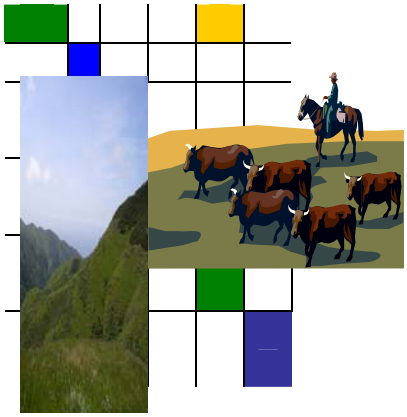
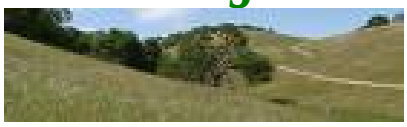


THE STOCK EXCHANGE

Rangeland Management Series 1



Fall 2009

Dear Livestock, Dairy Producers, Rangeland Owners, and Operators,

The information provided in the Stock Exchange's goal is to meet current demands of rangelands, its owners, operators, and the livestock producers that graze these lands. It will be critical for the livestock industry to integrate an approach that addresses ecological, economical, and sociological aspects of rangeland management to maintain rangeland owners, operators and livestock producers, I will continue to provide education and research in hopes of preserving the historical connection of people to local agriculture and natural resources.

The University of California Cooperative Extension (UCCE) is actively involved in maintaining a solid educational base for clientele, both old/new and it will be critical for all of us to work with and coordinate efforts with affiliated interests to improve and maintain the sustainability of our rangelands.

The Stock Exchange newsletter is one method to increase awareness of emerging issues, new opportunities and I encourage you to sign up for this newsletter to continue to receive this information. The **enclosed card** is your opportunity to sign up to receive this newsletter via email or USPS. Please return the mailing/email information card to me to insure you are kept up to date on the continuing Rangeland Management Series.

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RANGELAND MANAGEMENT

Improved stewardship of rangeland resources through educational and research efforts that promote a greater focus on management strategies is now a major focus of the Stock Exchange. This Stock Exchange will address the ecological aspects of rangeland management that deal with weed infestations. Weed infestations are an increasing problem in rangelands, as they decrease the quantity and quality of available forage. To help reduce these infestations, it is helpful to develop identification and management strategies. Every Stock Exchange will address two or three problem weeds in the County in hopes of helping land operators develop management strategies. The first weed to discuss will be the following on Tarweed.

Tarweed – Hemizonia Virgata

Yellow tarweed is a native plant that is well adapted to the hot dry summers. Tarweed's summer growth is sometimes tall and sticky. It is not palatable to livestock and coats the faces and legs of livestock with a tarry resin.

Tarweed is in the family Compositae, tribe Heliantheae, and subtribe Madinae. It was first described by Gray (1859), who classified it as *Hemizonia virgata*. Recent studies indicate that tarweed consists of many separate populations that do not reproduce when crossed because of chromosome pairing problems.

Phenology, Growth, & Reproduction

Field observations show that germination starts in the fall at the same time that the winter annuals are germinating and it continues into April (Perrior 1980). By the end of winter, the tarweed plant has developed about a dozen broad leaves in a rosette and deep taproot. Roots of tarweed go deeper than most of the winter annual grasses, reducing competition with them for soil nutrients and moisture. From late spring until early summer the shoots elongate and branch out with bract-like leaves on woody stems that stand 1 – 2 feet tall.

In August and September tarweed produces composite heads that have 3 – 5 ray flowers and 3 – 12 disk flowers.

Livestock use tarweed in winter and early spring while it is young and succulent. Use decreases rapidly as it increases in height and resin covering. It is hardly grazed at all at maturity when covered with resinous exudate. Summer annuals are often the only actively growing green plants, relatively high in protein, available in the summer on annual range. To discourage herbivory, summer annuals have apparently evolved mechanisms such as spines (*Hermizonia fitchii*), aromatic compounds in vinegar weed (*Trichostema lanceolatum*), and aromatic resins as in tarweed. Few animals are able to feed on these plants in summer.

Control

Tarweed competes with winter annuals by diminishing soil moisture in late spring. Because tarweed germinates in the fall and grows in close association with dense stands of winter annuals, there is probably also some competition for light and nutrients during the growing season. Major factors complicating our understanding of competition are the large diversity found in the species of plants grouped together as winter annuals, the great plasticity in growth and botanical composition of the annual grasslands due to soil and climatic variations, and the effects of grazing and human manipulations on these grasslands.

The occurrence of tarweed in the early successional stages of the annual grassland-type indicates that it is more

compatible with the less productive species commonly found in these stages, thus tarweed has been designated an "invader" species. The shallow-rooted, short statured, early maturing alien annual grasses use less light and water than the late successional perennial grasses or taller annual grasses. This results in a surplus of moisture that tarweed is able to utilize.

Because tarweed relies on stored soil moisture for summer growth, it is most competitive on deep fine textured soils, such as adobe clay. Tarweed is distributed widely over the range but is more common in swales, and tarweed often dominates the better forage-production sites

Annual variations in climate – mainly rainfall and temperature – result in large year-to-year differences in the composition of the California annual grasslands. Annual grasses are dominant in some years, and annual forbs or annual legumes in other years. The amount of competition between tarweed and these winter annuals is less in grass-dominant years and greater in forb-dominant years. The nitrogen-fixing ability of annual legumes tends to increase soil fertility, which increases forage production and water use and therefore reduces tarweed densities.

Management

Instead of being a highly competitive invader like some alien annual grasses, tarweed seems to have been able to invade the annual grassland by taking advantage of underused resources of moisture, nutrients, and light. Thus, its survival is due largely to niche separation from the winter annuals rather than aggressive competition.

There are two ways of managing annual-type grassland to limit tarweed production by increasing fertility and species composition and directly removing tarweed by mechanical or chemical means.

Fall fertilization of annual range with nitrogen has been shown to reduce tarweed density.

One of the major obstacles to mechanical or chemical removal of tarweed is the seed bank that exists on sites. To be successful, the use of these methods must be long-term to eliminate tarweed; otherwise the pasture will be re-infested once the eradication project ends. Thus, it is unlikely that these direct treatments can be economically justified on rangeland solely for the control of tarweed.

Mowing

Tarweed can be suppressed directly either by mowing, which can greatly reduce a population of tarweed leaving very few plants to flower and set seed. However, the timing of mowing is critical. Mowing any time prior to May gives minimal control, but mowing in July reduces tarweed around 90% and mowing in late August can eliminate all seed production.

Chemical Control

Perrier (1980), using 1.5 lb/acre of a low volatile ester of 2, 4-D, found that tarweed was affected much more by the herbicide treatment before rapid stem growth than after. Herbicide application in winter or early spring results in the greatest reduction apparently, but this needs further study as does the impact of leaving various amounts of plant residue. The use of herbicides must be approved through the Agricultural Commissioner's office in each County.

References: *Gregory K. Perrier, William A. Williams, & John W. Menke, Rangelands, Vol.4, No.4, August 1982, p.149-150*

The second weed discussed in this issue is Gorse. It is a prevalent weed along the Coast, reducing the value of rangeland.

GORSE
(Ulex europaeus L.)

Gorse is a dense, spiny, evergreen legume shrub, which resembles Scotch broom. It grows up to 10 feet tall with erect, angular stems. Spreading branches end in a sharp spine and have stiff spine like leaves, ½ to 2 inches long. The yellow flowers are shaped like those of peas, ½ to ¾ inch long. Flowers grow in clusters near the ends of branches. Gorse primarily flowers in the early spring, though plants may flower throughout the year depending on their location. The plants produce seed prolifically, and the bursting pods scatter seed for several feet. Animals, machinery, and water also carry the seed. Seeds have a hard coat and will remain viable in the soil for years. Individual plants grow outward, forming a central area of dry, dead vegetation. The oil in the plant, combined with the dead dry-matter, creates a serious fire hazard. Dormant seed resists destruction by fire and germinates more rapidly following a fire.

Introduced from Europe as an ornamental, gorse adapts to regions of mild winters and sandy or gravelly soils having abundant moisture. In the western United States, it appears from the Olympic Peninsula in Washington south through Sonoma County. Gorse propagates predominantly by seed and is slow in becoming established. Where gorse adapts it increases rapidly, crowds out other vegetation, and forms dense thickets that render land almost worthless. Few other plants will dominate an area so completely. Usually gorse becomes established on non-tillable land and in inaccessible places (fence rows, river banks, and rough sites) making control difficult. However, it has been increasingly invading local rangelands. Its persistence, constant fire hazard, and ability to encroach on agricultural and recreational lands make it a troublesome brush pest.

Control

You may be able to eradicate an infestation limited to a few plants or a small area. Once gorse becomes established with seed deposited in the soil, eradication is much more difficult. An effective control program requires integrating several methods. Degree of infestation, type of land infested, and use to be made of the land following control will influence selection of the best practices.

Biological control - A weevil, *Apion ulicis*, released on gorse in 1956, is widespread and has become abundant in most areas. Larvae feed in developing seeds. However, even the large population of weevils brought little or no reduction in gorse. Effects on the plant itself are minor although the insect destroys large numbers of seed. The seed supply in the soil seems far from exhausted. The gorse spider mite (*Tetranychus lintearius*) has been widely introduced but has been marginally effective because of predation by other arthropods. This spider mite was released in 1990 with limited success. Research is underway in Hawaii with other insects, including two moths (*Agonopterix ulicetella* and *Pempelia genistella*) and a thrips (*Sericothrips staphylinus*), as possible new control agents on gorse in the Pacific Northwest.

Burning

Burning old plants will destroy some existing gorse growth. If possible, start control of large patches with a field burn. Provide wide safety margins on the edges and have fire control authorities inspect the fields before igniting them. Windrow remaining plant materials and burn again. The most effective burns occur under conditions of low humidity. If conditions are unfavorable for a good burn, you can spray the area using a mixture of a desiccant and oil to dry the foliage. Always check local regulations before burning.

Cutting or burning the top growth usually does not kill gorse-plant crowns. Some growers prefer to burn gorse, then seed promptly to annual ryegrass. Grass slows gorse seedling invasion and provides fuel for re-burning a year later. The second burning destroys more of the remaining unburned brush.

Chemical Control

Please contact your local County Agricultural Commissioner's office to discuss chemical control. Either spray re-growth from crowns or remove them by means of heavy equipment. Spraying the re-growth after it is 12 – 18 inches tall gives best control of old crowns. Spraying smaller re-growth gives poorer control.

Management

Cultivation, where possible, is one of the best methods of controlling gorse. Cultivation that removes old gorse crowns and brings them to the surface is the most successful. Growing annual crops for 2 or 3 years before seeding to permanent pasture destroys many gorse seedlings.

In pastures, using a good fertilization program in conjunction with proper grazing management may be all that is needed to hold back gorse infestation. But, if gorse is already established, you may have to replant the area to obtain long-term benefits. If the gorse infestation is thick, remove it before starting any planting operations.

Plant the area to the desired species as soon as possible after controlling the gorse. Control gorse seedlings and re-growth from old gorse crowns in new plantings using a herbicide or another appropriate method. Mowing small gorse plants will keep them short enough to allow animals to feed on the new shoots. Unfortunately, rather than killing the plants, grazing encourages new plants to grow from the roots or crowns.

Pasture establishment

Seed the land to grass and clover immediately after preparation so the seeded vegetation will provide competition against new gorse seedlings. However, the presence of clover in a pasture will limit any herbicide option to control later emerging gorse. Maintain soil fertility, according to a soil test, by making annual applications of nitrogen and phosphorous fertilizers. As the new pasture becomes established, you can control gorse seedlings by heavy grazing or selective herbicides. An option is to delay seeding for a season following seedbed preparation to allow germination of gorse seed near the surface. In the second season, when you seed the pasture, keep soil disturbance to a minimum to avoid bringing more gorse seed to the surface.

Dry Land Pasture for Sheep & Cattle

The process for improving a dry land pasture should begin in late summer. Existing vegetation should be grazed to less than 1,000 lbs. per acre or clipped down to two inches before seeding. This allows for a good seedbed preparation, and allows the sun to reach the new seedlings upon germination.

When to Plant

Dry land pastures are seeded in the fall; prior to the occurrence of heave winter rains. Seeding early in the fall allows plants to grow while temperatures are relatively warm and also reduces erosion hazards from high intensity rains. Long-range weather records show that the most favorable period to seed is from October 1 to October 31.

How to Seed a Pasture

Mix the various seed before broadcasting. Small acreages, up to ten acres, can be seeded using a broadcast seeder operated by hand. This type of seeder will normally broadcast seed over a 15- to 20-foot wide swath. Each swath should overlap so that distribution is uniform. The broad casted seed should then be covered by a ¼ inch of soil. This may be accomplished by ring rolling, or by using a spike tooth harrow with the teeth sloped at a 45-degree angle. A less desirable method would involve dragging the field with a 2" x 12" board about ten feet long.

DO NOT DISK the field to cover seed, as this will place seed too deep to emerge. It is advisable to use the no-till method of seeding, as opposed to disking

and ripping the soil first. Disturbing the soil can bring up unwanted plant species. Dry land pastures are seeded in the fall; prior to the occurrence of heave winter rains. Seeding early in the fall allows plants to grow while temperatures are relatively warm and also reduces erosion hazards from high intensity rains. Long-range weather records show that the most favorable period to seed is from October 15 to October 31.

One seed mix could include the following mixture:

Seeding rates per acre:

10 lbs. Sub clover (inoculated)
Mixture of 2-3 types:
- ✯ Mt. Barker, Denmark, Woogenellup

8 –10 lbs. Tetraploid Ryegrass
2-5 lbs. Perennial Orchard Grass
Approximately 20-25 lbs. Total*****

***** Seeding rates will vary, depending on whether you are seeding a new pasture of improving an established pasture. Fewer pounds of seeds per acre are needed on an established pasture. Inoculation of sub clovers is crucial in establishing a good stand of clover. Only accept clovers that have been inoculated within the last two months. Inoculating the clovers yourself, assures higher counts of effective rhizobium, which means greater success.

Type of Fertilizer to Use

Nearly all of our range and pasture-lands are deficient in nitrogen and phosphorous, and some acres are also deficient in sulfur. Properly inoculated sub clover should fix 40 to 50 lbs. of nitrogen per acre on a yearly basis, which can be used by the grasses. The use of 200 lbs. per acre of 0-45-0-2 (treble super phosphate) or 150-200 lbs per acre of 11-52-0-2 (mono-ammonium phosphate) at the time of planting will supply adequate phosphorous and sulfur needed for the clovers. If only grasses are planted and/or nitrogen is needed quickly, the use of 250-350 lbs. per acre of 16-20-0-10 will supply adequate nitrogen and phosphorus. How often fertilization is repeated, depends upon the initial amount used at planting.

Grazing Management

Carefully control grazing the first year of pasture establishment, especially when soil is wet. Light grazing is recommended three to four months after seeding whenever the soil is firm. It is important to remove the grasses during the winter, thus allowing the sun to penetrate to the clovers. If subterranean clovers are shaded by the grasses early in growth, they will not grow properly and could be lost. Yields from a newly seeded pasture will be approximately 60 percent of future yield.

An important part of grazing management is implementing a controlled rotation grazing system that allows plants to rest and re- grow. Pastures should be managed to maintain animal health requirements while maintaining the needs of a new pasture.

Use of Supplemental Feed on Pasture

Supplemental feeding during certain periods will increase the utilization of the forage produced. Alfalfa hay, oat hay, or other appropriate food sources fed during the winter and summer months, may be necessary to need the nutritional requirements of livestock.

When pastures are short due to drought or implemented management strategies, i.e.; resting newly planted pastures, supplemented forages may need to be purchased. To better understand the forage purchased, read the following article *Understanding Your Forage Test Results*.

Understanding Your Forage Test Results

Balanced nutrition is important for efficient livestock production. Daily nutrient requirements vary depending on the phase of production. Knowing the nutrient composition of feeds and matching feeds to animal requirements at a given stage of production will ensure that nutritional needs are met. Forage analysis is a management tool that provides information needed for proper livestock nutrition.

Using the Results

Once you have your forage test results, carefully go through each item and

consider how the results will influence the way you use the feed in your livestock nutrition program. You can use the information to formulate a balanced ration for your livestock or for general feeding decisions.

You need to understand the nutrient requirements for different livestock in order to match forage resources with animal needs. These requirements can be found in publications such as Nutrient Requirements of Domestic Animals and the Cow-Calf Management Guide and Cattle Producer's Library (see "References," page 3).

This publication describes common terms found in laboratory forage analyses. The following information pertains to ruminants, including beef and dairy cattle and sheep.

Moisture is the percent water in a sample. **As-fed** is the actual feed, including moisture content, as it is offered to the animal but also referred to as-sampled or as-received, if not altered between sampling, testing, and feeding time. **Dry matter** (DM) is the feed without the moisture (DM = 100% - Moisture). It represents everything in the sample other than water, including protein, fiber, fat, minerals, etc.

On an as-fed basis, animals must consume more of a wet feed to receive the same amount of dry matter as they would from a drier feed. For example, if an animal consumes 25 lb of 90 percent DM hay, it consumes about 23 lb of dry matter (25 x 0.9). If haylage at 40 percent dry matter is substituted for the above hay, the animal must consume about 58 lb of haylage as-fed (23 ÷ 0.4) to receive the same amount of dry matter. Thus, it is very important to know the dry matter content of a feed to establish feeding rates and to ensure that livestock receive the proper amount of feed to meet their daily needs.

Dry matter basis means nutrient results for the sample with the water removed. Feeds vary in their moisture content, as discussed above. Nutrient content of feeds can be compared directly by removing the water (DM basis). For example, suppose you want to compare the protein content of hay (90% DM) and haylage (40 percent DM). On an as-sampled basis, the hay tested 10 percent protein and the haylage 7 percent protein. The hay seems to have a higher protein level. However, on a DM basis (without the water), the hay is 11 percent protein (10 ÷ 0.9), and the haylage is about 18 percent protein (7 ÷ 0.4). Thus, the haylage is higher in protein per pound of dry matter from the haylage than they will from the hay. Make sure the animal nutrient requirements and lab results are expressed on the same basis, either DM or as-fed. Always use the DM matter basis when comparing feeds.

Protein

Proteins are made up of amino acids, known as the building blocks of the body. Protein is essential for tissue growth and repair, maintenance, lactation, growth, and reproduction.

Crude protein (CP) is an estimate of the protein content of the feed. The normal range is 6 to 20 percent on a DM basis. Laboratories measure the nitrogen (N) content of the forage and then calculate crude protein using the formula CP = & N x 6.25. The factor of 6.25 is used because protein is approximately 16 percent nitrogen (100 ÷ 16 = 6.25). Crude protein includes both true protein and non-protein nitrogen. True proteins are organic compounds made up of amino acids. They are a major component of vital organs, tissue, muscle, hair, skin, milk, and enzymes. Non-protein nitrogen is urea and ammonia, which can be used by rumen microbes to make protein for the animal. Non-protein nitrogen is not used as efficiently as true protein when animals consume low-quality forages.

Adjusted crude protein is the crude protein with adjustments for availability to the animal. Some protein might be tied up with the fiber and unavailable to the animal.

Carbohydrates

Carbohydrates make up the structure of plants (stems, cell walls) and the cell contents that provide energy. **Neutral detergent fiber (NDF)** is a measure of hemicellulose, cellulose, and lignin, which represent the fibrous bulk of forage. These components are called cell wall or structural carbohydrates. They give

the plant rigidity, enabling it to support itself as it grows. Cellulose and hemicellulose can be partially broken down by microbes in the rumen to provide energy to the animal. NDF is negatively correlated with intake; a high percent NDF reduces forage intake. A normal range is 30 to 60 percent on a DM basis.

Acid detergent fiber (ADF) is a measure of cellulose and lignin. ADF is negatively correlated with overall digestibility; high ADF is less digestible. A normal range is 25 to 45 percent on a DM basis.

Relative Feed Value (RFV) ranks feed based on digestibility (ADF) and intake (NDF) potential. An RFV of 100 is considered the average score and represents alfalfa hay containing 41 percent ADF and 53 percent NDF on a dry matter basis. The higher the RFV, the better the forage quality. Use a range of RFV values when classifying forage. A good guideline is to accept anything within at least +/-5 points of the target value. For example, if an RFV of 150 is the target, any forage testing 145 to 155 should be considered to have an equivalent value. RFV is used in feed marketing and comparisons, not in balancing a ration for animals.

Nonstructural carbohydrates (NSC) are starches and sugars inside the cell that serve as energy sources for the animal. NSC is calculated as follows: 100% - (CP% + NDF% + Fat% + Ash%).

Fat

Crude fat contains fat and other compounds soluble in ether. Fat contains 2.25 times the energy found in carbohydrates and proteins. It is added to rations to boost energy concentration when intake may be limiting.

Energy

Energy is used in all biological processes and is essential for life. For livestock, energy requirements are determined for maintenance, growth or gain, lactation, reproduction, and activity level. Failure to supply adequate energy results in poor performance. Energy values usually are not measured directly from feed but are predicted using equations and relationships with various nutrients.

Total digestible nutrients (TDN) are the sum of the digestible protein, digestible NSC, digestible NDF, and 2.25 times the digestible fat.

Net energy for maintenance (NE_m) is an estimate of the energy value of a feed to maintain animal tissue without gain or loss of weight. NE_m is used in formulating beef and sheep rations for maintenance plus energy for pregnancy and lactation.

Net energy for lactation (NE_l) is used in formulating rations for dairy cattle. It estimates the energy available from the feed to support an animal's requirements for maintenance plus the final 2 months of gestation for dry, pregnant cows.

Net energy for gain (NE_g) is an estimate of the energy value of a feed used for body weight gain above that required for maintenance. It is used in ration balancing for beef and sheep when gain is desired.

Minerals

Minerals make up 3 to 5 percent of an animal's body dry weight. They have multiple functions within the animal. They are classified into two groups: macro minerals (major minerals), which normally are present at greater levels in the animal body or needed in relatively larger amounts in the diet, and micro minerals (trace minerals), which are present at lower levels or needed in very small amounts. Minerals cannot be synthesized; they must come from the diet (feed plus mineral supplement)

Macrominerals and their functions:

Calcium (Ca) – bone and teeth formation, blood clotting, muscle contractions, milk component, transmission of nerve impulses, cardiac regulation, and enzyme function.

Phosphorus (P) – bone and teeth formation, key component of energy metabolism, milk component, body fluid buffer system.

Sodium (Na) – acid-base balance, muscle contraction, nerve transmission, osmotic pressure regulation and water balance, glucose uptake, and amino acid transport.

Chloride (CI) – acid-base balance, osmotic pressure regulation and

water balance, component of gastric secretions.

Magnesium (Mg) – enzyme activator, found in skeletal tissue and bone, neuromuscular transmission.

Potassium (K) – osmotic pressure regulation and water balance, electrolyte balance, acid-balance, enzyme activator, muscle contraction, nerve impulse conductor.

Sulfur (S) – used for microbial protein synthesis, especially when non-protein nitrogen is fed.

Microminerals and their functions:

Cobalt (Co) – required for vitamin B_{12} synthesis.

Copper (Cu) – required for hemoglobin synthesis, coenzyme functions.

Fluoride (F) – prevents tooth decay.

Iodine (I) – required for proper thyroid function and to guard against goiter, still births, and wool-less lambs.

Iron (Fe) – hemoglobin and oxygen transport, enzyme systems.

Manganese (Mn) – growth, bone formation, enzyme activation, fertility.

Molybdenum (Mo) – component of enzymes, may enhance rumen microbial activity.

Selenium (Se) – antioxidant properties, prevention of white muscle disease and retained placenta.

Zinc (Zn) – enzyme activation, wound healing, skin health, some impact on udder health (reduced somatic cell counts).

Other Items

pH measures the degree of acidity. Good corn silage typically has a hP of 3.5 to 4.5 and haycrop silages 3.8 to 5.3. Nitrates can be accumulated by forage plants under stressed conditions such as drought, freezing, or heavy fertilization. Corn, sorghum, sudan-grass, and oat hay are nitrogen accumulators even without added stress to the plants.

Forage with nitrate nitrogen levels of less than 1,000 ppm are safe to feed. Those with nitrate nitrogen levels of greater than 4,000 ppm may be toxic; do not feed. Use forages with levels between 1,000 and 4,000 ppm with extreme caution, and restrict which animals receive them. Immature ruminants are more susceptible than more mature animals. However, pregnant ruminants may not be as tolerant of higher levels as non-pregnant animals. This could be because signs of sub-acute nitrate toxicity are abortion and other reproductive problems. Acid detergent insoluble nitrogen (ADIN OR ADF-N) is a measure of the protein bound to fiber due to overheating of stored forage. This protein, which is indigestible, is called "heat damaged."

References:

Amy Ruddell, Extension Agent, Oregon
Shelby Filley, Extension Agent, Oregon
Marni Porath, Extension Agent, OSU

Nutrient Requirements of Domestic Animals (National Research Council, National Academy Press, Washington, DC). http://www.nap.edu

Cow-Calif Management Guide and Cattle Producer's Library (University of Idaho Cooperative Extension System, Moscow, ID).