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## A Menu of Organic Fertilizers

By David Wann, Community Garden Coordinator, and author of ten books, including *The Zen of Gardening*

All fertilizers are investments, but some are more likely to give you reliable returns. Fertilizers that come directly from natural sources release a wide spectrum of nutrients, slowly and steadily over a period of years, as opposed to the quick-release action of nitrogen-obsessed fertilizers, that can wash away in the first heavy rain. If you choose to become an organic grower, you'll inevitably become a broker in a stock market of materials that were once living, from alfalfa meal to horse manure to oak leaves. Your rewards are tangible: good yields, better health, and better flavor. (No wonder the last three White House chefs have cooked with organic produce.)

## Grass Seeding

By Megan Lowery, West Greeley Conservation District

If you are considering reseeding your pasture, planting during the right time of year, with the right equipment, will increase your chances of success.



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## Grass Seeding continued from page 1

For non-irrigated dryland grass seeding, a dormant seeding time has been proven to be most successful in Colorado. This means that the grass seed is planted and sits in the ground over winter, but will not actually germinate and grow until late winter/early spring. The best time to do a dormant grass seeding is approximately November through March, when the ground is not frozen.

If you have irrigation, planting can take place throughout the summer, no later than 6-8 weeks before the average first frost date. Be aware that planting late in the summer, especially for warm season grass species, could leave newly establishing seedlings susceptible to frost. An early frost could be especially damaging to the new seedlings, as they have not yet had the opportunity to store sufficient nutrients.

It is important to identify your irrigation capabilities when choosing species to plant. If you don't have any water, then you want to choose grass species that are more drought tolerant, generally species native to Colorado. If possible, irrigation will help with grass establishment, but is not necessary with dormant seeding.

Success of grass establishment is also dependent on the planting method. Grass seed should be planted at a depth of  $\frac{1}{4}$  to  $\frac{1}{2}$  inch. This depth allows the seed to have good seed to soil contact, which is important for successful establishment. It is best to plant grass seed using a grass drill and not just a grain drill. Grain drills may not plant seed at the desired depth, may be too large for small pastures, and may release too much seed because grass seed is generally much smaller than grain seed. Broadcast seeding is another option, particularly for very small areas. You will want to rake the seed lightly into the soil for good seed to soil contact.

For a successful grass planting, it is also important to have any weeds under control prior to planting. But weeds will also be a problem while your new pasture is becoming established. During grass establishment, mowing is one of the best ways to control weeds, if done frequently. Mow at a level that controls the weeds, but minimizes clipping of the newly emerging grasses, generally 4-6 inches. Herbicides can be used once the seedlings have become established. If you have included forbs in your seed mix, using herbicides may not be an option because herbicides will probably harm the forbs as well as the weeds. When using herbicides, you should ALWAYS read and follow the label.

Many people feel that fertilization when planting grass will improve the chances of grass establishment, but this is not necessarily true. Adding phosphorus can be beneficial, but grasses are not able to benefit greatly from nitrogen. In fact, weed species become much more vigorous when nitrogen supplies are high. This is actually detrimental to the emerging seedlings as they must now compete with the weeds for establishment. If you think your soils are nutrient poor, especially in areas where extensive earth moving has taken place, then it is always a good idea to have your soils tested prior to planting.



**The best method for grass seeding is to use a grass drill.**

Grass Seeding continued from page 2

It is also important to realize that establishing grass from seed can often take two years, or longer for some native species. Irrigated pastures establish much quicker than those depending on mother nature for water. During grass establishment, it is important to avoid grazing the new grass. The roots are not yet established and a grazing animal will often rip the entire plant from the ground, delaying the success of pasture establishment.

To learn more about reseeding and pasture renovation strategies, check out our recently recorded webinar entitled, **Renovating and Reseeding Your Pasture** available at [http://](http://www.ext.colostate.edu/sam/webinar.html)

[www.ext.colostate.edu/sam/webinar.html](http://www.ext.colostate.edu/sam/webinar.html)



Menu of Organic Fertilizers continued from page 1

The overall strategy of organic growing is to feed the soil – not just the plants – with generous supplies of compost, manure, and side dishes such as alfalfa meal, bone meal, and rock phosphate – substances far more familiar and less destructive to soil organisms than concentrates that result in sub-surface boom and bust cycles.

In a single wheelbarrow of fertile soil, there are more organisms than there are people on Earth, and they are an industrious lot! Organisms, including bacteria, fungi, centipedes, beetles, and earthworms, produce vitamins and antibiotics that promote growth and control disease; knit particles of organic matter together to create well-draining soil; and release carbon dioxide to help plants form new plant tissue.

Good soil functions like an immune system. As long as beneficial organisms receive a high-quality diet, they keep bad organisms in check. But when overdoses of chemical fertilizers or a shortage of organic matter weaken the plants, the villains come after our plants. Soon enough, many growers then resort to pesticides.

A Well-Balanced Diet

To find out if your garden soil needs a better diet, give it a check-up by sending a soil sample to a soil testing lab.

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Selected Sources of Organic Fertilizers

Alfalfa meal	Supplies organic matter, high in nitrogen and potassium.
Bloodmeal	High in nitrogen
Bone meal	High in phosphorous, also good for nitrogen
Bluegrass hay	Good balance of nitrogen, phosphorus, potassium
Cow Manure	Good food for the beneficial soil organisms
Coffee Grounds	High in nitrogen, lowers pH
Compost, homemade	Moderate levels of nitrogen, phosphorus, potassium
Cottonseed meal	High in NPK nutrients
Eggshells	High in calcium, good for nitrogen
Epsom salts	High in magnesium, sulfur
Fescue Hay	Good balance of NPK
Fish meal	High in nitrogen and phosphorous
Elemental sulfur	Lowers pH
Granite meal	High in potassium
Greensand	High in potassium, trace minerals
Hairy vetch	Good green manure for winter crop
Kelp meal	High in potassium, contains 60 trace elements
Oak leaves	High in potassium.
Peat moss	Good for organic matter, slightly lowers pH
Pig manure	High in nitrogen
Poultry manure	High in nitrogen, phosphorus
Rock phosphate	High in phosphorus
Sheep manure	High in nitrogen, potassium
Soybean meal	High in nitrogen



## Menu of Organic Fertilizers continued from page 3

Find the CSU Soil Testing Lab address and instructions at <http://www.soiltestinglab.colostate.edu/> or buy a simple test kit that will show levels of the basics: nitrogen, phosphorus, potassium, and pH. In general, conventional fertilizers contain the “big three” nutrients – nitrogen, phosphorous, and potassium – but rarely contain dozens of other trace elements that support growth and prevent disease.

Colorado soils are especially deficient in water-holding organic matter and available nitrogen, and they are high on the pH scale, an alkaline condition that many crops don't like. Garden regulars like lettuce, corn, and peppers prefer a pH just below neutral - 7 - while tomatoes, strawberries, and potatoes like an even more acid soil. If the pH level climbs above 7.3, it inhibits plant uptake of essential nutrients such as phosphorus.

The good news is that soils high in organic matter can buffer pH extremes, effectively allowing good yields even if the pH is on the high side. Adding a 2- to 4-inch layer of compost to your beds every year is a good practice (see [www.mastercomposter.com/pile/](http://www.mastercomposter.com/pile/) for thorough information about composting). Adding peat moss, leaves, coffee grounds, and pine needles can also lower pH levels slightly, but the most effective health food for high pH is elemental sulfur in quantities that are expensive unless bulk supplies are available: up to 10 pounds per 100 square feet.

### Compost Can't Do It All

The organisms in compost make naturally occurring

nutrients in the soil available – a very valuable service - but eventually those background nutrients become depleted. To offset what's coming out of the garden, garden residues should be returned to the soil along with other goodies from the compost pile such as food scraps, leaves, and manure. If there are space or time constraints, high-quality compost mixes can also be purchased at reasonable prices. For example, Eko Compost performs well because it has a low ratio of carbon (e.g., not too much sawdust) to nitrogen (supplied with materials like alfalfa meal and poultry manure). While composting should be a key strategy in any organic garden, for best results compost needs allies from

other animal, vegetable, and mineral sources that have higher concentrations of nutrients.

Deep-rooted cover crops or “green manures” can also make

existing nutrients available because they mine nutrients from below the root zone of most vegetables (their roots go down six feet or more). When crops such as winter rye, crimson clover, and alfalfa are turned under and decompose, they enrich the soil with these scavenged treasures.

Nitrogen enhances green, leafy growth; phosphorous gives plants energy and supports flower and seed growth; and potassium synthesizes protein and builds strong stems. Compost and manure supply moderate amounts of these nutrients, but manure can also supply excess saltiness and weed seeds, and imbalanced nutrients.

Among the manures that are most useful are poultry, rabbit, alpaca, and cow manure.

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**Cottonseed meal (left)**



**Bone meal (right)**

## Menu of Organic Fertilizers continued from page 4

Michael Wade of the Boulder-based seed company, BBB Seed, swears by Moo Poo liquid fertilizer, which he orders in bulk from <http://www.manuretea.com/>. Mikl Brawner and his crew at Harlequin's Gardens carry a full range of organic fertilizers. A good product for Colorado vegetable gardens is Yum Yum Mix, made from alfalfa meal, cottonseed meal, kelp meal, rock dust, greensand, and soft rock phosphate. The recommended application rate is 1 cup per 3 square feet, or 4 pounds per 100 square feet, mixed into the top 1-2 inches of soil.

These whole-food fertilizers are not cheap, but like organic food, they provide more overall value than their processed, synthetic substitutes. In general, the more you buy, the less expensive they will be. Some growers join fertilizer buying co-ops and order by the palette (typically forty 50-pound bags), shipped by truck or rail. Products like alfalfa meal,

cottonseed meal (order organic, because conventional cotton is heavily sprayed), fish meal, and kelp can often be found at good prices in animal feed stores. In Colorado, alfalfa pellets are a good value at about \$20 or less for a fifty-pound bag. By knowing the soil-building values of various materials, you can substitute one for another. I've had good results using coffee grounds in large quantities (from a local roasting factory) to supply nitrogen and lower pH; and alpaca manure for nitrogen and organic matter, both brought home in a borrowed pick-up truck.

To be a good organic gardener is to be a shrewd manager. You're not just a garden geek, you're a CEO with quintillions of employees in the soil. The goal is huge pumpkins and juicy tomatoes, and the best strategy to meet that mission is to keep feeding the soil.

**Master grower John Jeavons, whose biointensive gardening methods are now practiced all over the world, suggests the following formulas to maintain soil fertility:**

**For Good Soil  
Pounds of Fertilizer per 100 Square Feet**

<b><u>Nitrogen (N)</u></b>	<b><u>Phosphorous (P)</u></b>	<b><u>Potassium (K)</u></b>
0.75 lb. blood meal or 4.2 lbs. alfalfa or 1 lb. fish meal	1 lb. bone meal or 2 lbs. phosphate rock or soft phosphate	1.5 lbs. crushed granite or 1.25 lbs. of kelp meal or 1.25 lbs. of greensand

**For Average Soil  
Pounds of Fertilizer per 100 Square Feet**

<b><u>Nitrogen (N)</u></b>	<b><u>Phosphorous (P)</u></b>	<b><u>Potassium (K)</u></b>
2.25 lbs. blood meal or 12.6 lbs. alfalfa meal or 3 lbs. fish meal	2 lb. bone meal or 4 lbs. phosphate rock	4.5 lbs. crushed granite or 4 lbs. of kelp meal or 4 lbs. of greensand

## Protecting and Enhancing Riparian Areas

By Noe Marymor, Private Lands Wildlife Biologist  
USDA-NRCS/Rocky Mountain Bird Observatory/Colorado Parks and Wildlife



Rivers, streams and creeks are the ecological lifelines that wind their way across our Colorado landscape, inextricably linking high alpine snow fields to roaring forest streams and eventually morphing into meandering prairie rivers. Riparian areas, which form at the intersection of uplands and waterways, are one of the rarest, yet most critical, habitat types in the state. The unique and relatively lush vegetation of riparian systems provides flood attenuation, improves water quality by trapping nutrients and sediments, increases ground water levels and provides high quality wildlife habitat. **In fact, riparian areas comprise only 3% of Colorado's surface area, but 40% of wildlife species in the state rely on these habitats at some point during their life cycle.**

Riparian corridors also serve important functions for people. They are the main conveyance for irrigation and drinking water, can support livestock calving operations, and provide excellent hunting and fishing opportunities. However, the same qualities that make riparian systems so important, also makes them prone to overuse and degradation. Unmanaged livestock access to streams can cause streambank erosion and a loss of the riparian vegetation that provides streambank stability and flood reduction services. Fields that are hayed to a stream's edge can cause similar erosion problems.

Fortunately, riparian areas are restorable with the proper management prescriptions. If livestock have unfettered access to streams or rivers, they can be excluded from those areas with temporary or permanent fencing. Landowners can

leave watergaps (or intentional points of stream access for livestock watering) in an exclusion fence, or they can install new watering tanks in riparian pastures. A grazing management plan can then be implemented that allows enough grazing to maintain riparian vegetation health, but ensures that overgrazing and degradation do not occur. In cases of severe streambank

erosion, it may be necessary to bring in heavy equipment to restore the proper slope of the bank and then re-establish vegetation, like willows, that can hold soil during high water events.

Riparian areas are also susceptible to invasion by exotic weeds, especially the woody invasives, tamarisk and Russian-olive. In many parts of the state these non-native plants become so prevalent that they out-compete native vegetation and form monoculture stands. New research from Colorado State University shows that Russian-olive trees can even change the herbaceous plant community under their canopy due to their increased ability to fix nitrogen and shade the ground. However, successful tamarisk and Russian-olive control projects in the Republican and Arkansas River Basins demonstrate that these species can be fairly easily removed by mechanical, chemical and biological means when landowners work together to treat entire stretches of streams or rivers.

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**Streambank erosion caused by unmanaged livestock access to the stream.**



## Riparian Areas continued from page 6

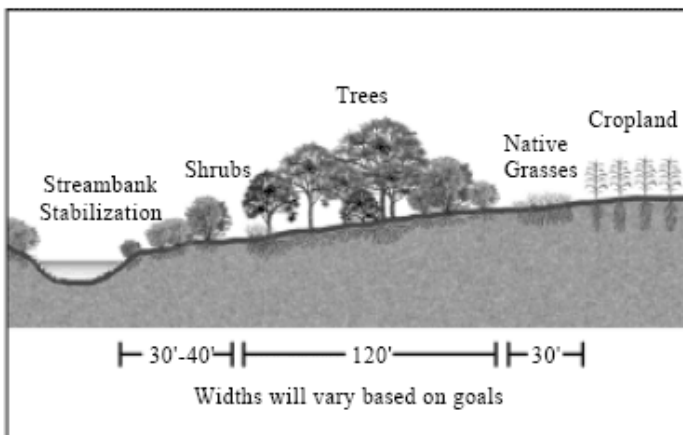
There are many resources available to landowners who are interested in improving riparian areas on their land. These resources can range from simple consultation on what practices can restore a stream, to cost-share for the implementation of those practices.

For more information, or to schedule a site visit with a conservation professional to evaluate your riparian habitats, contact your local Natural Resources Conservation Service Field Office (<http://offices.sc.egov.usda.gov/locator/app>) or one of the following private land biologist programs:

US Fish and Wildlife Service Partners for Fish and Wildlife Program: <http://www.fws.gov/mountain-prairie/pfw/colorado/co4.htm>

Rocky Mountain Bird Observatory Stewardship Division: <http://www.rmbo.org/v3/OurWork/Stewardship/StewardshipContacts.aspx>

Pheasants Forever Farm Bill Biologists: <http://www.coloradopf.com/biologists>



**We can protect stream water quality by maintaining a vegetative buffer of 50 feet to 250 feet from the water's edge. Within the riparian buffer, limit or discontinue grazing to maintain a healthy stand of vegetation.**

## How to Assess Hay for Quality

By Meg Sitarik, SAM volunteer

In today's uncertain economic state it is tempting to cut costs on the care and feeding of our animals. In the long run this is not a wise business decision. Feeding poor quality hay means you will have to compensate for the lack of nutrients in the poor hay by supplementing with additional feeds. This can be more expensive than paying the higher price for good hay.

The most accurate way to evaluate hay is by having samples analyzed. This process involves taking core samples of multiple bales and sending them to a lab for testing. For a variety of reasons most folks are not going to do this. Therefore we need to rely on our five senses (sight, taste, touch, smell and hearing) to assess the quality of the hay we purchase. These are the six characteristics to evaluate:

- **Color**
- **Maturity**
- **Presence of weeds or foreign material**
- **Moisture content**
- **Palatability**
- **Smell**

**Color** - Look for a natural green color that is associated with higher vitamins, minerals and proteins. More mature hay, and/or hay that has been rained on after cutting, will be a yellow to brown color indicating sun-bleaching and leaching of nutrients.

**Maturity** - Look at the number of leaves versus stems, there should be more leaves than stems. Leaves contain most of the protein and the highly digestible fiber that is easily converted to energy. The younger plants have a higher percentage of leaves to stem. Lignin, a component of plant fiber, is not digestible. As the plant matures the amount of lignin increases, which causes the digestibility of the plant to decrease. Another clue to hay maturity is the presence of long leaves and the presence of

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## Assessing Hay continued from page 7

seed heads. Seed heads indicate very mature hay with lower energy and protein values.

**Weeds and Foreign Material** - Expect to see a few weeds; however, an abundance of weeds is unacceptable. Weeds are low in nutritional value and some are toxic to animals.

Foreign material is a huge clue that the hay has not been managed well. The occasional twig or other natural item is fine, but baling twine, fast food wrappers, wire, nails etc. are major problems and that hay should not be purchased. Insects also affect the quality of hay. Blister beetles contain a toxin that is severely irritating to the gastrointestinal and urinary tracts of animals. For more information on blister beetles visit <http://www.ext.colostate.edu/pubs/insect/05524.html> or <http://insects.tamu.edu/fieldguide/bimg167.html>

**Moisture Content** - If the hay is baled while it is too wet, there is a risk of mold growing within the bale. Dark wet places are ripe for mold growth. Mold will lower the forage protein and energy values and may release toxins that can cause abortion, colic and other nasty problems. Moldy hay also generates heat and can become combustible. The only way to find out if a bale is moldy is to break it open since the mold may not be visible from the outside.

Another problem can be hay that has been dried too much. In this case the leaves will be so brittle that by the time you walk from the hay stack to the feed bunker most of the leaves will have crumbled. I once opened a bale of alfalfa and when I removed each flake it crumbled so badly that I was left standing in the hay room with an armful of stems.

**Palatability** – This is the animals desire to eat the hay. It is easy to assess, all you have to do is look to see if your animals are eating the hay. Younger plants are higher in protein and energy, and are much more palatable than older plants.

**Smell** -This is my favorite of the senses. Hay should smell clean and fresh, like a beautiful spring day. If it you smell mold, dust or a burnt smell, it is not good quality hay.

Finally, pay attention to what the vendor is saying. Are they happy to answer your questions? Or are they being vague and making excuses for the product? Someone who produces good quality hay is proud of the hay product and willingly answers your questions. Find a good reliable source of hay and treasure that resource. Establish a friendly working relationship. Repeat customers are an asset to the vendor. I have found that in times of shortages, repeat customers will usually be taken care of before a person who constantly shops around.

For more info:

<https://utextension.tennessee.edu/publications/documents/sp437-a.pdf> a user friendly worksheet called the Score Card for Visual Hay Quality Evaluation.

Laboratory Forage Analysis at CSU Soil, Water, Plant Testing Lab <http://www.soiltestinglab.colostate.edu/>

Washington State University Extension Agency, <http://smallfarms.wsu.edu/animals/buyinghay.html>

For more information on poisonous plants [http://southcampus.colostate.edu/poisonous\\_plants/index.cfm?countno=NO](http://southcampus.colostate.edu/poisonous_plants/index.cfm?countno=NO)





## High Nitrates in Drought Stressed Forage

By Sharon Bokan, Boulder County Small Acreage Coordinator

With the dry conditions this year, some forages will contain higher levels of nitrates. High nitrates in forage can cause animal poisoning and death, most commonly in ruminants including cattle, sheep, goats, alpacas, and llamas. Horses can also be affected, but much less frequently.

Under normal growth conditions, soil nitrates are taken up by plant roots and then converted and utilized in the plant as proteins. In drought conditions, when the plant is under stress, it is unable to convert the nitrates into proteins. Instead, the nitrates accumulate in the plant to potentially toxic levels. Certain plants are known to be nitrate accumulators such as corn, sorghum, sudangrass, and weeds (such as bindweed, kochia, and Russian thistle). Small grains such as wheat, oats, and annual ryegrass can also accumulate high levels of nitrates.

High nitrates in forage can cause ruminant animals to literally suffocate. In ruminants, nitrate from the forage converts to nitrite, which is then converted to ammonia and proteins. When nitrate levels in forage are high, the nitrate conversion to nitrite is quick, but ammonia conversion is slower. So the nitrites build up in the rumen and pass into the bloodstream. In the bloodstream, the nitrites react with blood hemoglobin and prevent oxygen from attaching to blood cells. This causes the animal to suffocate since the oxygen is not transferred throughout the body.

Symptoms of nitrate poisoning may not occur until 3-4 days after feeding a medium amount of nitrates. Look for respiratory distress, weakness, incoordination, and muscle

tremors. Call a veterinarian immediately to start treatment, as nitrate poisoning can be rapidly fatal.

The only way to know if your hay has high levels is to have a sample analyzed for nitrates. CSU Soil, Plant, Water Testing Lab has this service available for \$15 and the results take only a few days. Contact them at <http://www.soiltestinglab.colostate.edu/index.html>

If you do have hay with high levels of nitrates, you may still be able to feed the hay. Prior to using high nitrate hay, consider the following:

- Condition of your animals – you may not want to feed high nitrate forage to animals in poor health, or who are lactating.
- Keep hungry animals out of high nitrate forages – they will consume more if they are hungry.
- Dilute the high nitrate forage with low nitrate forage.
- Feed an energy supplement.

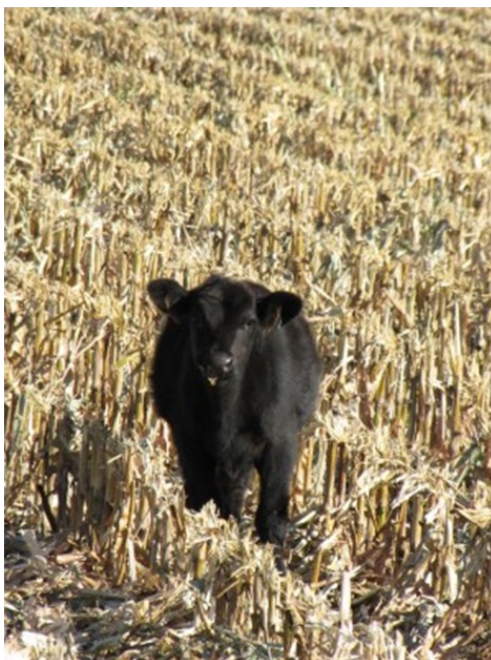
For more information:

Nitrate Poisoning, CSU Extension Fact Sheet  
<http://www.ext.colostate.edu/pubs/livestk/01610.html>

Beware of Nitrates  
<http://www.ext.colostate.edu/drought/bewareofnitrates.html>

Colorado Farms and Ranches Risk Nitrate Poisoning in Drought Stressed Forages  
[http://www.ext.colostate.edu/drought/tips\\_nitrate.html](http://www.ext.colostate.edu/drought/tips_nitrate.html)

Nitrates and Purchased Hay  
<http://www.ext.colostate.edu/drought/tips-nitrate-hay.html>





### Pasture Management on Small Acreages

November 29, 2012

Noon to 1:00 MT

Good grazing management ensures long-lasting healthy pastures. Jennifer Cook, CSU Extension/ NRCS Small Acreage Management Coordinator, will provide the tools and knowledge to be a better pasture manager. Learn the basics of how grass grows, how to avoid overgrazing and weeds, and how to set-up an appropriate grazing system for your property. To register go to <https://docs.google.com/spreadsheet/viewform?formkey=dEEExang3R3FPb1ZFYmtjR1hDSjJhU0E6MQ#gid=0>

learn about sources of fresh milk and cheese making supplies, watch Kate, from Briar Gate Farm, make the cheeses right in front of your eyes, and then sample several varieties of each of the cheeses you are learning about. You will leave the class with the confidence and know-how to make some delicious cheeses right in your own kitchen. Cheese samples and recipe booklets will be provided. Contact Anne Zander for more information and to register [azander@bouldercounty.org](mailto:azander@bouldercounty.org) or 303-678-6238.

For an updated list of events, visit CSU Extension Small Acreage Management website [www.ext.colostate.edu/sam/](http://www.ext.colostate.edu/sam/)

### Cheese Making Made Easy!

December 8, 2012 (10 am - noon)

Longmont, CO

If you love cheese and the idea of making it in your own kitchen, then this class is for you! In this beginner's introduction to cheese making. You'll learn the basics about farm-fresh vs. store-bought milks, and the differences between goat and cow's milk.

You will learn to make Chevre (soft goat cheese), Fromage Blanc (cream-cheese style soft cheese) and Homemade Ricotta using minimal equipment and easy-to-find ingredients. You will



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