

Livestock Management in the Mountains



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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 that 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.

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 (see advertisement inside front cover). 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 dogs 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.

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.

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 occasionally 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 3 feet buried underground or 5 foot 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.
Cougars/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 1-1¼ 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 clean 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, 6months 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.

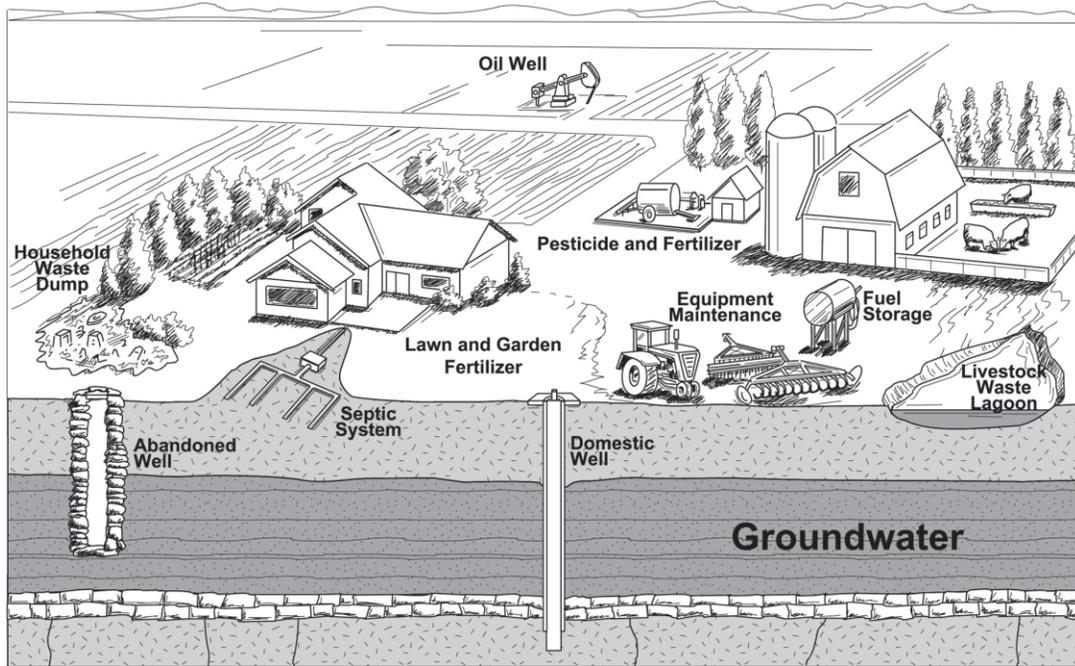
Other Watering Considerations:

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 on 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.

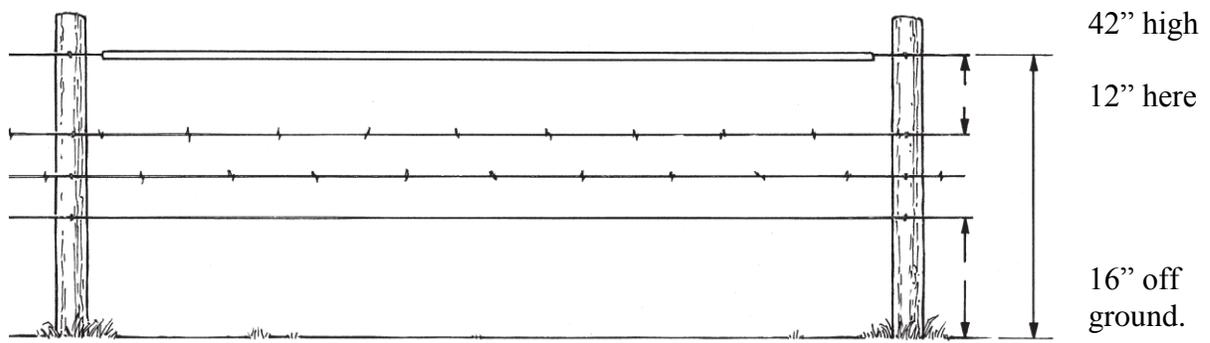
A woven wire fence with strands of barbed wire on the top becomes one of the most deadly types of fences since animals are unable to go over and cannot go under. Researchers at Utah State University completed a study of wildlife mortality along more than 600 miles of fences in 2005 and 2006 and some 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 photosynthesize 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

- 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.
- Keep animals off the pasture in the spring until there is four to six inches of grass growth.
- 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.
- Control your weeds. Many pastures 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.
- 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.

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 needed. 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>

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&childpage=agriculture-Main%2FDocument_C%2FCDAGAddLink&cid=1251616643546&page=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.

Your Board of County Commissioners and Weed Advisory Board are responsible for enforcement of the weed management plan (or, in incorporated areas, the Municipality is responsible). Although your local Extension Office is not responsible for the enforcement of the weed law, they will most likely be able 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.

Your local Extension Office or Weed Department, can help you with weed identification. 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.cwma.org/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.

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 (*Centaurea solstitialis*) 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 as 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# bales through 3' 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/wntstm.htm>

<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/19671/ec1635.pdf>

<http://www.omafr.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 litter 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). 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. If you can't evacuate your livestock, do not release them to fend on their own. In the smoke and flames, they will become disoriented and likely run into the fire or into a dangerous location. Do not confine them in the barn but keep them within a fenced area (corral) with little to no vegetation (dry lot). You can leave a halter on but do not leave a lead rope on as it could get caught and tie the animal down in an unsafe location. 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