Them
The success of a livestock operation depends heavily on the satisfactory control of animals through fence and gate use. So please leave the gate the way you found it, open or closed. The landowner will appreciate you responsibly passing through the area without causing problems for their livestock operation. All fences are property belonging to the rancher or the Federal Government and it is against the law to cut or dismantle any fence. It is sometimes difficult to close a barbed-wire gate if you haven't done it often. Here are a few hints on how to close the gate:
· Your leverage is greatly increased if you first put the bottom loop as high as possible on the gatestick.
· Put your arm around the gatestick, grab the post and pull the gate post to your shoulder.
· Pull the top loop down firmly on the gatestick.
· If you simply can't get the gate closed, go back, let the rancher or manager know and get help. Do not leave the gate open if it was closed.

Noxious Weeds

Noxious weeds not only degrade pastures and property values, they are not legal to let grow on your property. Since 1990, the state's natural and agricultural resources have been protected by the Colorado Noxious Weed Act (35-5.5 CRS); it is everyone's responsibility to control the weeds on their property. Recent revisions to the Act enable county and city governments to implement management programs aimed at noxious weeds in order to reclaim infested acres and protect weed-free land. These changes included prioritizing the State's noxious weed list into three separate lists, A, B and C.

- List A plants are designated for elimination on all County, State, Federal and Private lands.
- List B includes plants whose continued spread should be stopped; there are county-by-county recommendations for control/eradication.
- List C plants are selected for recommended control methods, but are widespread across the state.

The Noxious Weed Act can be found here:
http://www.colorado.gov/cs/Satellite?c=Document_C&childpagename=Agriculture-Main%2FDocument_C%2FCDAGAddLink&cid=1251616643546&pagename=CDAGWrapper

Stipulation of the Colorado Weed Law:

- Gives local governments authority to require the control of undesirable plants by state boards, departments, or agencies that control or supervise state lands.
- Gives local governments authority to require landowners to manage undesirable plants, provide for arbitration procedures, and due process.

The Gilpin County Commissioners and Community Development Department are responsible for enforcement of the weed management plan (or, in incorporated areas, the Municipality is responsible). Although your Extension Office is not responsible for the enforcement of the weed law, they will assist you with weed identification and integrated weed control recommendations.

Nuisance weeds are non-native weeds that are not listed as a noxious weed by the State of Colorado. These include small-flowered alyssum, salsify, prickly lettuce, field pennycress, and others. Control is not mandated, but is recommended if the plants are aggressively colonizing your property and reducing pasture.

Appropriate integrated weed management tools include the use of one or more methods of control (chemical, cultural, biological, or mechanical) that prevent or slow seed production on annual or biennial weeds. For perennial weeds, integrated weed management tools are chemical, biological, mechanical, or cultural practices that prevent or slow seed production and prevent, slow, or reduce vegetative growth. Any control method listed above can be used as long as it is known to be effective in managing a particular weed; people cannot be forced to use chemical herbicides. An exception to this is that biological controls are not permitted for control of List A species, since this technique does not eradicate the weeds, as stipulated by the law.

Examples of appropriate control methods for the specific weeds are:

- ***Leafy spurge-*** Creeping perennial. Systemic herbicides alone or in combination with mowing or grazing by goats or sheep. Pulling is usually not effective due to extensive root system. Biological controls have not shown to be effective in the mountains.
- ***Toadflax(es)-*** Creeping perennial. Systemic herbicides, pulling of small infestations. Pulling is usually not effective on established stands due to the extensive root system.
- ***Knapweed(s)-*** Biennial to short-lived perennial. Herbicides, mowing, grazing by sheep before seed set, hand pulling of small infestations.
- ***Whitetop-*** Creeping perennial. Continuous mowing and systemic herbicides.
- ***Houndstongue-*** Biennial. Herbicides, handpulling.
- ***Canada thistle-*** Creeping perennial. Continuous mowing or mow/cut in the early season followed by fall systemic herbicide application. Pulling is usually not effective due to extensive root system.
- ***Musk thistle-*** Biennial. Herbicides, mowing, grazing by sheep before seed set, hand pulling of small infestations before flowering.
- ***Oxeye daisy-*** Creeping perennial. Systemic herbicides, mowing, pulling of small infestations.
- ***Annual weeds-*** such as cheatgrass, scentless chamomile – pull, hoe, mow, or cultivate before seed set, or use contact or systemic herbicides while young and actively growing.

For more weed information specific to Gilpin County visit
http://www.extension.colostate.edu/gilpin/natu/noxi.shtml

For the Gilpin County Weed Ordinance and Management Plan, please visit
http://www.co.gilpin.co.us/Commissioners/Weed%20Ordinance/Resolution%20on%20noxious%20weeds%20-final%20REVISION.pdf

You can also find more resources here:

Resources:
Pictures and fact sheets on noxious weeds from Colorado Dept of Agriculture:
http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1167928184099

Information on noxious weeds from the Colorado Weed Management Association:
http://www.cwma.org/noxweeds.html

Noxious weed ID guide and pamphlets available from the Colorado Weed Management Association: http://www.cwmastore.com/SearchResults.asp?Cat=37

Book: Weeds of the West, 10th edition. 2006. Tom Whitson, Ed. U of Wyoming -- Good pictures and descriptions. Has both noxious and pasture weeds.

Book: Weeds of the Great Plains, 3rd edition, James Stubbendieck, Geir Friisoe, Margaret Bolick, Univ. of Nebraska - Same photos and weeds as Weeds of the West but contains more information on each weed.

High Altitude Food Preparation

Since the Pioneers
Ever since early pioneers pushed westward into the Rocky Mountain area, cooks have found problems with food preparation at higher elevations. Staple items such as potatoes and beans do not cook in the usual times and favorite cake recipes sometimes fail dismally.

Even today, people moving to Colorado or other mountainous regions from near sea level are puzzled by problems of high altitude cookery. In addition, standard cookbooks and periodical recipes are generally written for low altitude cooking.

The Difference Between Low and High Altitude Cooking
Cooking difficulties are due to differences in atmospheric pressure. The pressure of the air is greatest at sea level and becomes less as the altitude increases.

Atmospheric pressure at sea level is 14.7 pounds per square inch, at 5000 feet it decreases to 12.2 pounds per square inch, and at 10,000 feet it is 10.2 pounds per square inch. Generally, there is no need to make recipe adjustments up to 3000 feet. As the elevation becomes greater, however, the challenges also become greater.

Food problems at high altitudes are all due to a decrease in atmospheric pressure. Lowered atmospheric pressure affects:
· Baked products
· Vegetables
· Sugar cookery
· Jelly and starch gels such as puddings
· Deep fat frying
· Canning procedures.

Decreases in atmospheric pressure permit faster evaporation of water and other liquids, greater expansion of leavening gases, and lower boiling points, all of which affect food preparation.

Cooking
The boiling point is the temperature at which the pressure of the water vapor equals atmospheric pressure and the bubbles of water vapor are able to break through the surface and escape into the air. If the atmospheric pressure is less, the temperature required for water to boil is less. Therefore, cooking food in water boiling at this lower temperature takes longer.

BOILING POINT OF WATER

Sea level	212° F
2,000 feet	208° F
5,000 feet	203° F
7,500 feet	198° F
10,000 feet	194° F

An increase in cooking time is needed for vegetables such as green and wax beans, beets, cauliflower, and onions. Greens such as spinach and Swiss chard cook in approximately the same length of time as at sea level. Whether cooking vegetables at high or low altitudes, more vitamins and minerals will be retained if you follow the following rules:

· Use flat-bottomed, straight-sided pans with tight-fitting lids.
· Cook vegetables in a covered pan, in a small amount of water.
· Cook vegetables just until they are tender or tender-crisp.
· To preserve the bright green color in green vegetables such as asparagus, broccoli, Brussels sprouts and green beans, cook them for about three minutes with the lid off, then cover tightly for the remainder of the cooking time. Acids that could affect the color escape from the pan at the beginning of the cooking period. Spinach is the exception to this rule. It should be covered throughout the cooking period and cooked for only a short time—just until the leaves are wilted and the ribs are tender.

Baking Bread

High altitude has its most pronounced effect on the rising of bread. Doughs double their size faster at higher altitudes than at lower altitudes. The higher the altitude, the shorter the time required for dough to double its size. However, bread needs to rise in the bowl (ferment) for a certain length of time in order to develop a good "nut-like" flavor and a light, tender texture. For this reason, it's best to allow the full bowl-rising time given in your recipe, but to punch the dough down two or more times-each time it doubles its bulk. Once you've formed bread dough into loaves, be sure to allow the dough to rise only until doubled in bulk before baking.

Another hint on bread baking at high altitudes: flours tend to be drier and thus able to absorb more liquid in high, dry climates. Therefore, you may need less flour to get the proper dough consistency.

Breadmakers

Since most recipes for breadmakers are not written for high altitude, some adjustments may be necessary to produce a satisfactory product. Since most automatic breadmakers are preprogrammed with a set length of time for each stage of the cycle, adjustments cannot be made easily and over-fermentation may occur.

Several things to try are:

· Reduce yeast to 1-1/2 teaspoons yeast per 3 cups of flour.
· Increase salt to 1-1/2 teaspoons in the recipe.
· Increase liquid from 1-1/2 cups to 1-1/2 cups + 1 tablespoon per 3 cups of flour.
· Add 1-1/2 teaspoons gluten, found in the specialty food section of the supermarket or health food stores.
· Choice of cycle: research showed that use of the sweet dough cycle was best for white bread. The longer cycle controlled fermentation by allowing more gluten to develop.

Biscuits, Muffins and Quick Breads
Quick breads vary from muffin-like to cake-like in structure. Although the cell structure of biscuits, muffins, and muffin-type quick breads is firm enough to withstand the increased internal pressure at high altitudes without adjustment, a bitter or alkaline flavor may result from inadequate neutralization of the baking soda or powder. When this occurs, reducing the baking soda or powder slightly will usually improve results.

Quick Breads
Rich quick breads with a cake-like texture are more delicately balanced and usually benefit from adjustments for altitude. Characteristics of a quick bread that has not been adjusted properly for altitude include a porous, sugary crust; a coarse, gummy or oily texture; and a fallen or low volume in proportion to weight. These characteristics usually can be improved by a light reduction in the proportion of leavening agents, fat, and sugar, and/or a slight increase in the proportion of eggs or liquid ingredients. Using smaller pans and increasing the baking temperature 15 to 25 degrees Fahrenheit may also help keep rich quick breads from falling.

Cakes
Rich cakes are a particular problem at high altitudes. The problem is that leavening gases expand more when the air pressure is lower. In cakes, too much rising stretches the cells, making the texture coarse, or breaks the cells, causing the cake to fall. If the rising occurs too quickly, the cake batter may even spill over the top of the pan before the cake sets, and falls. Some extra expansion can be expected, so fill pans only two-thirds full. Bake extra batter in small pans or as cupcakes.

When problems do occur with cakes made with shortening or other fat, they can usually be corrected by decreasing the baking powder or soda. Also, increasing the baking temperature 15-25 degrees F “sets” the batter before cells formed by leavening gases expand too much.

If the cake is still not satisfactory, consider this next problem: excessive evaporation of water at high altitudes leads to a too high concentration of sugar, which weakens the cell structure and causes cakes to collapse. Therefore, you may want to decrease sugar in the recipe and/or increase liquid.

When making very rich cakes at high altitudes, it is sometimes necessary to reduce the amount of shortening or fat called for. Fat, like sugar, weakens cell structure. On the other hand, an extra egg will help strengthen the cell structure and may be enough to prevent a too-rich cake from falling.

Making cakes at high altitudes involves a blending of art and science. Don’t assume that all sea-level recipes will fail. It is best to make only one adjustment at a time in a recipe until you find the right combination of corrections.

Cookies
Again, do not assume that your sea-level recipe will fail. Try it first, it may need little or no modification. Modifications may include a slight increase in baking temperature, a slight decrease in baking powder or soda, fat, and/or sugar, and/or a slight increase in liquid ingredients and flour. Many cookie recipes contain a higher proportion of sugar and fat than necessary, even at low altitudes.

High Altitude Food Preservation (canning)
Adjustments must be made if processing is completed at altitudes above 1000 feet. Because air is thinner at higher altitudes, both pressures and boiling points are affected. Water will boil furiously at temperatures well below 212 degrees F at altitudes greater than 1000 feet above sea level. Because the lower temperatures are less effective for killing bacteria, the processing time must be increased for boiling water bath canning. For pressure canning, the pressure is increased.

At altitudes above 1000 feet adjust the processing times according to the following charts:

BOILING-WATER CANNER

Altitude (feet)	Increase Processing Time
1001-3000	5 minutes
3001-6000	10 minutes
6001-8000	15 minutes
8001-10000	20 minutes

STEAM-PRESSURE CANNER

Altitude (feet)	Weighted Gauge	Dial Gauge
0-1000	10	11
1001-2000	15	11
2001-4000	15	12
4001-6000	15	13
6001-8000	15	14
8001-10000	15	15

Minimizing Conflict Between Residents

An increasing number of urban people are moving into the area and sharing the western resources with people who have been here for some time. Conflicts arise from real and perceived differences of each group. Common areas of conflict as seen by existing livestock operators are:

· Free roaming pets, particularly dogs,
· Improper care of land by new residents usually because they are just unaware of better land management (i.e., not controlling weeds, and overgrazing small acreage),
· Failure to maintain adjoining fences,
· Disrespect for private property and privacy, such as fishing without permission, driving on private roads, jogging on private property without permission, etc.

A better understanding of the reasons behind these conflicts may aid new and old residents in becoming better neighbors.

Dogs and Why They Are a Problem to Livestock

Free roaming dogs are a threat to livestock. When dogs chase livestock they are putting undue stress on the animal, which can and does result in lower weight gain and risks of physical injury to the livestock. Livestock chased by dogs may become high strung and difficult to control. Dogs will kill young livestock, particularly lambs. These situations cause a direct, negative impact on the profitability of a ranch.

Livestock operators have the right to protect their livestock and can legally destroy animals threatening their livestock. To remedy this situation be sure your pet stays on your property and/or is under your control at all times.

Land Care

The vast majority of livestock operators have strong ethics regarding land stewardship. Many newcomers to Gilpin County also have strong ethics about land stewardship, but are unfamiliar with local problems like weed control or overgrazing. Failure to control some weeds leads to their spread on neighboring land causing additional expense for control. Overgrazing is simply a result of negligent land management. Remedies include:

· Get to know your neighbors and seek their advise on land management.
· Seek additional information sources, including the Colorado State University Extension Office, and private consultants to advise you on the best strategies of land management.

Maintaining Adjoining Fences

Under Colorado law, when agriculture landowners share a property line, it is the duty of each landowner to maintain half of the existing fence or share equally in the construction of a new fence that divides two agriculture properties. Contacting adjacent landowners and working out fence maintenance will aid both landowners in preventing unwanted livestock from wandering onto property, and will also help improve communication.

The fence law also says a rancher cannot willfully place livestock on another person's property. However, livestock are allowed to roam free and may even roam onto your property if they are not fenced out. Please see the "Open Range, Fencing for Wildlife and the Colorado Cowboy Way" section in this handbook for more details.

Respect Private Property and Privacy

Many people are unaware of private boundaries when first arriving in the county. Unintended trespass sometimes occurs because of preconceived notions about open ranges in the West and the large portion of federally owned land in Gilpin County. It is always the responsibility of the individual to know whose land they are on regardless of whether or not it is fenced.

Ways to alleviate unintended trespass include:

· Obtain a county map clearly showing public lands and roads.
· "Ask first" before entering private lands; even for something as harmless as walking in a meadow, ASK FIRST.
· Look for posted "no trespassing signs."

Many landowners let people utilize their property within certain guidelines depending on the time of year, activities, and road use. However, the primary reason that makes it more difficult for landowners to allow recreational trespass is their liability for persons injured while on their land. It may take years to build trust and friendship between new and existing landowners before access to a property is allowed. Some landowners, because of privacy desires and liability fears, may never let people enter their lands.

Finally, other recreational groups (i.e., fishing clubs or hunting groups) pay substantial sums of money to utilize a ranch's recreational amenities; therefore, the landowner cannot allow other individuals on his/her property. For all these reasons many ranchers no longer allow neighborly access as was once customary throughout the West.

Gilpin County Animal Code

Section 2.8 in the Gilpin County Zoning Code addresses all livestock in the county. The term "livestock" includes "domesticated farm, ranch and game animals…" Livestock are allowed in any numbers, unless in conflict with other provisions in the Zoning Code. In RS-zoned lands, however, game animals and swine are prohibited. Additionally, livestock in RS zones "shall cause no harm to neighboring properties. Harm shall be defined to include any condition that may jeopardize health and safety, and other documented animal related impacts."

The Livestock Mediation Board consists of 5 members appointed by the Gilpin County Board of Commissioners and will consider all complaints or issues concerning livestock. They will 1) determine if the complaint is founded, and 2) when a complaint is founded, approve a mandatory Livestock Impact Mitigation Plan. The Mitigation Plan applies only to RS-zoned properties and will prescribe the best management practices for the livestock in question as well as the number and physical condition of the animals. The planning staff will forward the Mitigation Plan to the Mediation Board who may approve the plan. If a violation in the Zoning Code occurs, the County will "use all available legal remedies to compel the removal of all livestock subject to violation."

For more information on the Mediation Board and other livestock regulations in the county, please visit:
http://www.co.gilpin.co.us/CommunityDevelop/Zoning/2012%204.10.12%20%20Zoning%20Code%20Update.pdf

Small-Scale Agriculture

Numerous agriculture enterprises are adaptable to small acreage tracts. Both livestock and specialized crops can be compatible on land from five to 160 acres. There are several reasons to create an agriculture enterprise even if you are a novice with crops or livestock.

· Taxable income may be reduced by qualified expenses to agricultural enterprises that would not be considered tax deductible without the agricultural enterprise. Check IRS rules as they have extensive definitions of what a "farm" is versus a "hobby."

Drawbacks to Small-Scale Agriculture Enterprises

· The economy of scale can make marketing of crops and livestock less economical than larger producers. Direct expenses (i.e., feed, marketing, veterinary supplies, etc.) can be higher for smaller quantity purchases, which can harm the profitability of the enterprise.

· Most small-scale agriculture enterprises require various forms of equipment that are not utilized to their potential; thus capital equipment expenditures (i.e., tractors) may be overpurchased.

· Custom hire of farm work (i.e., plowing, hay harvesting, etc.) usually costs the small farmer more as the custom farmer cannot afford to charge usual and customary rates on small parcels.

· Agriculture, particularly livestock, can be highly labor intensive at certain times of the year. This demand for labor competes with individual recreational and off-farm employment demands.

· Most small-scale agriculture does not have the economy of scale to minimize risk. For instance, a hail storm, livestock disease, or death can be extremely damaging to the enterprise. There is not enough size and scale to spread the normal risk of agriculture enterprises.

Typical and Existing Small-Scale Livestock Enterprises

Beef

There are several beef enterprises to choose from. They range from the relatively low risk cow-calf operation to yearling "grass steer" operations. The cow-calf operation has a 400-500 pound feeder calf as its saleable product and a potential net cash income range of $0 to $300 per cow. Yearling "grass steer" operators buy 500-600 pound feeders in the spring, put them on pasture for five to six months, then sell them as heavy (700-900 pound) feeders in the fall.

In general, beef enterprises have relatively low labor requirements and can make use of family labor. Chore time is flexible, too. Capital investment can be kept low per unit if the farmer is careful. Most beef enterprises can make extensive use of home-raised forage, which reduces cash expenses. The yearling "grass steer" has an additional advantage because the producer's money is tied up in the animals for only a short time (5-6 months).

Unfortunately, beef enterprises usually have a relatively low net return per unit. They also require fairly large acreages of pasture to be feasible.

Swine
Swine enterprises can be operated by part-time farmers. A herd of sows can be bred to produce two litters per year. The baby pigs can be sold as feeders at 30-50 pounds or finished out to 220-260 pound market hogs. Farrowing enterprises are usually not profitable in the Intermountain West because of a lack of locally grown feed and cold winter weather. Purchasing 30-50 pound feeder pigs and feeding them out to 220-260 pound market hogs during the summer can be profitable as there is strong demand for locally raised pork. Swine are prohibited in residential (RS) zones in Gilpin County.

Sheep
Sheep require very little labor except at lambing time. Farm-produced forage is a major source of feed. The biggest investment is not in buildings or equipment, but fencing costs, which is about 22 to 35 cents per foot for material (a 10 acre pasture will take a minimum of 2,500 feet). Five ewes have the same forage requirements as one cow. Profit potential is variable because of high predator losses and marketing methods. Lambs can be marketed directly to consumers for the highest potential return.

Game Birds
Game birds are an enterprise that a few people with fairly large acreages in remote areas are trying as a farm business. They have a potentially higher return than meat birds, but adverse weather conditions, predators, or poor management can turn the potential profit into a loss in a short time. Markets or outlets should be explored before considering game birds.

Exotic Livestock
Elk, buffalo, deer, yak and llamas are all possible livestock enterprises in the intermountain region of Colorado. These types of livestock offer perhaps the greatest return for small acreage landowners. Many of these exotics are still building numbers in the United States, thus supplying breeding stock to others can be very profitable. However, this breeding market eventually matures and the exotic livestock raiser needs to be fully aware of the post-breeding animal values. Exotics also require much higher initial investments than traditional livestock.

Beef Cattle

Two basic types of beef cattle operations are "cow/calf" and "yearling." Cow/calf enterprises are year-round operation where calves are the primary product. Yearling operations are when the rancher purchases weaned calves in the spring and sells heavier weight calves in the fall utilizing only summer grazing.

There are advantages and disadvantages to both. Cow/calf enterprises are financially less risky and offer higher returns per animal, but require year-round care. Yearlings are much more financially risky because the cattle market can shift significantly, and weight gain alone (from summer grazing) does not guarantee a profit. Yearling operations take maximum advantage of the natural forage available in Gilpin County.

Cow/Calf Operations

There are two basic types, differentiated by product: commercial or registered. The product of a commercial herd is calves, or pounds of beef, and the main product of a registered herd is breeding livestock. While registered herds can be profitable, it takes years to establish a reputation and most small herds don't become successful suppliers of breeding livestock.

Commercial Herds

The typical production cycle for cow/calf operations is to breed cows in late June or early July, calve the following April, and wean in October. Typically, 15% of the calf crop will die between birth and sale.

It commonly takes $300 per year to cover direct expenses (feed, veterinary services, medicine, breeding, etc.) per cow. Calves currently (2007) are selling for $1.15 per pound and they average 400 to 500 pounds at weaning. Therefore, an annual average return per cow is $150 to $200. Initial investment in the cattle business ranges widely, but purchasing commercially bred cows typically costs $600 to $900 per head.

Breeds

There is not one right breed of cattle to buy. However, it is necessary to match the cattle type with the intermountain environment. While no exacting research supports what breeds are ideal, it does indicate that moderate weight cattle (1000 to 2000 pound mature cows) are the most economical in the intermountain environment. Crossbred animals are superior over straight bred herds for commercial cows because they produce a calf that is 5-15% heavier at weaning time.

Yearling Operations

Yearling operations take advantage of natural forage throughout the growing season. Yearling operators typically purchase 600-pound weaned calves in the spring (May) and sell them 90 to 150 days later. These cattle will typically gain 200 to 250 pounds in 100 days. Death loss for yearlings is approximately 2%. The risk with yearling operations is the operator bears the risk of fluctuations in the cattle market over the summer.

Sheep

The relatively low investment and the natural, gradually increasing size of a flock make sheep ideal for the beginning small and part-time farmer, according to Dr. Clair E. Terrill, an animal breeding specialist. “The future of sheep is bright,” says Terrill.

There are two kinds of markets for small-scale sheep production in the United States; meat and wool. There are some who believe a market could be developed for sheep milk products as well.

Experts say it takes about two hours of work per year to maintain one ewe and her offspring on a farm pasture. Thus, a farmer caring for 20 to 100 ewes would add about 40 to 200 more hours of work to his regular duties.

Advantages of Sheep

Where a farmer already has some beef cattle, there are economical and biological advantages to adding some sheep to the operation, Terrill says. Lamb prices tend to go up when beef prices fall, and vice versa. He also points out that shared pastures can also work well. Sheep tend to prefer finer plants and cattle the coarser ones.

Sheep can be fed out to market on forage alone if it is adequate, thus requiring little outlay for feed. There are many acres of ideal pasture land that could be used for sheep (natural meadowland, waterways, woods, orchards, or abandoned cropland, for example) as long as the sheep are protected from predators such as coyotes or roving dogs.

A typical budget for a flock of 104 animals (four rams and 100 ewes) shows annual costs and returns based on farm prices for slaughter lambs varying from $63 to $75 per hundredweight (cwt). At $75 per cwt gross annual income per ewe can average $80 if 129 lambs can be marketed from 100 ewes. Variable costs, including feed and labor, range from $75-$80 per ewe. Fixed costs, including interest, average $13 per ewe. This puts total costs at about $87 to $89 per head.

Startup cost of a 30-ewe flock is estimated to range between $188 and $236 per ewe and the annual cash operating cost is about $51 each.

Improving Earnings

An entrepreneur can increase earnings by improving flock quality. Flock quality means production of more lambs per ewe or more pounds of lamb sold per ewe. The Sheep Producers Council has organized a National Sheep Improvement Program (NSIP) to help producers find superior animals through a computerized evaluation system. Entrepreneurs who want to buy ewes or rams on the basis of NSIP data may do so if the producer from whom they buy keeps NSIP records. Details may be obtained from NSIP at 200 Clayton Street, Denver, CO 80206.

Freezer Lambs
Farmer-suppliers of freezer lambs may earn more profits than selling live lambs at a customary auction market. They may produce and sell lambs at premium prices somewhat higher than 75 cents a pound for an unbutchered lamb weighing up to about 110 pounds. Sales sometimes can be made directly to Moslem immigrants from the Middle Eastern countries such as Lebanon, Iran, Greece, Syria, and Turkey. Such buyers are likely to want the butchering done in their presence. Slaughter can be done on the farm or at a local freezer-locker plant. Many freezer plants or slaughter houses will have a butcher available for processing after slaughter. Similarly, arrangements might be made with a city butcher shop to provide lamb for customers upon request.

Wool
While everyone knows about black sheep, not so well known are those that produce blond, red, beige, brown, silver, and gray wool. The best fleeces of natural colored wool command premium prices. New colors are being developed, fiber diameter is being refined, and the staple length is increasing.

Undyed, unprocessed, natural colored fleece is popular with the fiber art industry, weavers, and felt markets. There is a growing recognition of colored wool in boutique clothing manufacture. So far, however, no major woolen mills handle colored wool because of the wide variation in its grade, quality and color. All countries are trying to commence colored wool processing on a large scale commercial basis, but none have succeeded.

One outlet for colored wool is with schools that have classes in fiber and textile arts. You might also consider attending the school and learn to produce yarn yourself, or find spinners who want exotic fleeces.

Pigs

Contrary to popular opinion, pigs are the cleanest and smartest of all farm animals. They require little space and can produce an average of 150 pounds of pork products in five to six months. **Note: Pigs are prohibited in RS-zoned areas in Gilpin County.**

Breeds
There is no one outstanding breed. Today, most pigs are crossbreeds which allows you to take advantage of improved heterosis. Meat types include Duroc, Hampshire, Poland-China, Berkshire and Landrace. The Yorkshire breed is known for its maternal traits.

Purchase
Purchase two or more pigs at one time. Make sure they are of similar ages and weights and preferably from a single source. Pigs are weaned at about four weeks of age and sold at six to eight weeks of ages. They should weigh 20-30 pounds at six weeks and 30-40 pounds at eight weeks. Piglets at six weeks of age should be eating dry food on their own.

Housing
If pigs are purchased in the spring and butchered prior to winter, then elaborate housing is not needed. However, a good solid fence is a requirement. Electric fence can be used and once pigs are trained, they will respect the wire. The advantage of electric fence is the portability. Using electric fence for young pigs may be a problem because the wire must be so low that it is easily grounded. Two strands may be necessary for young pigs. The bottom wire should be a bit lower than snout height and the top wire just a bit lower than the pig's height. These wire heights must be changed periodically to accommodate the rapid growth of the piglets.

If you use wood, build to a height of four feet. If it's much lower than four feet, a 200 pound pig could scale it. If you house young pigs, space the boards no wider than four inches apart. Pigs will root, so the bottom board must be buried somewhat to prevent them from rooting around it.

Wire or hog panels work well, but are more expensive. They should also be buried approximately six inches to prevent rooting and be at least four feet high.

Pigs need shade. Elaborate systems are not needed, but dependable shade is a requirement.

Equipment
Provide 1 1/2-2 feet of feeding space per pig. It should be a non-tip type since pigs love to turn their dishes over. A number of self-feeders are designed specifically for pigs. In addition, self-waters are commercially available. They offer a constant supply of water.

Feed

Pigs need a balanced diet: proteins, carbohydrates, fats, mineral salts, vitamins, and water. Commercial pig feed is a “complete” feed in that it contains all the food essentials listed above.

Two pigs will grow faster and more economically than one. From weaning age to processing weight, you will need 600-1000 pounds of commercial feed. The most critical time in the raising of a pig is immediately after weaning. Up to 100 pounds, a pig needs feed containing at least 16 percent protein; from 100-150 pounds it needs 14 percent protein; and from then on to processing it needs 12 percent protein.

A pig raised for meat should be fed as much food as it will clean up between feedings. If there is a lot of food left over from the previous feeding, cut down to avoid waste. If none is left, increase until there is just a bit left at the time of the next feeding. Feed at least two times a day.

Chickens

Managing a home flock of birds can be a rewarding pastime. The entire family can participate in caring for the flock. You can produce eggs for your own use or to sell on a limited scale.

Care takes about a half hour each day; a little longer if you plan to raise baby chicks. As a general rule, the expense of starting a home flock isn't too great since you can make the equipment you need.

Planning for the Flock
Sound management begins with planning. For that reason, you need to make several decisions before you start your layer flock. The following are major points to consider:

Type of Birds to Select
White Leghorns are best for egg production, they have a high rate of lay and low feed consumption per dozen eggs produced. Heavier breeds like the Rhode Island Reds and Barred Rocks are larger and use more feed to produce eggs. Obtain chicks from a commercial hatchery. Chicks from this source are generally free of disease and are vaccinated for Marek's disease when a day old.

Facilities to House Chickens
If you do not have a house for the flock, you can build one for a low or moderate cost. In towns and urban areas, birds will have to be housed in a building or pen. In rural areas, they can be let out during the day when it's warm or they can be kept in a pen.

Labor
At least one person must be able to feed and water the birds and gather eggs everyday.

Choosing the Birds
Baby Chicks
Be sure to order pullet (female) chicks only. Order 50% extra; if you want to have 30 good hens, order 45 chicks.

Pullets
You can usually buy 20-week old ready-to-lay replacement pullets. Be sure the pullets you buy have been vaccinated for common poultry diseases.

Hens
Layers (hens that have been through one cycle of lay) can often be obtained from a commercial egg producer for considerably less than for a starter pullet.

Young pullets starting into production produce more eggs for a longer time than hens that have been through one full cycle of lay. Although pullets cost more, they probably are more profitable in the long run.

They lay well for about 12 months. Older hens need 8-12 weeks rest after a laying year to molt before they start to lay again. In their second period of laying, older hens lay for about 6-7 months.

Housing Your Flock

If you already have a building for your flock, be sure it is dry and rodent proof. Be sure the building is large enough to hold your flock. Each laying hen needs two to three square feet of floor space. If you plan to keep 40 laying hens you need a building approximately 10 feet square (10 x 10 = 100 square feet per 40 hens).

If you plan to build a house, you can use scrap or salvage lumber, or materials from an old farm building. A good hen house does not have to be fancy, but it should be fairly sturdy and must not leak. The house should have at least one screened window you can open for ventilation.

Be sure to clean and disinfect the house at least one week before the flock arrives. Use a strong household disinfectant such as Lysol to scrub and disinfect the house. Two to three days later, spread three to four inches of clean, new litter over the floor. Wood shavings, sawdust, chopped straw, or peanut hulls can be used for litter.

If you plan to keep the birds in a fenced yard, the fenced area should provide five or more square feet per hen. The yard should be at least twice as big as the house. The fence should be closely woven wire at least five feet high. You need a top over the yard or you need to clip the main feathers on one wing of each hen. Clipping keeps the birds from flying out.

Caring for Young Chicks

If you decide to raise your own chicks, you will need additional equipment: brooder and brooder guard, plus chick feeders and waterers.

Commercial brooders are available, but a heat lamp (250 watt infrared bulb) works just as well and can be used to brood up to 100 chicks.

You will also need chick feeders (one 3-foot long feeder for each 25 baby chicks housed) and a one gallon jar-type waterer for each 50 chicks.

A brooder guard will have to be constructed in a circle around the brooder lamp. The brooder guard keeps the chicks from straying away from the heat and prevents them from being chilled by drafts. It can be constructed from fiber board boxes split open and taped together to form a chick barrier about 18 inches to 2 feet high. The brooder guard should be about 6 feet in diameter for 100 chicks. It can be removed when the chicks are one week old.

Put the brooder guard in the house a few days before the chicks arrive. Hang the brooder lamp about 15 inches above the litter and check to see that it is working. Feeders and waterers should be filled and placed inside the brooder guard a few hours before the chicks arrive. For the first day, put feed (chick starter) on three or four newspapers inside the brooder guard. This helps the chicks find feed and get started off properly.

The chicks must be checked during the night to see that they are comfortable. If they crowd together directly under the heat lamp, they are cold. Lower the heat lamp to warm them. If the chicks are hot, they will be as far away from the center as they can get. Raise the brooder lamp.

Raise the infrared brooder lamp about two inches per week until the chicks are four weeks old. At that time, the chicks will no longer need the lamp, but you should leave it hanging at a height of 24 inches for the next two weeks just in case an extremely cold night is forecast. After the chicks are six weeks old, you can remove the brooder.

Some chicks will get hurt, and others will die for different reasons. The extras you ordered will leave you enough to have your flock.

Clean and refill waterers daily. Fill feeders about two-thirds full each day until the chicks are a few weeks old. Once chicks have learned where and how to eat, half-full feeders will be adequate. Feed the chicks a 20 percent protein pullet starter diet for the first eight weeks and a 16 percent protein pullet grower-developer diet from eight through 20 weeks of age.

Roosts can be installed after the chicks are one month old. The roosts should extend the width or length of the house. Three roosts, each about 10 feet long, should be hung about 18 inches above the floor on one side or the end of the house. Three roosts, 10 feet long, are enough for up to 50 birds. Roosts should be comfortable for the birds to perch on and should not have sharp edges.

After the birds are five weeks old, an additional one-gallon waterer will be required per 50 birds and an additional three-foot feeder will be required for each 25 birds.

Vaccination for Disease

When the birds are about eight weeks old, vaccinate them for fowl pox. Vaccinate in the wing web and follow the manufacturer's recommendations. At two, seven, and 16 weeks of age, vaccinate the chicks for Newcastle and bronchitis (drinking water vaccination). If vaccine is difficult to obtain, buy the minimum amount of fowl pox and Newcastle-bronchitis vaccine. Keep all vaccine in the refrigerator until it is used.

Mites and Lice

Keep a constant watch to be certain the birds do not become infected with lice and mites. These external parasites can irritate the birds and prevent them from growing and developing properly. Mites and lice can also cause reduced egg production.

Check birds weekly for mites and lice. Pick up a few birds and push the feathers back to inspect the skin around the vent and head. If you find lice or mites, dust the birds with labeled product.

Nutrition

Pullets must have good nutrition and daily care to develop into top quality hens that lay well. Everyday the pullets need to receive fresh, clean water and enough good feed. They need a clean, dry place to live. Observe them daily to see that they are healthy.

The pullets should be fed a complete pullet feed and layers should be fed a complete layer feed.

Feather eating or pecking can result from poor nutrition.

Caring for Pullets and Laying Hens

Before your started pullets or laying hens arrive or during the time your pullets are growing, several things must be done to prepare for laying. If you are buying starter pullets, the house should be thoroughly cleaned and disinfected as described earlier. If you have raised your own pullets, the litter you have should be adequate if it is not wet and caked. Wet, caked litter should be removed and replaced with clean, dry litter.

You will need a 12″ by 12″ nest for each four or five hens. You can buy or build them yourself, using a 1″ by 12″ or a 2″ by 12″ board. The same length of 1″ by 4″ may be used to divide the nests into 12″ by 12″ sizes. Often, wooden boxes such as tea boxes or ammunition boxes can be found. These make excellent nests. Whether you build or buy nests, place them on legs about two feet high and fill them about half full with clean straw or shavings.

Build roosts as described earlier and place them 15 inches apart and 18 inches to two feet from the floor. Each hen needs eight inches of roost space. Therefore, a 10′ by 10′ building with 40 laying hens should have three roosts each 10′ long.

On a hot day, 10 hens will drink about one gallon of water. Therefore, 40 hens will need two waterers that will hold at least two gallons each. If the waterers are on the floor, move them from time to time so the litter can dry out where water has spilled.

Each hen needs five or six inches of feeder space. Therefore, each 20 hens need a four-foot long trough-type feeder. The feeder should be as high off the floor as the hen’s back or approximately seven to nine inches high.

Because the modern laying hen (White Leghorn) is bred to lay at a high rate of production, she needs a special laying diet with 10-17 percent protein and 3-4 percent calcium. If hens are not fed a good laying diet, they will not perform at their optimum rate. You must be sure the proper diet is fed and that the hens have enough to eat. Do not fill the feeder over half full. Excess feed causes waste. Purchase commercial feed; be sure to use layer rations. Feed is the most expensive part of keeping home flocks, but for each four to five pounds of feed a good, healthy hen provides a dozen eggs. Keep the feed in a dry place.

For maximum egg production, laying hens need at least 14 hours of light each day. Hens are exposed to long day lengths in spring and summer and have high egg production. This day length should be maintained or egg production will drop as the day length decreases in fall and winter.

To maintain high egg production, you need to provide long days all year. To do this, you can supplement natural light with artificial light. A time clock can be used to turn lights on and off. There are three ways to provide artificial light:

1. You can bracket the day. This means you can have your lights come on before sunup and go off after sundown.
2. You can turn your lights on when the sun goes down in the evening.
3. You can turn your lights on before the sun comes up in the morning.

Collecting Eggs

Collect eggs at least twice daily. Clean dirty eggs with water that is warmer than the egg itself. Refrigerate eggs as soon as possible. Refrigeration maintains quality for several weeks.

Goats

The goat is one of the smallest domesticated ruminants and has served mankind earlier and longer than cattle and sheep. It is managed for the production of milk, meat, and fiber, particularly in arid, semitropical or mountainous countries. In temperate zones, goats are kept often as supplementary animals by small holders, while commercially, cows or buffaloes are kept for milk, cheese, and meat, and sheep for wool and meat production.

Goats come in almost any color (solid black, white, red, brown, spotted, two and three colored, blended shades, distinct facial stripes, black and white saddles) depending on breeds.

Breeds of goats can vary from as little as 20 pounds for mature female dwarf goats for meat production, up to 250 pounds for Indian January, Swiss Saanen, Alpine and Anglo Nubian for milk production.

Birthweights of female singles are between 3 and 9 pounds; twins being often a pound lighter and males 1/2 pound heavier. Twinning is normal in goats with a high percentage of triplets thus giving several breeds an average annual litter size above two per doe and more than 200% reproduction rate. Females are called doe, young are kids, males are bucks; one speaks of buck and doe kids, and doelings, and of wethers or castrates.

Fencing
Goats face the same predator problems as sheep; therefore tight fencing is a must for goat production. Woven wire fencing with two or three barbed wires above is preferred. A barbed wire fence can be made fairly goat proof by spacing the lower wires about six inches apart and gradually widening the space between them. It takes eight to nine strands of barbed wired with plenty of stays between the posts to make a barbed wire fence goat proof.

Nutrition
During the spring, summer, and fall goats will browse on any weeds, bark, grass or leaves available in their pasture. Goats are browsers and selective eaters and when given a choice tend to select the most highly nutritious palatable parts of the plant. A meat type goat will consume 3-3.5% of its bodyweight of feedstuffs on a dry matter basis daily and a lactating goat will consume 4-5%. When grazable forage cannot meet this requirement, supplemental feeding is necessary. Provide goats with loose salt on a continuous basis.

Reproduction
Many goat breeds are seasonal breeders, being influenced by the length of daylight (photostimulated). Most young does are ready for breeding at 18 months. Bucks are capable of breeding at six months of age, but it is unwise to use a buck kid too much until his second year. Does normally come into estrus in 21 day cycles lasting approximately one to two days. The natural breeding season is from August until November.

Health
Among diseases, goats are not too different from cattle and sheep in the same regions. Lice can spend their entire life cycle on goats. Control is normally accomplished by spraying the goats with an insecticide. Watch animals closely for signs of internal parasites, such as scouring, rapid loss of weight, anemia or depraved appetite. Drench or worm the animals throughout the season as necessary.

Dairy Goats
Goat milk is used for human consumption. In fact, more people in the world drink goat milk than cow milk, although in the U.S. the opposite is true. Goat milk is similar nutritionally to cow milk, but it contains smaller fat globules and as a consequence it is easier for some people to digest and it does not require homogenization.

Goat milk is also used to feed many other animals. Usually they are bottle fed, but goats will fairly easily adopt lambs (with a bit of coaxing).

There are six types of dairy goats that are recognized by the American Dairy Goat Association. They are Nubians, LaManchas, Alpines, Oberhaslis, Togenburgs, and Saanens.

Additional information may be obtained on any particular breed from the various breed organizations and the American Dairy Goat Association. Also, the *Dairy Goat Journal* is a monthly publication that provides a lot of good information as well as information on the names and addresses of different breed organizations.

Meat Goats
Goats of any breed or crossbreed are eventually slaughtered for human consumption. With the exception of the South African Boer goat imported via New Zealand in early 1993, there are no true meat goat breeds in the U.S.

Four key traits to be considered for genetic improvement in goats used primarily for meat production are the following: 1) Adaptability to environmental and production conditions, 2) reproductive rate, 3) gross rate, and 4) carcass characteristics. Of these four production traits, only carcass characteristics are not readily measurable on the farm. With good record keeping and a set of scales, the meat goat producer can collect the information needed to measurably increase the productivity of his/her meat goat enterprise.

Fiber Goats
Angora Goats—Mohair is the name given to the hair produced by the Angora goat. Healthy, well-bred Angora goats have lustrous, silky, hair, which hangs over the entire body in wavy curls five to six inches in length. Generally, Angoras are shorn twice a year, each clip yielding an average of five pounds, depending on age, size, and sex. Young Angoras produce the best quality mohair. As an animal grows older, the hair becomes coarser and straighter. Unlike wool, mohair is a hair and as such is much stronger than wool as well as being more lustrous, warmer, and less inclined to shrink.

Cashmere—Cashmere is the fine down undercoat produced by all goat breeds except the Angora. Most breeds do not have enough cashmere to be considered fiber goats, except for the Spanish goat, which is often referred to as Spanish/Cashmere. Cashmere has a dull finish and a specific crimp form. The fleece from Cashmere producing animals will have two very distinct forms of fiber—the fine undercoat or cashmere, and the coarse outer or guard hair. To avoid the tedious task of separating the two types of fiber from a shorn fleece, breeders often hand-comb their goats to obtain the cashmere. The best cashmere is sold with less than one quarter of 1 percent hair content.

Pygoras—The Pygora is a fleece producing goat that can have one of three distinct fleece types. Depending on the goat, Pygoras can produce cashmere, mohair, or a blend of these fibers. The mohair is cool, shiny, and silky. It stays silky even as the goat ages. When in fleece, the Pygora is well covered. The legs from the knee down are clean (without fleece). There may be fleece on the face, but the eye area should be clear and there is usually little fleece on the underbelly or inside of the legs. The color of the goat is determined by the out-of-fleece coat color. The coat colors are described as caramels, agoutis, and solid black or solid white. Breed specific markings include a contrasting dorsal stripe, socks to the knees which may be incomplete or diluted, a facial mask, and on dark animals, there is often a white crown.

Horses

There are many considerations if you are interested in purchasing and caring for horses. You will have to decide the purpose behind your ownership, how much time you have to spend with the horse(s), the costs of ownership, where you are going to keep the horse(s), and who will be responsible for their daily care.

Horse Ownership
Owning a horse is a big and expensive responsibility. Horses require time and money for proper upkeep. You may think that the purchase price of a horse is the main investment; however, the maintenance is much more expensive.

Pasture
The major component of a horse's diet is good forage, such as hay (see below for information about hay) or pasture. A horse weighing 1000 pounds will eat about 500 pounds of forage each month. How much land will you need to feed one horse for a year?

If this is the only source of forage, your horse will need about 15 acres of dryland (nonirrigated) pasture a year. To keep pasture grass healthy, DO NOT let the horse overgraze the land so that grass will no longer grow. Overgrazed dryland pasture may never recover.

Irrigated pastures with adequate moisture will grow more forage than dryland pasture so less acreage is needed. The amount of land needed for one horse ranges from 3/4 to 1 1/4 acres. The horse will not eat grass that has been trampled or has manure on it. Overgrazing will also damage irrigated pastures. For good quality regrowth, leave about 1/3 of the grass uneaten. Manage your pasture as a crop by soil testing, fertilizing, clipping weeds, and managing manure.

Hay
Your horse will need supplemental hay during periods of snow cover or other times when pasture forage is not available. Feeding hay will also extend the grazing season on properties with small acreage. A small rectangular bale of hay can weigh between 45 and 85 pounds. How much hay to buy and feed your horse should be based upon the weight of the bales and the nutrient value of the hay. You can feed less hay if it is of higher quality. It is best to have your hay analyzed to determine the nutrient value. An average 1000-pound horse will eat 20 pounds of medium quality hay per day. How do you determine how much hay to buy? Use this formula and fill in the blanks with your own numbers:

___# of days to feed hay x 20 lbs hay per day ÷ ___ lbs of weight per bale = # of bales needed

Example: 365 days x 20 lbs hay per day ÷ 50 lbs per bale = 146 bales for one year for one horse

Feeding and Nutrition
A horse must have clean, fresh water available at all times as it will drink 5 to 12 gallons each day. A horse will consume approximately 2 percent of its body weight each day in feed. This is

approximately 18-20 pounds of food a day. Never feed more than 1/2 of the diet in grain. The majority of the diet should be good quality hay or pasture. If the grain mix does not contain salt and necessary minerals, these should be provided to the horse in the form of a salt block or balanced into the diet.

Grain
A grain mix (usually oats and corn) should be added to the diet when you increase the horse's training, work, or activity. Young and old horses may also need grain.

Health
Foot, Dental and First Aid Care
Horses' feet should be examined and trimmed every six to eight weeks. Contact a qualified farrier. Consult a veterinarian at least once a year to check teeth. Contact a veterinarian any time the horse appears sick, disoriented, or has been injured.

Deworming
Deworm your horse 3-6 times a year. The frequency of treatment varies with use and concentration of horses. Contact your vet for deworming.

Vaccinations
Age, intended use, individual health, and time of year influence the incidence of disease and vaccination program. All horses should be vaccinated against:
· Eastern encephalomyelitis
· Western encephalomyelitis
· Tetanus
· Influenza
· In some instances, rhinopneumonitis and strangles should be considered.

Shelter
Horses need protection from the hot sun, wind, and precipitation. This can vary from a three-sided shed in the corner of a pasture to a complete stable with box stalls. Horses without shelter will need more feed and water to maintain their health.

Annual Cost of Keeping a Horse
The national average for horse upkeep is $1500-$3000. If you plan to show or have your horse trained, add $450 per month, minimum.

The following is a list of annual expenses usually required for the upkeep of a horse.

Feed cost:	Hay, grain, and supplements
Health supplies:	Deworming, vaccinations, shoeing, veterinary care
Fixed costs:	Shelter, boarding, bedding
Tack:	Equipment and repairs

Brand Inspection

The following items are a highlighted overview of the requirements to purchase, sell, or transport livestock within Colorado or out of the state. Also included are a few pointers for transporting livestock purchased in other states.

Employees of the State Board of Stock Inspection are charged with the protection of the Colorado livestock industry. They must certify that the shipper or seller is the legal owner prior to issuing a certificate. All lost, missing, stray, and stolen livestock fall under the jurisdiction and control of the State Board of Livestock Inspection.

Items to Remember

· Inspection is required for sale or movement of stock even if the previous parties did not comply the last time the animal was sold or transported.
· Inspection is required regardless of whether the animal is branded or not branded.
· Inspection is required on all classes of stock (horses, cattle, mules, or donkeys).
· Registration papers or the lack of registry does not exempt inspection.
· The definition of a brand for the purposes of this section is a permanent mark on the hide of an animal registered with any state as a livestock brand. (Tattoos are not brands.)
· Inspection is required at the point of origin unless released by the local inspector.

Regulations

1. An inspection is required every time an animal is sold or purchased (horses, cattle, mules and donkeys) or when any change of ownership occurs, regardless of whether or not the animal is transported after or prior to the sale. *(C.R.S. 35-53-105, 35-53-112)*
2. An inspection is required when livestock is to be transported over 75 miles totally within the boundaries of Colorado (some exceptions). *(C.R.S. 35-53-105, 35-53-112)*
3. An inspection is required every time livestock leaves the state regardless of circumstances. (*C.R.S 35-53-112)*
4. For horse owners, items 2 and 3 may be accomplished by the owner obtaining a "permanent travel card." Simply contact your local inspector. *(C.R.S. 35-53-129)*
5. Any time livestock is to be transported on a public road, proof of ownership of the stock should be available for inspection by the Colorado State Patrol, local law enforcement, or a brand inspector. If the animal carries your Colorado brand, this can be your proof of ownership. *(C.R.S. 35-53-117)*
6. Animals being transported by a commercial hauler must have a "Bill of Lading" showing point of origin, destination, number of head, color, sex, the hot iron brands, and be signed by the owner or agent of the stock even if an inspection is not required. *(C.R.S. 35-53-117)*
7. Animals being transported by anyone other than the legal owner should have a letter or note from the owner authorizing that transport in conjunction with the inspection certificate (if required). (*C.R.S.* 35-53-122)
8. Failure to comply with Colorado Brand Law is at least a Class I misdemeanor and may be a felony. A first offense carries a minimum fine of $250 and/or up to 90 days in jail. *(C.R.S. 35-53-112)*

Out-of-State Livestock Purchases
When purchasing animals in states other than Colorado, please check that state's requirements concerning inspection prior to the purchase and transportation back to Colorado. Contact the local livestock market to inquire about state regulations.

Several states do not have an inspection law, and therefore, a certified inspection cannot be obtained. Always get a valid bill of sale and a health certificate when purchasing animals in no-inspection states.

The requirements of a legal bill of sale are:
· Seller's name
· Buyer's name
· Complete description of stock being purchased. The complete description should include the number of head, color, sex, breed, markings, registration numbers, and hot iron brands. On cattle this should also include ear marks, dewlaps, and waddles.
· Signature of seller
· Signature of buyer
· Signature of a witness residing in the county where the transaction takes place.

Quick Facts
· To report suspected livestock thieves or wildlife poachers, call 1-877-COLO-OGT (1-877-265-6648).
· To schedule a brand inspection, contact the Colorado Department of Agriculture Brand Inspection Division at 303-294-0895.

Livestock and Wildlife Management

Predator Management for Livestock

Numerous predators make raising livestock in the mountains difficult. Predation management for cattle, sheep, or goats may be necessary if the animals are put into pastures where their vulnerability to predation increases. For cattle, this is usually confined to the calving period, and with the exception of a few losses to mountain lions and bears, most predation management is directed at coyotes.

Coyote Control

Coyotes are opportunistic hunters. They prey on small mammals, domestic pets, livestock, and domestic fowl but will readily eat carrion and plants. A coyote will adjust its diet depending on the food that is available.

In Colorado, coyotes are classified as a game species and may be taken year-round with either a small game or a furbearer license. Landowners may kill coyotes, without a license, on their land if the coyotes threaten their property or livestock.

A number of variables (availability of alternative prey, coyote pup-rearing, and an even age structure of the coyote population) may affect predation rates on calves. For open range calving where coyotes can be a problem, predation rates in the absence of coyote control can approach 5%, with a 3% rate being considered average. With predation management in place, calf losses to coyotes should be <1%. However, with predation management in place, losses can still be expected to approach 5% for lambs, 2% for adult sheep, and 12% for goats. The problem of predation becomes more pronounced as pasture size decreases, with some evidence that coyotes especially use the fences to aid in their hunting strategies.

Strategies to protect livestock from predators include pastures for birthing, confined birthing areas, and coyote removal immediately prior to calving. Effective predation management for calf protection may also involve calving in pastures close to people, where increased human activity would reduce coyote presence. Removing coyotes in, or near, calving pastures immediately prior to calving would increase the effectiveness of a predation management strategy. Another option is to use netted fencing to exclude them from the livestock.

Recent research, as well as decades of practical field experience, suggests that removal of dominant coyote pairs at the beginning of breeding season may substantially reduce predation on livestock for up to a year

While it is expensive and difficult to construct a completely coyote-proof fence, a fence that discourages coyotes will have the following design characteristics. Fence height should be a minimum of 5-1/2 feet and should be built higher on sloping terrain. Net wire-mesh should be no larger than 6 inches between stays. Electric fences of various designs have been effective in excluding coyotes. Retrofitting existing fences by adding electrified wires may provide an added degree of effectiveness. Electric fencing can be less expensive to construct than conventional woven-wire fence, but it requires substantially more maintenance to keep it in working condition.

Using sound or visual stimuli to keep coyotes away from livestock or other resources will provide only temporary effectiveness, if any. Such efforts are likely to work best in localities where coyotes are wary as a result of continuing predator control efforts and where the stimuli can be frequently varied in type and location.

Certain breeds of guard dogs, as well as llamas and donkeys, may effectively exclude coyotes from pastures. Livestock operators who have had the best success with guard animals typically place them in small, flat, fenced pastures where the guard animal can see and challenge any intruding coyotes. Guard animals are most effective when they are behaviorally bonded to the sheep or goats they are protecting.

Mountain Lion Control

The mountain lion is called by more names than any other Colorado mammal – cougar, puma, panther, catamount or just plain lion – and all connote respect for a magnificent hunter. They are Colorado's largest cat, weighing 130 pounds or more.

In Colorado, mountain lions are most abundant in foothills, canyons or mesa country. They are more at home in brushy areas and woodlands than in forests or open prairies.

Mountain lions are active year-round, with deer as its main staple. Adults maintain their condition by eating a deer a week. They prefer to kill their own prey and work by ambushing and hunting by stealth, often pouncing on prey from a tree or rock overhanging a game trail. The deer is often killed cleanly with a broken neck. They drag the carcass to a sheltered spot beneath a tree or overhang to feed on it. The cat gorges on the carcass until it can eat no more, covers the remainder with leaves or conifer needles, then fasts for a few days, digesting and resting. Generally, they move the carcass and re-cover it after each feeding.

They are most active from dusk to dawn, although they travel and hunt in daylight. Lions prefer to eat deer; however, they also kill elk, porcupines, small mammals, livestock, and a variety of domestic animals such as pets.

As with coyotes, the mountain lions are most detrimental to cattle during the calving season since healthy, adult cattle are too large for the lions. Sheep and goats are more vulnerable at all life stages due to their size. Mountain lions typically avoid human interactions, so birthing close to human proximity or in enclosed areas are deterrents.

Black Bear Control

Black is a species, not a color. In Colorado many black bears are blonde, cinnamon or brown. Over 90% of a bear's natural diet is grasses, berries, fruits, nuts and plants. The rest is primarily insects and scavenged carcasses. Because of this, the black bear is generally not a threat to livestock but are certainly a concern when they locate food sources in or around our homes. Black bears often break into chicken enclosures and kill and eat large portions of or entire flocks. Thus, building an extremely strong coop, and locking poultry inside at night may be necessary.

Black bears are naturally shy, and very wary of people and other unfamiliar things. Their normal response to any perceived danger is to run away. In Colorado, most bears are active from mid-March through early November. In preparation for hibernation black bears will forage for 20 hours a day consuming over 20,000 calories a day. When food sources dwindle they head for winter dens.

With a nose that's 100 times more sensitive than ours, a bear can literally smell food five miles away. Bears are very smart and have great memories—once they find food, they come back for more.

Other Predator Control Actions

1. Prompt removal of all carcasses.
   Dead animals attract coyotes and other scavenging predators. Unless the dead animals are removed, the predators will return to feed on them. Coyotes may depend on dead animals to remain in livestock-raising areas. One Canadian study found on farms that promptly removed dead livestock, predator losses were lower than on farms where dead livestock were not removed.

2. Use larger livestock in pastures with histories of predator problems.
   Pastures with a history of predator problems should be avoided, especially during lambing and kidding. Pastures with rough terrain or dense vegetation provide good cover for predators. Placing larger animals in these pastures will usually reduce the incidence of predation such as llamas or donkeys. As mentioned earlier, certain species of dogs may also be effective in protecting livestock.

3. Noise, light, and other deterrents.
   Predators can display uncanny abilities to outwit a producer's attempts to protect livestock. Producers may need to use more than one practice concurrently, and probably will need to vary the practices occasionally. Most predators are wary of any changes in their territory and will shy away from anything different until they become familiar with it. The following are several devices that help discourage predators.
   i) Developed by the USDA/APHIS/Wildlife Service, the Electronic Guard is a light-sensing device that is activated at dusk and de-activated at dawn. It combines a strobe light and a siren going off in random order. The random intervals help prevent predators from becoming accustomed to it.
   ii) Lighting corrals at night may serve to frighten some predators away, but may also attract roaming dogs to the stock. Lights will allow the producer to see any predators that are in the pen. Lighting doesn't usually affect the livestock, and they adapt quickly. In a 1977 Kansas study involving 100 Kansas sheep producers, lighting corrals at night had the most obvious effect on losses from predators. Of the 79 sheep killed by coyotes in corrals, only 3 were lost in corrals with lights.
   iii) Eugene L. Fytche, author of "*May Safely Graze"*, cites a producer who used visual distractions around the edges of his pasture. These included large pieces of Styrofoam, wheel discs, aluminum pie plates, windchimes, plastic oil containers filled with a variety of liquids, balloons, old clothes, and whatever came to hand. Fytche

commented that the producer didn't have any losses in three years despite living in a high-risk area.

Dogs as Predators

Free roaming dogs can be a serious threat to livestock. When dogs chase livestock, they put undue stress on the animal as well as create the risk of physical injury. Additionally, dogs are capable of killing livestock, especially lambs, kid goats, and poultry.

Ranchers legally have the right to protect their livestock and can destroy animals threatening their livestock. To prevent an incident from occurring, be sure your pet stays on your property and is under control at all times. Even the nicest, most well-behaved dog can chase livestock, especially when running with other dogs; so don't assume your dog would never harass livestock.

Chickens and Predators

No doubt about it, your backyard chickens depend on you for health, housing and safety. In return, they will supply you with eggs, entertainment, pest control, fertilizer, meat and more. But as prey animals, chickens are also the subject of great interest to everything from domestic dogs to snakes, rats, owls and hawks. You should expect to lose a bird to predation occasionally, but these tips will go far to help keep your flock safe.

1. Husbandry is one of the first steps you should take to reduce predation, and includes: a) Keeping the grounds around your chicken coops clean, b) Removing piles of yard debris, trash, and construction waste, which provides cover and housing for rats, c) Eliminate food sources that will draw nighttime visitors, d) Clean under bird feeders and, e) Keep chicken housing and runs out in the open if possible, away from the edges of woodlands and riparian areas.
2. Train your birds to return to the chicken house every evening – and be sure to close it up. If you raise your chicks in that coop, they will naturally return to lay eggs and roost at night after you let them range for the day. Make sure the house is varmint-proof and that you close it up at night once the birds have settled.
3. Raise the chicken coop off the ground by a foot or so to discourage rats, skunks and snakes from taking up residence beneath it and stealing eggs, chicks or young hens. Be certain to keep the henhouse floor tight and patch any holes that snakes and rats can get through.
4. Enclose the coop in a secure poultry run to discourage dogs, coyotes, bobcats and other four-legged carnivores from gaining access to your flock. You can choose poultry wire, welded-wire mesh, electric netting or other fencing materials with sufficiently small openings (or sufficiently high-voltage electrical pulses) to keep your birds in and predators out. Bobcats and coyotes are fantastic jumpers and can easily clear 4-foot-high fences, so build your enclosure appropriately tall, or add a cover net to keep the varmints from vaulting the fence.
5. Cover the chicken run with welded-wire fencing, chicken wire or game-bird netting, or install a random array of crisscrossing wires overhead to discourage hawks and owls from making a buffet out of your birds. If you shut your chickens in the coop at night, owl attacks will not be an issue. But hungry owls are cagey and may grab their meal right

at dusk, or slightly beforehand, so if owls are a problem in your area, don't wait until after dark to close up the coop.

6. Choose small-mesh fencing materials for enclosing coops and runs when raccoons and members of the mink or fisher family are among the predators. Raccoons and other fairly dexterous animals are infamous for reaching through larger meshed fencing or chicken wire and killing the chickens they can snag. This is especially important when you keep your chickens in a fully enclosed wire coop/run, such as various chicken tractor (moveable coops without a floor) designs. Although 2-by-3-inch welded-wire fencing is less expensive, you will lose fewer birds if you use 1-by-2-inch mesh or smaller welded wire.
7. Bury galvanized hardware cloth or other welded-wire fencing around the perimeter of the chicken run if you have problems with predators digging beneath your surface fencing.
8. Provide a night light (motion-sensor-activated) that will flood the chicken run with light after dark or install a set of Nite Guard Solar predator-deterrent lights. This will keep most nocturnal predators away from the coop.
9. Give your chicken-friendly dogs the run of the chicken yard – particularly at night. Be sure your dog's aren't tempted to chase running, squawking chickens if you choose not to close up the coop at night or choose to leave the dogs in the chicken yard during the day.
10. Prepare yourself to take swift action when you discover predation. You can take measures to eliminate the predator or to eliminate its access to your birds. Failure to do so will result in subsequent losses, if the predators think the buffet line is open.
11. Create a predator-danger zone around the coop and chicken yard. Most terrestrial predators are uncomfortable crossing an area with minimal cover. Go ahead and plant bushes inside the chicken run – your birds will love the shade and nibbling on the leaves – but leave the perimeter as cover-free as you can. Raccoons are less likely to try to work their "hands" into a welded-wire enclosure when they have to sit in the open to do it.

Predator	Where	Domestic Prey	Characteristic	Attack Pattern	Feeding	Fencing
Coyotes	Traditionally in rural areas west of the Mississippi, but they are extending their range to towns and cities, and east of the Mississippi, with a significant increase in the Southeast.	Takes sheep, goats, calves, and poultry, and small domestic dogs or cats	Hunts alone, in pairs, or occassionally as a family pack	Attacks from sides or hindquarters. Bite marks and subcutaneous bruising under neck and throat, bloody foam in the trachea.Usually attack right before dawn, or right after dusk.	Feeding: usually begin on flank just behind the ribs, consuming organs and entrails	Six feet high, with 3feet buried underground or 5 feet high electric fence
Wolves	Found in pockets of the West and around the Great Lakes	Capable of taking mature cattle, llamas, horses..., as well as all small stock	Hunts in a pack	Similar to Coyotes, but large tooth patterns, and often multiple kills in one night	Similar to Coyotes	Woven wire 6 feet high with electric wires along top and bottom.
Foxes	Throughout the country; often live in towns	Mainly lambs/kids or poultry	Hunts alone or in pairs	Similar to Coyotes but small tooth patterns	Similar to Coyotes	Net wire 4 feet high with openings less than 3" square buried to 3 feet with a 1 foot apron.
Domestic Dogs	Found anywhere that people are	Capable of taking mature livestock, as well as all small stock	Hunts alone or in packs	Indiscriminate mutilation of prey, bites on multiple areas of body, often attacks during day	Often kill large numbers of animals at one time, but do very little feeding	Same as coyote fencing.
Bears	Remote areas and wildland/urban interfaces over much of the country	Capable of taking all classes of livestock	Hunts alone or with cubs	Kill with crushing bites to spine, skull, and dorsal side of neck. Claw marks often found on the neck, back, and shoulders of larger prey. Often kill more than one animal.	Consume the udder and flank, and removes the paunch and intestines intact; carcass may be almost entirely consumed. Prey often dragged to cover, sometimes covered with grass and dirt.	Electric fence at least 3 feet high.
Bobcats	Remote areas over a fairly large portion of the country, but in largest numbers in Western States	Small stock, poultry, domestic dogs and cats	Hunts alone	Usually kills small animals by biting on the head or back of neck. Often leaps on the back and bites the neck and throat of larger prey. Hemorrhaging from claw punctures often can be found below the skin on the neck, back, sides, and shoulders. Paired upper and lower canines usually are ¾-1 in. apart	Often begin feeding on the viscera after entering behind the ribs. May drag and cover kill.	Woven wire 5 feet high.
Cougers/Panthers	Mountainous regions of the West; the South has remnant populations of native panthers	Capable of taking all classes of livestock	Hunts alone	Usually bite to the back of the neck and skull causing massive hemorrhaging. · Large canine tooth punctures, upper canines 1¾-2 in. apart, lower canines 1–1¾ in. apart. Large claw marks on head, neck, shoulder, flank	Usually eviscerates the carcass, remove entrails and move aside. · Consumes lungs, heart, liver, and larger leg muscles first. · May drag and cover the carcass.	Heavy woven wire 9 feet high or electric fence 9 feet high.
Birds of Prey	Found throughout the country	Small stock, poultry, domestic dogs and cats	Hunts alone	Often kill poultry or small mammals (new lambs and kids are fairly vulnerable). Talon punctures in head and body with internal hemorrhage from talons. Tufts of feathers, wool or hair scattered and carcass often "skinned out". Presence of white-streak feces	Consumes entrails, organs, sometimes opens skull and eats brains. Ribs removed near the spine on young animals.	Wire topped cages. Also, respond to scare balloons or aluminum pie pans strung on poles.
Raccoon	Almost everywhere	Poultry	Hunts alone or in family group	Usually comes on a schedule, once every 5 to 7 days. Often kills more than one bird. May cleans out eggs from nest boxes. Mainly night hunter.	May eat just the head and crop.	Two electric wires at 6" and 12" off ground.
Mink/Weasel	Large areas of the country	Poultry	Hunts alone	Several birds (or fish in aquaculture operations) are killed, and neatly piled together or lined up. Strictly night hunter.	Usually only eat the back of the head and the neck.	Close animals in buildings at night. Cover all openings with 1/2 hardware cloth.
Opposum	Large areas of the country, with greatest numbers in Southeast	Poultry	Hunts alone	Usually only attacks one bird per visit. May eat eggs. Mainly night hunter.	Usually just the abdomen is eaten.	Wire mesh fence with electric 3" outside mesh at ground level and top.

Deer and Elk Control

Deer and elk commonly impact agricultural resources by competing with domestic livestock for pasture and damaging cereal and hay crops, ornamental plants, orchards, and livestock fences. Elk also damage forest resources by feeding on seedlings and saplings of coniferous and deciduous trees. During winter, elk concentrate in areas where food is available, including pastures. A survey conducted in 1989 indicated that elk caused damage to crops in seven states, mostly to haystacks and pastures.

Because the elk is a highly desired game animal, management efforts in the last few decades have concentrated on increasing the size of local elk herds. As elk numbers have gradually increased in many parts of their range, the incidence and intensity of damage to agriculture and forestry have also increased.

Elk tend to roam over greater expanses of habitat than deer, so the occurrence of damage by elk is more widespread and sporadic than damage by deer. Also, because elk move in groups instead of singly, the nature of their destruction to crops and pastures includes trampling, much like domestic livestock.

Damage by elk is often seasonal. Foraging on hay crops generally occurs in spring when the first succulent vegetation emerges, and native forages are in short supply. If native forages are chronically limited, damage to crops may persist through harvest. Damage may continue through late summer at a reduced level. Conifers are often damaged after they are planted on clear cut or fire scarred sites. Elk are drawn to conifers when other food supplies are limited and/or of low nutritive quality. Elk also are attracted during spring when conifers produce new growth that is especially palatable and highly digestible. Damage to haystacks occurs during winter when there is little food available for elk on winter ranges. Elk damage to pastures usually occurs during winter and during migration periods when elk move between summer and winter ranges.

Elk usually damage areas that border standing timber because they have learned from their association with humans not to venture far out into large openings. They also prefer riparian zones and benches as opposed to steep slopes, and damage is usually distributed accordingly. Much of the damage caused by elk is in response to low availability of forage on winter range; thus crops on winter range or along migration routes are often damaged.

Damage Prevention and Control Methods

In some situations, only one technique for controlling elk damage is necessary. In many situations, however, the greatest reduction and prevention of future damage will be accomplished by application of more than one damage control technique.

1. Fencing has provided relief from elk damage where plants cannot be protected individually, such as in hay and grain fields, large orchards, and pastures. Six-foot-high woven-wire fences, topped with two strands of smooth or barbed wire will prevent access, but the cost is high.

Recently, high-voltage (3,500- to 7,500-volt) electric fences have proven to be a relatively inexpensive and effective alternative to woven-wire fences. They feature 8 to 11 smooth strands of triple-galvanized, high-tensile steel wire supported by conventional fence post systems. Considerable expertise is required to construct these fences, but when built properly, they can provide nearly as much protection from damage as mesh fences.

Researchers in Pennsylvania developed 4- to 5-strand electric fences that provided 80% or more protection from deer damage. In Oregon, an 8-foot electric fence consisting of 11 wires successfully kept elk from entering a rhododendron nursery that previously had sustained persistent trampling damage. A key component of electric fences is the high-voltage charger or "energizer." These are available as 110 volt or battery-operated units.

For a fence to be effective, it must be seen by elk. In the case of an electric fence, which a herd can easily run through, it must be seen and associated with an electric shock. Place branches along the top of livestock fences and drape light-colored surveyor tape from electric fences to make them more visible to elk. To help "initiate" elk to the shocking power of fences, place peanut butter on tinfoil strips and attach the strips to electric fence wires 3 feet above ground. The elk will lick the peanut butter and get a shock warning them about the fence. For more details on fencing, see the fencing chapter in this brochure.

2. Haystacks have traditionally been protected by wooden panels. Because panels are expensive to build and unwieldy to place in position, they are no longer recommended except in cases where nothing else is available. With the advent of the effective and less expensive electric fencing, it is now feasible to place perimeter fences around hay yards. They allow ranchers easier access to hay and greater mobility in moving the hay within yards.

   Haystacks can be protected from elk for one or two seasons by wrapping plastic barriers around them. Ten-foot-wide sheets of 6-mil black plastic or netting made of expanded polyethylene are commonly used. Attach the sheets to standing stacks of hay bales by tying baling twine around pebbles enclosed in a fold of plastic at the top of the sheet, and tying the loose end of the twine to baling twine on hay bales. The netting is simply stretched around hay stacks.

3. Protectors for individual coniferous and deciduous tree seedlings are effective until the leader (growing tip) or lateral branches grow out of the protectors and are once again exposed to elk browsing. Use rigid diamond-pattern plastic or nylon tubes, netting, and waterproof paper cylinders (bud caps) to protect conifer seedlings. The plastic tubes extend from ground level to above the top of the seedling. Netting and bud caps fit over the growing tips of the leader stem and lateral branches. The plastic tubes are more expensive than netting and bud caps but have a longer lifespan (about 5 years).

4. Where elk and livestock compete for the same forage, a long-term solution is a system of succession cropping. If cattle placed on the pasture from late spring through late summer do not remove all the forage, it will recover, mature in early fall, and provide quantities of high-quality forage for elk in winter. The elk, in turn, will crop and stimulate the forage, providing good forage for cattle returning to the pasture in spring. Such a system has increased the availability of forage and numbers of both livestock and elk. Careful planning is required to ensure that proper numbers of livestock and elk use the pasture.

    a. A well-designed grazing system incorporating the principles of rest-rotation can actually improve rangeland over time and thus improve the quantity and quality of habitat available for both wildlife and cattle.
    b. Conflict between wildlife and cattle use of summer range can be eliminated by designing and implementing grazing systems that take into consideration habitat preferences of both cattle and wildlife in combination with proven grazing principles.
    c. By taking advantage of elk spring preference for pastures grazed by livestock the previous year, elk can be directed to public game ranges and away from adjacent private lands, thus reducing depredation conflicts.

5. Repellents may reduce elk damage in orchards, vineyards, and conifer plantations. Where frequent washing rains occur, some repellents must be applied more than once. Damage can be prevented without treating the entire area by applying odor repellents to plants within a 25-foot-wide (10-m) strip around field edges where most of the damage occurs. Successful repellents include formulations of putrescent egg solids and hot sauce containing high levels of capsaicin.

Resources:

http://texnat.tamu.edu/files/2010/09/004.pdf
http://whatcom.wsu.edu/ag/documents/other_animals/PredatorControl.pdf

https://extension.usu.edu/rangelands/htm/stock-wildlife/bibliography/#Use
http://www.extension.org/pages/8756/elk-damage-assessment
http://www.extension.org/pages/8773/elk-damage-management
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74135.html
Ekarius, Carol. "*Storey's Illustrated Guide to Poultry Breeds* and *How to Build Animal Housing*".
http://www.grit.com/livestock/chickens/tips-for-protecting-chickens-from-predators.aspx

Livestock and Water Management

Well Types and Watering Restrictions:

If you have less than 35 acres of land:

1) Check your well permit. If issued after 1972 it should be designated as "household use only" permit.
    a. Allows for single family use only.
    b. Cannot water outside including gardens, domestic animals, livestock, greenhouses (attached to the house or detached).
    c. There is an option to "augment" your well permit but it generally costs between $1-5 thousand and a significant time period, 6 months to a year, and is not guaranteed.
    d. You might wish to put in a cistern or holding tank and have water delivered for a more reasonable cost. Most mountain communities have water delivery systems available.

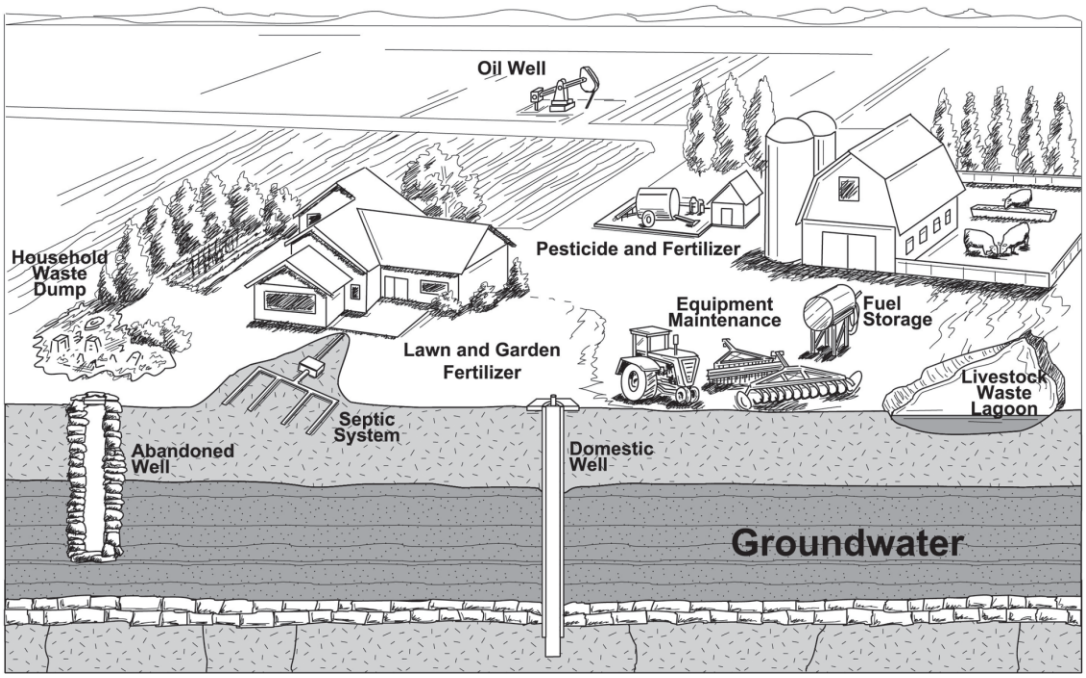
2) If the well was there prior to 1972, then it may be an "Unregistered Existing Well."
    a. It allows for serving up to three homes.
    b. Allows for irrigating home gardens and lawns and watering user's own domestic animals and livestock.
    c. Cannot be used for commercial use.
    d. It can be registered for historic uses if those uses are no greater than those allowed for a domestic and livestock permit (see below).

If you have 35 or more acres of land, then:

1) The permit should be permitted for "Domestic and Livestock."
    a. It may be able to serve up to three single-family dwellings.
    b. Irrigate one acre, or less, of lawn and garden, and
    c. Provide water for the individual's domestic animals and livestock.
    d. This permit cannot be used for commercial use.

Other Watering Considerations:
Because of Colorado's very stringent water laws, the following items must also be considered:
1) You can only capture runoff from your roof in barrels, buckets, etc. for watering purposes with a proper permit; and then you can only use it for the same purposes that your well is permitted. You also have to be able to get, or have, a well permit to apply for the permit.
2) You cannot use gray water for exterior watering purposes.

Protecting Your Water Supply:
If you are on a well system, then you are your own water treatment agency and it is imperative that you protect your water source for you, and your neighbors' health. The picture below shows some typical ways that groundwater can become contaminated. Note that mountain groundwater is usually in fractured rock aquifers, and looks a little different than this illustration.



Below are considerations to keep in mind regarding your well and water sources:

1. Keep livestock away from the well head, water sources (such as streams and riparian areas) and off the septic leach field, which could cause leach field failure from compaction.
    a. Create or maintain a Riparian Buffer at least 50 feet to 250 feet from the water's edge
    b. Allow very limited or no grazing within the buffer to maintain healthy vegetation
    c. Plant native trees, shrubs, and grasses in the buffer area
    d. Avoid storing manure or corralling animals within the buffer area
    e. Use only water-safe herbicides within the buffer area
2. Keep manure piles, corrals, and livestock buildings away from the well head.
3. Periodically inspect exposed parts of the well for problems such as:
    a. Cracked, corroded or damaged well casing.
    b. Broken or missing well cap.
    c. Settling and cracking of surface seals.
4. Slope the area around the well to drain surface runoff away from it.
5. Keep accurate records of well maintenance and water quality analysis.
6. Hire a licensed water well contractor for new well construction, modification, or abandonment and closure.
7. Avoid mixing or using pesticides, fertilizers, weed killers, fuels degreasers, and other pollutants near the well.

8. Do not dispose of wastes in dry wells, abandoned wells or sinkholes.
9. Do not cut off the well casing below 12 inches above the ground's surface.
10. Pump and inspect septic systems as often as recommended by your local health department.
11. Never dispose of hazardous materials in a septic system.
12. Have the well tested once a year for coliform bacteria, nitrate and other particles of concern and every 5-10 years for heavy metals or other contaminants.

Resources:
www.water.state.co.us
http://www.ext.colostate.edu/pubs/natres/06703.html
http://www.ext.colostate.edu/sam/water.html
http://www.ext.colostate.edu/pubs/crops/xcm179.pdf

Open Range, Fencing for Wildlife and the Colorado Cowboy Way

Colorado is "Open Range" Land

Colorado is an "open range" state and that means that it is the landowner's responsibility to "fence out" any livestock that may come on your property. It is not the landowners' responsibility to fence their livestock so they remain within their pasture boundaries. Open range is a land definition, not a law.

The Colorado fence law goes back to the early 1880's and is very different from many other states and regions. The Colorado Revised Statute pertaining to fence law is CRS 35-46-101. Livestock invading your fenced property is not a criminal offense, but civil recourse is available to the landowner with a "lawful" fence.

A "lawful" fence is defined as a "well constructed three barbed wire fence with substantial posts set at a distance of approximately 20 feet apart, and sufficient to turn ordinary horses and cattle, with all gates equally as good as the fence, or any other fence of like efficiency." According to the Colorado Department of Agriculture, Colorado's "fence law" will not prohibit any legal action for any escaped livestock involved in an accident on the public highways.

If you do have a "lawful fence", but another's livestock are on your property, the burden of proof falls upon you, the property owner, to prove that the livestock broke through a "lawful fence" and did not simply walk through an open gate, unfenced portion or a broken fence. It is legal to take possession of livestock that have trespassed on your property, **but if you do** keep that livestock, you also become legally responsible to feed and care for the livestock. (CRS 35-46-102) You must also notify your local brand inspector and the sheriff's office when livestock is held for trespass damage.

Robert Frost said, "Good fences make good neighbors" and while Frost lived in New England and wrote of mending rock fences, you will find the same true of good fences in Colorado. Be aware that many counties, cities and developments have their own rules and regulations about fencing and the **type** of fence you can build, so be sure to check with those governing bodies to make sure your fence is in compliance.

Fencing with Wildlife in Mind

During the time of western explorer John C. Fremont, his diaries were full of descriptions of large herds of deer, elk, grizzlies, black bears, mountain lions and pronghorn throughout Colorado. Wildlife needs to travel through these areas to find food, water and shelter. Fences, loss of habitat from human development and even extreme weather conditions have played a role in preventing this natural migration for food, water and shelter and have caused unnecessary loss of animal lives.

When the settlers came, fences were used to designate boundaries of ownership, and protect special areas which needed protection. Fences have a purpose and careful design of fences with wildlife in mind, can indeed serve "both masters" of needing barrier protection/designation and allowing Colorado's wildlife an opportunity to do what they do best . . . to be a sustainable part of our great Colorado landscape.

Fences that are a problem to wildlife:

- Too high to jump over,
- Too low to crawl under,
- Too loose that legs get tangled,
- Woven wire that traps calves or fawns,
- Closely spaced wires also tangle legs of jumping deer and elk,
- Wires that are hard for wildlife to see, any kind of fence that makes a complete barrier, like this woven wire with two strands of barbed wire on top (see picture).

Elk and deer go over fences and jump with their back feet forward.
This means that their legs can get caught jumping over a fence. The result is a desperate and painful death. Fawns or calves that are unable to jump a high fence and unable to crawl under, find themselves separated from their mother and then become victims of predators, vehicles or starvation.
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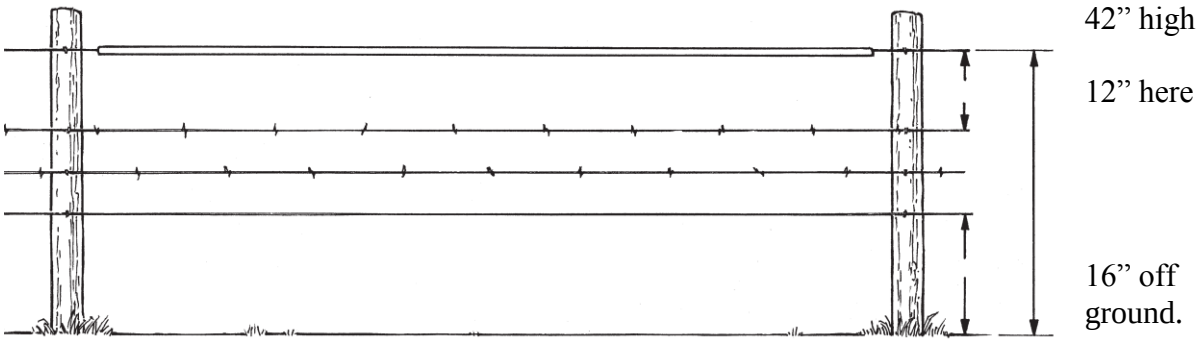
A woven wire fence with strands of barbed wire on the top becomes one of the most deadly types of fences since animals are unable to go over and cannot go under. Researchers at Utah State University completed a study of wildlife mortality along more than 600 miles of fences in 2005 and 2006 and some of their key findings include:

- Juveniles are eight times more likely to die in fences than adults.
- Woven-wire fence topped with a single strand of barbed-wire was the most lethal fence type; ungulate's legs are easily tangled and snared between the top barbed wire and the woven base.
- Fences higher than 40" accounted for 70% of all mortalities.
- Fawn carcasses made up 90% of those found. These young animals, unable to cross with their mothers became caught in the fence and died there.

Ideal Wildlife Fence

The friendliest fences for wildlife are ones which are highly visible and allows animals to easily jump over or go under the fences. The Colorado Division of Wildlife recommends the following types:

- Fencing wire placed on the side of the fence posts where the livestock is located;
- Smooth wire on the top and on the bottom;
- Top wire height of 42";
- At least 12" between top two wires;
- At least 16" between the ground and the bottom wire.



- For sheep and goats, a 12” smooth wire may be the best method to keep in your livestock.

Consider high tensile wire
Landowners may want to consider installing a high-tensile fence. This type of fence is very strong, a 12.5 gauge wire which doesn’t elongate until 1,350 pounds of pressure is applied and a breaking point of 1,650 pounds. This means that most wildlife is less likely to get tangled or caught in this type of wire and it has amazing “spring”. This fence would spring back even after a tree fell on it, where other fences would simply break or stretch out of shape.

High tensile wire is less expensive to install and easier to maintain than traditional barbed-wire fences. High tensile wire can be strung up to 100 feet between posts. For more information and details on building high tensile wire fences and other types of wildlife friendly fences, contact the Colorado Parks and Wildlife Resources:
Colorado Department of Agriculture website: www.colorado.gov

Hanophy, W. 2009. Fencing with Wildlife in Mind. Colorado Division of Wildlife, Denver, CO. 36 pp
Harrington, J.L., and M.R. Conover. 2006. Characteristics of ungulate behavior and mortality associated with wire fences. Wildlife Society Bulletin 34(5) 1295-1305.
Karhu, R. and S. Anderson. 2006. The effect of high-tensile fence designs on big-game and livestock movements. Wildlife Society Bulletin 34(2) 293-299.
Robert Frost, “Mending Wall”

Managing Small Pastures

Small pastures are particularly susceptible to overgrazing (too many grazing animals for too long on too little space). Many people overlook the importance of managing smaller pastures, and consequently, they are the most commonly abused grazing lands in the county. Management principles are the same for small pastures as for large ones and equally as important. The basic steps are as follows:

Decide How You Want the Pasture to Look

Do you want a mix of grasses and shrubs, shrubs only, grass only, or bare ground? Knowing your desired landscape is the first step in managing a small pasture. Too many animals (be it horses, cattle, or llamas) lead to bare ground on dryland, and a thick, short sod on well irrigated pastures. Animals can also be used to manipulate the composition of a pasture. Animals, such as goats or sheep, selectively graze forbs and shrubs making them less prominent over time. Conversely, cattle or horses select out the most desirable grasses and foods, thus forbs, shrubs and unpalatable grasses become more prominent in the pasture.

What will you use the pasture for? Will it be for grazing only, haying only, or haying with some grazing? This will determine the forage species that you plant. Contact your local Colorado State University (CSU) Extension or Natural Resources Conservation Service (NRCS) office for assistance. Do you want the pasture to look more like your lawn (sod forming grass) or do you mind a clumpier/bunchy look (more native look)? Can your soils and access to water support the look you want? Your local CSU Extension office or NRCS office can help you with what grasses do well in your area with the resources and soils that you have.

Use the Basic Principles of Good Range Management

There is more than one method of pasture management. It is easiest for smaller pastures to adhere to the "take half and leave half" method. The idea is that by only grazing one-half of the available and desirable forage and leaving half, the existing plant community is sustained at that stocking rate. By not grazing too much of a plant, the plant is allowed to regrow and replenish its energy root reserve.

Another consideration is timing of grazing. Grazing too early in the spring causes the plant to utilize its energy reserves without being able to replenish them, and consequently, it cannot regrow as fast as other ungrazed grasses. In early spring, the grass is using stored energy reserves to grow leaf surface area for photosynthesis. Until the grass has sufficient leaf surface area to phosynthesize more energy than it can use (usually 4-6" height), it must continue to use stored root energy. If grazed too early and too often, the plant never produces enough energy to store in the roots for the following year. Multiple years of overgrazing leads to root die-off and eventual grass die-off. This is why it is important to change the time of year each pasture is grazed each year to ensure a healthy pasture with high plant diversity.

Grazing impacts vary throughout the year and growing season. Plants are most severely affected from grazing too early and during seed formation when they need maximum energy to produce seeds. The least critical time for grazing is dormancy (i.e., late fall and winter). Grasses grazed while dormant are not as adversely affected as the plant that has already stored energy; therefore, grazing or leaf removal has little impact on the plant's ability to regrow the following spring. The only concern with this is if the crowns are completely grazed down or the pasture is utilized when the ground is muddy or icy and the crowns are damaged by hooves.

Estimating the Carrying Capacity

There is no standard reference on the amount of available forages for different pastures in the intermountain west. Dryland pastures in most Colorado counties typically range from 300-2000 pounds per acre in total usable dry matter. Irrigated pastures range from 2000-6000 pounds per acre. Typically, dryland in most counties produces 1000 pounds, decreasing as you go toward more arid environments in the west. Thus, a typical dryland pasture has around 500 pounds of usable forage (dry matter basis, foraging only 50% as previously mentioned) per acre. To know for sure, clip a small area of mature grass representative of the pasture, and weigh it after allowing it to air dry for three or four days. For example, if you clip 100 sf, multiply the pounds by 435.6 to get pounds per acre.

- Grazing animals need 2-3% of their body weight of air-dried forage daily. Thus, a 1000 pound cow needs approximately 25 pounds of air-dried forage a day or 750 pounds of dry forage per month. Therefore, a 1000 pound cow needs 1.5 (or almost 2) acres per month.
- Horses are the same, but they tend to waste and trample more forage, and 3-4% of their body weight per day is more typical.
- Sheep need 2-3% of their body weight; however, they utilize a higher percentage of brush species and forbs than cattle or horses.
- Llamas tend to have slightly more efficient digestive systems and require only 1.8-2% of their body weight of air-dried forage daily.

To estimate the total carrying capacity of a pasture take the estimated air-dried forage production divided by 2 times the number of acres:

$$\frac{\text{Estimated air-dried forage production}}{2 \times \text{Number of Acres}}$$

This is the total available production of the pasture that will sustain the existing desirable vegetation.

Then calculate the needed forage to sustain all the animals for a day. Next divide forage availability by forage need to discover the amount of days the pasture can sustain grazing during the growing season. Or you can save yourself from all of this and call the Agriculture Agent at the Extension Office or your local NRCS office who will do it for you.

$$\frac{\text{Forage availability}}{\text{Needed forage}}$$

Tips for Improving Small Pastures: Rabbit Brush, Sage Brush and Other Brush Removal
A combination of herbicide and brush hogging (heavy duty rotary mower) is the best strategy for lasting removal of sage brush. Brush hogging alone will remove all existing material, but the brush grows back after 2-3 years. By brush hogging first and then treating the new growth with an herbicide, there is a much greater success rate (80-100% removal). This also allows for a lower herbicide dose as the plant is already stressed from the brush hogging. Check with the local Division of Parks and Wildlife to prevent destruction of important wildlife habitat.

Encourage More Grass

1. Be sure grazing is not so severe that it reduces grass. If so, reduce the amount or severity of grazing or allow for longer rest periods.
2. Keep animals off the pasture in the spring until there is four to six inches of grass growth.
3. Divide your pasture into grazing cells and use a rotating grazing scheme. Rotation grazing uses the "take half and leave half" principle and lets you manage your pasture more intensively. This can lead to more forage production and greater carrying capacity and overall healthier pastures. Seek additional advice from the Extension or NRCS Office for help implementing a rotation grazing plan.
4. Control your weeds. Many pastures which have historically been overgrazed will have more broadleaf plants, weeds, and shrub species than grasses. Applying a broadleaf herbicide suppresses the broadleaf and weed species and aids the grass' re-establishment. Prior to herbicide application, carefully read the label and adhere to the rate recommendation, personal protective equipment, and grazing restrictions. Be particularly careful in spraying poisonous plants as many herbicides change the sugar composition of poisonous plants, making once unpalatable plants palatable and more likely to poison livestock and horses. Depending on the weed infestation, it may be advisable to spend time up front conducting weed control prior to seeding. This time will be well spent as the weeds will compete with the new grass seedlings. Use of a cover crop may be needed to help control soil erosion. Consult with your local CSU Extension or NRCS office for seedling recommendations.
5. In worst case scenarios, where a pasture is severely overgrazed or weedy, reseeding may be necessary. There are two seeding methods: broadcast and drill. To determine which method is best for your property, seek additional advice before reseeding. Reseed with a mixture of grass plants, not just a single variety to ensure a greater chance of establishment.

The best method to determine the fertilizer needs of your pasture is by doing a soil test. If you hay your pasture you will need more nitrogen to replace the vegetation removed even if you use it onsite and spread the manure. If you are just grazing, you will need fewer nutrients. Recommendations for fertilizing mountain meadows can be found in CSU Fact sheet 0.535.

Any grazing management system must include a sacrifice or dry lot area. Livestock must be kept in the sacrifice area when the pasture is not ready for grazing or is in need of rest. The sacrifice area should be located so that it stays as dry as possible and the runoff does not contaminate a well, stream or other water body. The sacrifice area should allow sufficient square feet per animal based on the species.

Dairy cattle – 600 sq. ft.	Beef cattle – 500 sq. ft.
Horse – 400 – 500 sq. ft.	Goat, sheep – 25 sq. ft.

Resources:
http://www.ext.colostate.edu/cedirectory/countylist.cfm
http://www.co.nrcs.usda.gov/contact/index.html
http://csfs.colostate.edu/pages/your-local-forester.html
http://offices.sc.egov.usda.gov/locator/app?state=co&agency=fsa
http://www.ext.colostate.edu/pubs/crops/00535.html
http://www.ext.colostate.edu/pubs/crops/00500.html
http://www.ext.colostate.edu/pubs/crops/00501.html
http://www.ext.colostate.edu/pubs/crops/00502.html
http://www.ext.colostate.edu/pubs/natres/06108.html
http://www.ext.colostate.edu/pubs/natres/06112.html

Manure Management

Did you know all animal owners are responsible for managing manure to protect surface and ground water? Many counties have ordinances regarding the size of manure piles, and Federal and State laws forbid discharging animal waste into water. This is because manure has the potential to pollute water, affecting human and aquatic health, recreation (fishing and swimming), and drinking water. Manure can be an invaluable resource for soil and plant health, but it can also be a pollutant.

Manure contains nutrients (particularly nitrogen and phosphorous), bacteria and protozoan (such as *E.coli* and *Giardia*) that can have a negative impact in our lakes, rivers, and groundwater. High levels of nitrogen can be toxic to fish and can cause blue baby syndrome in humans, livestock deaths, and other health problems in humans or animals drinking the water. Excess phosphorus can cause algae blooms which can lead to fish kills. In addition, manure can produce fecal coliform contamination in water, making it potentially hazardous to fish and anyone who drinks the water.

Because of the potential health and environmental damage manure can cause, it is imperative that all animal owners have a sound manure management plan. It may not seem like your residence, with only a few animals, is a big deal, but there are thousands of your small size operations in Colorado who cumulatively could create a major water quality issue.

Manure management means having a plan for properly storing and using the manure produced by your animals. Basically, manure can be stockpiled, composted, spread, and/or disposed of off-site. For all of these options, there are strategies which when implemented, will reduce the likelihood of water pollution and pathogenic infection.

Stockpiling Manure

Manure is often stockpiled before use. Proper site selection for the manure storage area is imperative to safeguard against surface and groundwater contamination. Stockpile manure at least 150 feet away from surface water (ponds, wetlands, streams), wells, and gardens. Reroute any rainwater (including roof water) or snowmelt away from manure stockpiles. Build an earthen berm or diversion, and use gutters and downspouts to divert any clean water away from manure piles. If manure has historically been stored near a well head or other human or livestock drinking water source, your drinking water should be tested for nitrates, heavy metals, and fecal coliform by a certified laboratory such as CSU Soil, Water, Plant Testing Lab.

In Gilpin County, the Trash Ordinance 99:02 limits manure stockpiling on Gilpin properties (in contiguous acres) to the following:

-3 acres or less: less than 3 cubic yards
-greater than 3 acres to 7 acres: less than 8 cubic yards
-greater than 7 acres to 20 acres: less than 12 cubic yards
-greater than 20 acres: unlimited

Composting Manure
Composted manure acts as a slow release fertilizer and is an excellent soil conditioner. Composting manure takes additional labor and time, but it reduces the total volume by more than half, reduces smell, and can kill weed seeds and pathogens like *E. coli*. Locate your compost pile out of natural drainages and away from wells. Remember, keep your drinking water clean.

For composting to work, the proper ingredients are needed:

1. Mix the right **carbon:nitrogen ratio**. For manure composting, this means using about 2 parts carbon (bedding, leaves, shredded paper, browned grass clippings) for 1 part manure by volume.
2. **Oxygen** throughout the pile is need. Aeration is created by turning the pile regularly.
3. Pile should be **50% moist** (feels like a wrung out sponge). This can be achieved by watering as needed. Try using a tarp over the pile to keep moisture contained.
4. Allow enough **time** for the material to break-down. The composting process may take much longer during cold winter temperatures.
5. **Bacteria and microorganisms** will break down the material. They are naturally occurring in soil and manure.

Composting manure properly will kill most *E. coli* and weed seeds. In order for a manure pile to be composted properly, the following requirements must be met:

- Mix the compost regularly. This is important not only for aeration but also to ensure that the entire pile has reached the required temperature.
- Monitor the temperature. Long-handled thermometers are available for this purpose. The temperature must reach 130 to 140 degrees F for at least two five-day heating cycles. Mix the compost between cycles.
- After composting, allow the compost to cure for two to four months before applying it to your soil. This allows the beneficial bacteria to kill disease-causing bacteria.

For more information on composting manure, refer to the following CSU fact sheets: #1.225, Composting Horse Manure in Dynamic Windrows, #1.226, Composting Horse Manure in Static Windrows, #1.224, Vermicomposting Horse Manure, #7.235, Choosing a Soil Amendment and #9.369, Preventing *E. coli* From Garden to Plate**.**

Spreading Manure
Keeping records is essential to land application of manure because you never want to apply more nutrients than the vegetation can utilize. Keep track of when and how much manure or compost is applied. Regularly have manure or compost analyzed for nutrient content (N, P, K, and electrical conductivity (salts)) and apply manure at a rate that does not exceed crop nutrient requirements. Test your soil and manure at a certified laboratory such as CSU Soil, Water, Plant Testing Lab (http://www.soiltestinglab.colostate.edu/). To learn how to calibrate your manure spreader, refer to CSU fact sheet #0.561, Manure Spreader Calibration.

Never apply manure to land that is highly erodible (steep slope), frozen, or saturated. Spread manure evenly, no more than one inch thick per year. To protect water quality, do not spread within 150 feet from surface water and wells. Incorporating (mixing manure with soil) manure immediately after application reduces nutrient losses from erosion and volatilization. Harrowing perennial pasture grass after spreading manure will further break-up and distribute manure for faster decomposition. The best time to spread manure is in the spring because nutrients are utilized by plants quickest during this time of year.

Don't apply fresh manure to the soil in your fruit or vegetable garden. Even aged manure can have *E. coli* present. For additional details, refer to the CSU Extension fact sheet #9.369, Preventing *E. coli* From Garden to Plate**.** Additionally, fresh manure will also be higher in salts that can damage crops. This is another reason to let your manure compost and then cure before use.

Disposing of Manure Off-Site

Although not the best option, check with your local waste disposal company to see if they allow manure. Other ways to get rid of manure are to market it to friends, family, coworkers, and neighbors for use in their landscaping.

Top 10 Manure Management Strategies

1. Keep clean water clean. Runoff from manure storage or compost areas, dry lots, and pastures carries pollutants such as nitrogen, phosphorus, and bacteria into surface waters. Use downspouts, build earthen berms, concrete curbs, or trenches to prevent water from entering or leaving these areas. Move manure piles to a covered facility during winter when we receive most of our precipitation.
2. Apply manure to land at agronomic rates. Heavy manure applications over-fertilize grasses. Animals that eat these grasses may suffer nitrate poisoning or grass tetany. Test soil and manure using a certified laboratory to help you determine how much manure to apply. Over application can also lead to nutrient run-off.
3. Keep manure at least 150 feet away from surface water, dry creek beds, wells, and food gardens. Establish a 150 foot manure-free zone around well heads, streams, ponds, wetlands, dry creek beds, and ditches. Be sure manure is not stored or spread in these zones.
4. Keep animals out of surface water bodies. While animals are drinking or walking through water bodies, they often leave manure behind. Manure nutrients can kill fish, cause algae blooms, and spread bacteria to our drinking water. Use temporary or permanent fence to prevent animal access to surface waters. Install water tanks so animals don’t have to drink from surface water.
5. Manure management on pastures depends on getting good manure distribution across the pasture. Rotational grazing is an excellent way to achieve good manure distribution. Moving feeding and watering facilities often encourages better manure distribution. Use a harrow to break-up and spread manure in pastures.
6. Be aware that manure tends to be high in salts, when applied at excessive rates can contribute to soil salinity. Soil salinity causes plants to become water stressed, or in extreme cases, die. When manure is applied to pastures, salts can accumulate on the soil surface unless they are leached into the subsoil. Salt accumulation is most common with clay-based soils with limited irrigation and rainfall.

7. Plant trees to reduce wind and odor near stockpiles. Stockpile manure downwind from barns and 200 feet from your neighbors.
8. Control insects. Raw manure and mud provide a breeding ground for flies. Prevent accumulation of manure. Remove manure and soiled bedding from pens on a regular basis. Composting at proper temperatures inhibits fly development. Use fly predatory wasps or several pesticides on manure piles to kill maggots.
9. Pathogens are a potential problem with fresh manure, especially on vegetable gardens. Compost manure for at least two heating cycles at 130 to 140 degrees F to kill any pathogens. Home-composted products containing manure are best used in flower gardens, shrub borders and other nonfood gardens. To prevent *E. coli* infection, always wash your hands with soap and warm water after handling manure. Don't use the same tools for manure handling that you use for crop harvesting (buckets or gloves, for example). Remove manure-contaminated clothing, including shoes and gloves, before going into the house and especially before eating, drinking or preparing food.
10. Be aware that if animals eat forage which was treated with herbicides containing aminopyralid, clopyralid, or picloram, the herbicide can carry over in manure and composted manure. This becomes a problem when the manure or composted manure is used on vegetable gardens. If you purchase forage, compost, or manure, be sure to ask what herbicides were used on it. For more information on herbicide carryover read, **Contaminated Organic Material Kills Sensitive Vegetables**, Small Acreage Management Newsletter, Summer 2011, archived at http://www.ext.colostate.edu/sam/nlarch.html

Poisonous Plants

If you are pasturing livestock, be aware that there are a number of plants that are toxic to animals. Many of these are native, therefore not noxious weeds, but they are still undesirable in the pasture (but are fine in areas where livestock doesn't graze). Others are noxious weeds and thus should be controlled for another reason. While many poisonous plants have an unpleasant taste that animals avoid, if other forage is limited, they might eat them anyway or even develop a taste for them.

Some plants cause extreme photosensitivity/sunburn due to liver disease, others may cause only temporary symptoms if the animal is removed from the plant source, and still others can cause incurable symptoms or even death. Livestock owners should inspect their pasture prior to turning animals out to graze for the first time each season. Watch for unusual behavior in your animals. If you suspect a poisoning, consult a veterinarian as soon as possible. Be sure to collect samples of the plants you suspect caused the poisoning for positive identification

The Six Worst Plants for Horses (according to Colorado's Poisonous Menace booklet)

- Senecio *(Senecio* spp.) (*S. jacobea* or tansy ragwort is a List A noxious weed. There are many species of native Senecios, many of which are toxic).
- Yellow star thistle *(Cenaturea solsticialis)* Also a list A noxious weed – currently the plant is not found in the mountains, and is very rare on the Front Range. Only toxic to horses, can cause irreversible and usually fatal brain disease.
- Houndstongue *(Cynoglossum officinale)* Also a list B noxious weed.
- Locoweed *(Oxytropis lambertii* and *sericea* and *Astragalus molissimus)* All grazing animals are affected, damage is often irreversible.
- Sages *(Artemisia frigida, A. ludoviciana, A. frigida) (A. absinthium* is a list B noxious weed, but is fairly rare on the front range). Sage poisoning is most pronounced in winter time when heavy snow covers the lower growing range grasses. Horses can eat sage without problem provided they are not forced to eat it exclusively when other forages are scarce.
- Russian knapweed *(Acroptilon repens)* Also a list B Noxious weed (rare in the Front Range mountains). Only toxic to horses, can cause irreversible and usually fatal brain disease.

Other Common Mountain Plants that may be Poisonous to Livestock (list is not necessarily comprehensive)

Golden Banner *(Thermopsis divaricarpa)*
Chokecherry (*Prunus virginiana)*
Virginia creeper (*Parthenocissus quinquefolia)*
Larkspur (*Delphinium spp.)* (Causes more fatal poisoning of cattle than any other naturally occurring species – horses are less susceptible)
Monkshood (*Aconitum spp.)*
Lupines (*Lupinus spp.)*
Hairy vetch (*Vicia villosa)*
Poison hemlock *(Conium maculatum)* List C noxious weed.
Death Camas *(Anticlea elegans*, or at lower elevations, *Toxicoscordion venenosum)*
Flixweed *(Descurainia Sophia)*
Field Bindweed, morning glory *(Convolvulus arvensis)*
Nightshades *(Solanum spp.)*
Serviceberry *(Amelanchier alnifolia)*

Resources:
Online guide to poisonous plants - from Dr. Tony Knight at CSU (includes pictures, symptoms)
http://southcampus.colostate.edu/poisonous_plants/index.cfm

Webinar on Poisonous plants for horses by Dr. Tony Knight
https://connect.extension.iastate.edu/p3dl0a6bkb3/

Book: A guide to plant poisonings of animals in North America, by Anthony Knight and Richard Walter. http://southcampus.colostate.edu/poisonous_plants/book/book.html

Booklet: Colorado's Poisonous Menace: Do you know what your horse is eating? Produced by the Colorado Dept. of Agriculture
http://www.co.weld.co.us/assets/3B6a9C9450D27066296d.pdf

Dealing with Cold Temperatures and Deep Snow

Helping your livestock survive and thrive in mountain winter weather starts with planning. Key considerations are providing them with feed (livestock have increased nutritional needs in colder weather, and getting feed to the livestock may be challenging), protection, water, and your choice of species and breed. Livestock with more hair will stay warmer than those with minimal hair (i.e. beef cattle versus dairy cattle). Consider breeds that originate from colder climates rather than tropical areas. Purchase your animals locally so that they will be adjusted to our climate and elevation. For poultry, choose those that have smaller combs and wattles to prevent freezing. You may also want to insulate their coop and keep a light on for heat on those subzero nights.

Livestock species are designed to be able to live outside and survive most weather conditions. The Lowest Critical Environmental Temperature (LCT) is the temperature at which animals can maintain their main core body temperature without supplemental energy (feed). For most livestock, if they are dry, the LCT is 20 to 32° F. However, if they get wet, it goes up to 60° F. Both of these temperatures are without a wind chill factor. Another way to think about this is for every 2° F drop in wind chill temperature, livestock energy (feed) requirements go up 1%.

To help your livestock maintain good body condition in adverse weather, you need to do several things.

- Monitor your livestock for excessive shivering, lethargy and weakness. As animals begin to experience hypothermia, they increase their metabolism to generate more heat. Blood flow to the extremities is reduced. Ears and teats may experience frostbite. Rapid warming of the teats is needed to minimize damage and monitoring for mastitis is required after calving. Some frostbit damage may not be reversible.
- Be sure to provide them plenty of forage to meet their added calorie requirement. Have your hay tested so that you know the nutritional value. Providing good, top quality hay is essential during the winter months. For horses, you can provide them some “comfort” food such as warm bran mash, moistened beet pulp or soaked pelleted feed to increase water intake and provide some warmth. You may need to increase the feed amount and the “nutrient density”. The more nutritionally dense (packed with nutrients) grains may need to be added to the diet.
- Water is critical to all living beings. Livestock daily water requirements range from 3 gal/day for sheep to 14 gal/day or more for cattle. They cannot meet their requirements from either forage or consuming snow or ice. Consuming snow or ice lowers body temperature making them more vulnerable to problems. They need fresh, unfrozen and, if possible, slightly warmed water. They tend to drink less when water is cold so they can become dehydrated. You can use tank heaters to help keep stock tanks clear of ice and water slightly warmed (35 – 40°F). However, you need to check the heaters frequently to prevent fire and electrocution problems. Also have a backup generator in the event power fails.

Young and older animals are especially vulnerable during the cold. Providing them extra bedding, protection, and warm food and water is important. If you are lambing or calving during the cold, make sure that the mothers are in a well-protected building with plenty of bedding for warmth. Make sure that the young get dried off quickly after birth.

Livestock doesn't need a fully insulated, state-of-the-art heated barn. In many cases, a three sided structure (preferably with a roof), hill, clumps of trees, or a solid fence provides enough protection from cold winter winds. Reducing winter wind exposure is a must so orient the building based on your winter prevailing winds. The structure, or area, must have plenty of dry bedding. Livestock can conserve 20 to 25% heat loss by lying down on dry bedding. The shelter needs to be sized to handle all the livestock that will be using it. Please refer to the Oregon State document link for square footage needed for each species. Wet, muddy, or no bedding can increase their vulnerability to cold temperatures. During a snowstorm or cold spring rain, a structure that provides not only wind protection but a roof to keep them dry is needed. Remember that the LCT jumps drastically if they get wet. Protection desired will vary by species. Sheep don't mind getting wet but goats do so they will tend to seek shelter rather than graze in the open. Some species have thinner hides and hair and therefore get cold more easily. Dairy cattle will chill quicker than beef cattle since they tend to have less hair to insulate them. The coat condition is critical to providing insulation. The more hair the better as it allows for air space between the hairs to act as insulation. When their hair is wet or muddy, it becomes matted, limiting the insulating air spaces available. Manage mud in your dry lot area and provide drier areas with bedding so animals can stay dry. Check your livestock going into the fall not only for general health and body condition but also for skin and hair health.

Deep Snow and Drifts

When storing hay, consider how you will get it to your livestock in winter. You don't want to lug 50 – 80 pound bales through 3feet or more of snow. You may want to store several days' worth in the stable or barn or wherever your livestock will be kept during major winter storms. Consider how you will get from your house to the barn in case of a large snow fall or snow drifts. Consider a windbreak or fence that will provide you with a path to the livestock. Also consider a fence or windbreak around their shelter and water tanks. If you can, build feedlots, shelters and other buildings on south facing slopes and other protected areas where temperatures are higher and moisture is lower or melts off quicker. If your livestock is a considerable distance from the house, have equipment ready to plow a path to the area and for the livestock to be able to move around. With deep snows, fencing may be covered so that animals can walk over or through it. Keep your fencing in good condition and check for areas that might allow animals to escape.

Livestock can survive several days without feed but must have access to water. When reintroducing, provide livestock smaller portions several times a day. There can be some potential for nitrate poisoning if your feed is high in nitrates and your livestock has not been fed for several days. It is always a good idea to have your hay tested but especially for winter feed. Also make sure that they have sufficient salt and mineral blocks.

Resources:

https://www.southernstates.com/sscinfo/news/2010/01/livestockcoldstress.aspx
http://anr.ext.wvu.edu/livestock/cattle/cold_stress
http://www.clemson.edu/extension/ep/cold_livestock.html
http://www.nws.noaa.gov/om/brochures/wntrstm.htm
http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/19671/ec1635.pdf
http://www.omafra.gov.on.ca/english/livestock/horses/facts/info-coldweather-man.htm

Handling Emergencies

Wildfire, flooding and animal disease outbreaks are examples of disasters/emergencies that livestock owners should be prepared to handle. Preparedness ahead of time can save livestock and stress.

Wildfire and Flooding

When creating defensible space, don't forget the area around your barn or stable. Barns, stables and other out buildings' defensible space, construction materials, maintenance, and cleanup tasks are the same as your home. Exterior materials should be noncombustible, ignition sources limited and debris build-up should be eliminated. Keep grasses mowed and other littler cleaned up (i.e. needles in gutters) around barns and corrals. Power sources inside your barn should be hardwired just like your house. You don't want to start a fire by your negligence. Be aware of coffee pots, heaters and other possible ignition sources. Keep flammable materials stored in an appropriate cabinet. Your hay should be dried sufficiently to prevent combustion.
All landowners should have a plan on how you will evacuate yourself and your livestock and pets. Identify at least two different routes out of your area since one may be blocked by the disaster. Learn the name of streets/roads in your area by both their common name and a road number if available and make sure you can travel them safely with your trailer. Are there pullouts or turnarounds to make it easy to get out of your area and avoid any emergency vehicles?

If you do not have a trailer or in case you are not at home, you will need to work out a plan with a neighbor to jointly evacuate animals. However, if they only have a two horse trailer and, between the two of you, have four horses, you might have a problem. Depending on the location of the fire or flooding and how rapidly it is progressing, you may not have time for a second trip. Some people may want to pre-evacuate (evacuate prior to notification) if they know that it will take them several trips to get all their livestock out. You can also check with your county to see if there is a County Animal Response Team that can assist with evacuations. If not, you may want to help get one started.

Prepare a list of what you will need for your animals in case of evacuation. Know what you will grab for your animals (halters, medications, buckets and feed) or have a bin near the stall with these items in it. During an evacuation is not the time to train your animals to load into a trailer. Practicing ahead of time will help alleviate some of the stress and potential for injury to you or your livestock. Make sure that all their vaccinations are up to date and that you have documentation of this stored offsite.

Know where your local evacuation facilities are (both the primary and a secondary location). Find out how they do evacuations and release livestock after the disaster so that you can come prepared both during and after with documentation. Make sure that your animals are branded, chipped or identified in some other manner. If you must leave, attach your contact information to a mane, tail, halter, etc. If you can, the identification tag or device should be nonflammable. You can also put duct tape on the animal with your contact information or spray paint your phone number on the animal. The Colorado Department of Agriculture (CDA) will, for a low cost, microchip horses and provide you with an identification card. They need a group of horses

to make it worth their while. Contact the CDA (303-239-4161) for more information on this. Along with your personal papers that you take with you or have stored offsite, you should also keep brand inspections, identification, photos or other appropriate information that will make it easier to identify and retrieve your livestock after the emergency is over. Check with your local fire department to see if they would like to know what livestock you have. They may have a program where they will come inspect your barn and provide you with tips to make it safer. Have a fire extinguisher located in the barn. The main power shutoff should be in a prominent location. Sign up for your county's reverse 911 system, and provide the system with home, cell and work phone numbers.

Have an emergency water supply (cistern) available for your home and barn/stable if possible. Have a backup generator for when the power is off.

Animals will be affected by the smoke, ash, and fire retardant if it was used in your area. Check with your vet for treatment recommendations. Be aware that hay will have ashes in it which may cause respiratory problems. Fire retardant is not advisable for consumption. If possible wait to graze livestock until after precipitation or if you can irrigate to settle ash and retardant. Expect more incidences/conflicts with wildlife. Keep food and livestock safe (see wildlife section). Clean ash and retardant out of feed bunks and water tanks prior to feeding animals.

Biosecurity

To prevent disease exposure and spread, any livestock owner must practice biosecurity. Be aware of what biosecurity measures are practiced at any event that you may attend to limit your animal's exposure and the possibility of bringing it home with you. At your property, have separate boots and clothing that are only worn in your facilities. Wear different clothing and boots when visiting other facilities. Disinfect them when you get home. If others visit your property have a disinfectant foot wash at a minimum so they don't bring disease to your property. Watch new animals (separate/isolate if you can) or animals returning from events to make sure you do not introduce disease. Keep your coops, stables/barns, and shelters clean.

Resources:

Caring for livestock before a disaster http://www.ext.colostate.edu/pubs/livestk/01814.html
Caring for livestock during a disaster http://www.ext.colostate.edu/pubs/livestk/01815.html
Caring for livestock after a disaster http://www.ext.colostate.edu/pubs/livestk/01816.html
Cheatgrass and wildfire http://www.ext.colostate.edu/pubs/natres/06310.html
Creating Wildfire Defensible Zones http://www.ext.colostate.edu/pubs/natres/06302.html
Fire Resistant landscaping http://www.ext.colostate.edu/pubs/natres/06303.html
FireWise Plant materials http://www.ext.colostate.edu/pubs/natres/06305.html
Forest Home Fire Safety http://www.ext.colostate.edu/pubs/natres/06304.html
Soil Erosion Control after Wildfire http://www.ext.colostate.edu/pubs/natres/06308.html
Wildfire Preparedness for Horse Owners http://www.ext.colostate.edu/pubs/livestk/01817.html
Ready Colorado http://www.readycolorado.com/pdf/LivestockBrochureF.pdf

Biosecurity:

http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_bio_sec_07.pdf