WASHINGTON STATE UNIVERSITY EXTENSION

Winter 2009

Washington Animal Agriculture Team Livestock Round-Up

In this issue:

WSU Livestock Listserv

WSU Extension and the WSU Department of Animal Sciences have established a listserv for those interested in information about livestock production. To subscribe, send an email with no message to: SUBSCRIBE-WSULIVESTOCK@lyris.cahnrs.wsu.edu. If you have problems subscribing, contact Tip Hudson at hudsont@wsu.edu.

Livestock Management and Health

Large Animal Composting

DISPOSAL OPTIONS

Many parts of Washington no longer have livestock rendering services available, so livestock owners with dead animals have to consider other options. These options are given in the WA Administrative Code at 16-25-025, which interprets the law, the Revised Code of Washington. Legal options include landfilling, burial, incineration, composting, rendering, or another method approved by the local health officer, such as aboveground natural decomposition.

Natural decomposition is legal on private or state rangeland if the animal died from causes other than a significant infectious or contagious disease agent; as long as the carcass is at least 1/4 mile from any well, spring, sinkhole, or body of surface water such as a river, stream, lake, pond, or intermittent stream; 1/4 mile from any public road; and is out of public view. Few places meet these criteria. Also, areas with high water tables are not suitable as livestock burial sites. Burial is also not an option when ground is frozen. This leaves landfilling and composting as realistic options.

There are a number of good reasons to consider composting mortalities. Composting can prevent flies, scavengers, rodents, and odors associated with burial or the “drag-and-drop” method. There is reduced risk to ground and surface water quality as well as increased on-farm biosecurity. It is advantageous to recycle the nutrients from mortalities; composting can lower operational costs by decreasing fertilizer costs and eliminating landfilling costs. Composting is a more manageable approach to process large volumes of mortality material, such as in the event of a winter storm/ice event or toxicity problem during which multiple animals die. Composting is essentially accelerated natural decomposition. Built properly, a composted cow will break down completely in three to six months.

"Composting is a biological process: aerobic microorganisms (bacteria and fungi) convert raw organic waste into stable, nutrient-rich organic matter. In large numbers, these microorganisms produce enough metabolic heat to increase temperatures inside the compost pile and kill pathogenic bacteria and

viruses. The basic requirements are organic raw materials (manure, straw, sawdust, etc.), a dedicated area, and careful management" (*from WSU publication EB 2031, On-farm Composting of Large Animal Mortalities, available free at http://cru.cahe.wsu.edu/CEPublications/eb2031e/eb2031e.pdf).*

Figure 1. Building a Compost Pile for Large Animal Mortalities

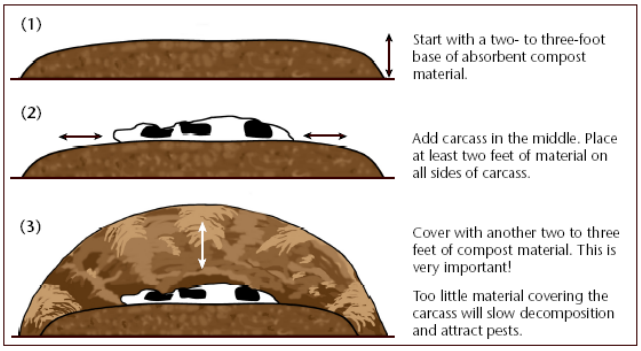


Figure from "On-farm Composting of Large Animal Mortalities," p. 6.

HOW-TO

Composting occurs most rapidly and effectively at a moisture level of 50-60%. This is moist, but not so wet that water is easily squeezed from a handful of material. The carbon to nitrogen (C:N) ratio should be 25:1 to 40:1. Too much nitrogen will result in release of ammonia or water-soluble nitrates that smell and can leach to groundwater or run off with precipitation into surface water. Too much carbon results in inadequate microbial growth and slow composting.

The carbon-to-nitrogen ratio is determined by the bulking material. Common farm wastes such as straw, old hay, sawdust, wood chips, and manure are high in carbon. Because the ideal particle size is .25-1 inch, a mixture of these materials works well. Wood chips, for example, work well as a base since they will absorb a lot of moisture and have a high carbon ratio. See the publication referenced above for additional details.

A livestock compost pile will typically be about six feet tall with a base of 1.5 to 2 times its height. As shown in Fig. 1, begin with two to three feet of bulking material. Place carcasses so all parts are at least 24 inches from any edge. Lance the rumen of ruminants to hasten decomposition. Bury carcasses completely with bulking material so all parts are at least 24 inches from any edge.

To kill bacteria and other pathogens, the internal temperature of the pile must reach 131°F for three consecutive days. Measure and record temperatures frequently using a long-stemmed thermometer (see Photo 1). After several months, turn and mix the pile – only large bones and some hair should be identifiable by now. After turning, the internal temperature should rise again to at least 131°F for three days. Finished compost should not smell or have any visible trace of animal tissues (see Photo 2). Large bones will be brittle; put them in the next pile.

KEY POINTS TO REMEMBER

1. The compost pile must be at least 300 feet from a well or surface water body, including irrigation ditches.

2. The carcass must be surrounded by at least two feet of bulking material on every side. This may take 5-10 cubic yards of material.

3. Euthanized animals must be buried or composted soon after death. There is lethal risk to scavengers (including eagles) that consume tissues from animals euthanized with intravenous chemicals, particularly old horses. A properly-built compost pile will neither smell nor attract animals, but be aware of this risk to scavengers.

--Tip Hudson
WSU-Kittitas County Extension

Photo 1. Monitoring temperature of livestock mortality compost pile. Image from "On-farm Composting of Large Animal Mortalities," p. 8.

Photo 2. Finished livestock mortality compost. Image from "On-farm Composting of Large Animal Mortalities," p. 9.

Small Scale Pork Production: Things You Should Know Before Getting Started

Raising pigs in the "non-traditional" pork state of Washington provides both opportunities and challenges. Pork has become a popular meat in the U.S. and across the globe, resulting in pork being the number one consumed meat in the world. In addition, 4-H and FFA youth project numbers for swine are typically higher than other livestock projects in most of the counties and at fairs in the Pacific Northwest (PNW).

High feed costs, limited commercial markets, and few packing plants in the area have proved challenging to profitable swine production in the PNW. However, swine are an efficient animal that can be raised under many different types of production systems to match the various resources and markets individuals have access to. The additional challenges many new swine producers face are that swine are susceptible to many diseases and parasites and require close attention during breeding and farrowing to ensure production efficiency.

Despite these challenges, swine production offers many opportunities for agricultural success. Pound for pound, swine surpass all other farm animals in converting grain into high-quality animal protein. Swine are also very prolific, commonly farrowing two litters per year with six to twelve or more piglets per litter. In addition, swine have a 70% dressing percentage (percent of carcass weight to live weight), which is high. Swine provide family farms, niche marketers, and small acreage farms the opportunity to grow high quality protein on-farm for their own home consumption or the expanding local, natural and organic markets. Another very positive aspect of swine production is national industry groups and stakeholders develop, organize, and disseminate information and educational opportunities to producers across the U.S., regardless of operation size, production system, and market type. Rather than trying to create an article that tries to describe the many considerations one needs to consider when starting a small-scale swine operation, the remainder of this article will identify resources for producers to use to successfully start their small-scale swine operation.

RESOURCES FOR NEW PORK PRODUCERS

• **National Pork Board:** The National Pork Board (NPB) was created by an Act of Congress that established the Pork Checkoff. The Pork Promotion, Research and Consumer Information Act of 1985 is called "The Pork Act." The Pork Act outlines how Checkoff funds must be used. The NPB collects Checkoff funds on all U.S.-produced market hogs, feeder pigs, breeding stock, imported hogs and pork products. Pork producers and importers pay 0.40 of one percent of the market value of each animal, which is 40 cents per $100 in value. This generates about $50 million per year. Through committees and a national business meeting, pork producers direct and audit how those funds are used. About 20% is returned to state pork associations for their Checkoff-funded work and oversight by individual state producer leadership.

The National Pork Board is responsible for communicating with pork producers and the public. Communication tools include a quarterly magazine, a radio service with farm broadcasters, newsletters and Internet sites to keep people who pay the Checkoff informed about the programs their investments support. The National Pork Board's website is www.pork.org. On the link "For Producers," individuals can find numerous resources on swine production, health, marketing, and much more.

• **Pork Information Gateway (PIG):** PIG is a FREE on-line resource for the U.S. Pork Industry and is available on the internet at http://wsu.porkgateway.org. PIG is the result of a partnership of the U.S. Pork Center of Excellence, the National Pork Board, and over 20 land grant universities, including Washington State University Extension. This valuable resource is free to anyone interested in the pork industry and has information available to producers of all sizes, including youth producers. People can access the site and register for a free account. Free registration allows visitors to search PIG for information about any topic they may need.

The PIG Library provides individuals with electronic fact sheets, references, and a place for subscribers to ask questions of swine extension specialists from around the U.S. "PIG Events" highlights educational opportunities for subscribers and "PIG Opportunities" informs those interested in becoming involved in the Pork Industry about educational and career opportunities.

- **Profitable Pork: Alternative Strategies for Hog Producers:** This is a Sustainable Agriculture Research and Education (SARE) publication that showcases examples of alternative ways to raise pork profitably. In designing hog systems that work on their farms, producers have been able to save on fixed costs, achieve greater flexibility, identify unique marketing channels and enjoy a better quality of life. The 16-page bulletin features profiles about successful hog producers as well as the latest research on everything from greater profits to better-tasting pork raised in alternative hog systems. View the publication at www.sare.org/publications/hogs.htm.
- **WSU Small Farms Team:** Small-scale ranching and animal husbandry face a wide range of challenges in Washington State. The Small Farms Team assists livestock producers with profitability, sustainable practices, marketing, and other challenges. In recent years we have seen the development of mobile processing units, adjustment of state poultry regulations, and the rise of consumer interest in sustainably-produced meats. Information at http://smallfarms.wsu.edu/animals.php provides producers with information ranging from production to marketing.
- **WSU Extension Animal Agriculture Team**: This team of educators provides research-based information to livestock producers and natural resource managers to improve their economic status and quality of life while they create a quality product in a sustainable manner. Swine production fact sheets are available at the team's web site: http://wsu.animalag.wsu.edu.

--Sarah M. Smith
WSU Extension—Grant/Adams Area

Swine are suited to a variety of production systems.

What Are Your Plans for 2009? Strategic Risk Management Planning

With the new year here and it being winter, it is appropriate to discuss strategic planning. This is a good time to look back on what you have done as a livestock owner, including what went right and what went wrong, and then plan accordingly for next year. This article won't focus on pounds of calf weaned per cow, lambing percentages, or utilization of pastures. Instead, it will encourage you to take some time and think about how you manage risk. There are some very good resources available to help livestock owners navigate through the risk management process. One of those resources is named "Risk Navigator, Strategic Risk Management Planning (SRMP)."

Decisions about markets, production, or finances can affect your bottom line. Do you have a plan to manage these risks? The RightRisk™ Education Team developed a ten-step risk management program to help you navigate a risk plan. The ten steps fall in three categories: strategic, tactical, and operational. This process is cyclical to remind us that risk management requires constant evaluation and adaptation. You could call this a "holistic" approach to risk management planning.

STEPS IN SRMP STRATEGIC PHASE

The first step involves determining your financial health. This would be where you metaphorically "read your vital signs" to see if you are in the state of health to proceed with your plans. Your financial health tells you the liquidity and solvency of your business, your repayment capacity, profitability, and financial efficiency of your business. This is done with a balance sheet, cash flow statement, income statement, and statement of owner equity. It is important to know how you arrived where you are today before proceeding on the journey.

The second step is determining your risk preferences or tolerance -– how much risk you are willing to take to achieve an investment goal. The Risk Navigator process is a tool to use to asses your risk tolerance. If you are afraid of or highly dislike taking risks, you are "risk averse." You prefer investments with lower payoffs due to less risk. You are "risk-neutral" if you care more about the expected

payoff and not the risk you take to achieve your investment goal. If you actively engage in risky investments, you are "risk-seeking."

Step three is establishing risk goals. As Lewis Carroll said, "If you don't know where you are going, any road will get you there." But will it be the right road? The SRMP process will aid in setting goals. Goals will give you direction and allow you to evaluate how far you have come. This process will entail writing a mission statement, tactical objectives, and an operation plan.

Figure 2 from RightRisk™ Education Team. Used with permission.

STEPS IN SRMP TACTICAL PHASE

The second phase is tactical and contains the next four steps. Step four is determining risk sources and will enable you to identify, quantify, organize and prioritize risks, which allows you to assess what risks threaten your operation. Most agricultural risks fall in one of five categories: production (pests, weather, or events making yield unpredictable), marketing (changes in prices of outputs and inputs), financial (agricultural business management and securing operating capital), institutional (governmental or other regulations), and human resources (labor issues).

The fifth step in the SRMP process is identifying management alternatives. There are four ways to manage risk: avoid risk (rent/lease equipment instead of owning), transfer it to someone else (futures and options), assume the risk (retain ownership), or reduce the risk (diversify your enterprise). Your best decisions will be made if you take the time to complete the first four steps.

After you identify your management alternatives, you will want to know the probability of outcomes that result in making management decisions. The sixth step will help you estimate likelihoods. Risk Navigator can calculate the probability of each possible outcome for every management action under consideration by using your historical data to produce graphical representations of likelihoods for outcomes.

Once you know your likelihoods, rank your management alternatives in step seven. Your choice here will depend on the work you did in the first six steps. SRMP provides tools to help you adjust for uncertainty and develop a farm management for your level of risk preference.

STEPS IN SRMP OPERATIONAL PHASE

We now enter the operational phase that includes the last three steps of SRMP. Step eight is implementing your plans. This is about getting your plan off paper and on the ground running. Implementing your plans is about managing resources. You acquire your resources (forages, buildings, feed, etc.) and figure how you will acquire them (cash, credit), then manage the flow of resources similar to a cash flow statement. Resources need to be at a manageable level when needed during the production year to maximize output and profit.

Steps nine and ten of the SRMP process guide you through monitoring and adjusting your plans. You'll learn what worked, what did not, and then you'll go to the tenth step and re-plan to bring you back to the beginning of the planning process of step 1.

This cyclical model and all of its steps can be studied in more detail at http://www.rightrisk.org. Under "Products," select "Risk Navigator SRM." Along with the planning model, you will find many online tools that will help you accomplish each step.

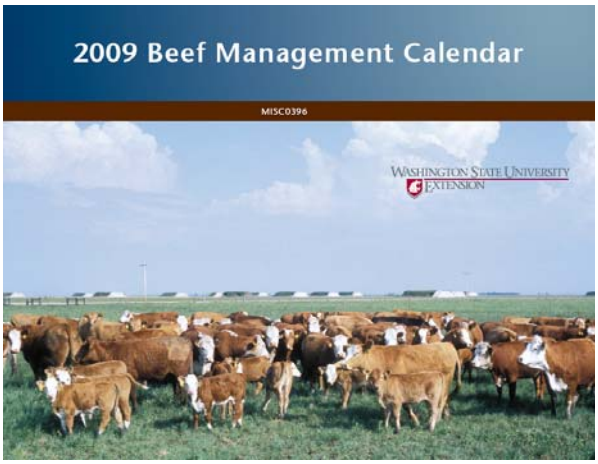
We are at a new year. It's time to stop and clear your desk, make some coffee and check out this website and make some plans. Let's not jump into the new year without a clear direction of where you want to go and a well managed plan of what you will do and how it will be implemented. Put it down on paper. Our memories are limited. Include others in the planning process. What are your plans for 2009?

--Norman Suverly
WSU Okanogan County Extension

2009 Beef Management Calendar

Just in time for the New Year and your winter planning, a 2009 Beef Management Calendar (MISC0396) is available to assist you in formulating a management plan for your beef operation. You can use the calendar to schedule various management practices and farm-related activities. It provides timely month-to-month management recommendations for both spring and fall calving herds in the areas of nutrition, animal health, reproduction, marketing, pasture and range management, and business or farm management. It can also be used as a record-keeping tool for calving and breeding records that can ultimately be used for birth verification for mandatory country-of-origin-labeling (mCOOL) requirements and age-verification programs. The calendar also features a section that explains age- and source-verification programs and mCOOL. A bound printed version with color cover can be ordered for $5 at http://pubs.wsu.edu and a free version is available for downloading from http://cru.cahe.wsu.edu/CEPublications/MISC0396/misc0396.pdf.

--Norman Suverly
WSU Okanogan County Extension



Final mCOOL Rule

Interested in reading the final mandatory country-of-origin labeling rule covering muscle cuts and ground beef, lamb, chicken, goat, pork and other food products? Everything you ever wanted to know about mCOOL is at www.ams.usda.gov/COOL.

New Concepts in Small Ruminant Parasite Control

Long-time sheep and goat producers can readily list all the standard parasite control measures they have been taught over the years:

- Deworm when fecal examinations are positive
- Deworm all animals at the same time
- Place animals in clean pastures post-worming
- Deworm regularly
- Rotate dewormers

Unfortunately, these practices and other factors have contributed to the development of parasite resistance to dewormers. In some southern states, producers have no effective dewormers and cannot raise sheep and goats without extreme losses to parasites; the common name for a major intestinal parasite—"the bankrupt worm"—has become all too true for them.

SMALL RUMINANT PUBLIC ENEMY #1

Haemonchus contortus ("the barber pole worm") is responsible for most losses from small ruminant nematode (roundworm) parasitism. Other common sheep and goat nematodes are *Ostertagia, Trichostrongylus, Cooperia, Nematodirus* and many more. Figure 3 depicts the life cycle of *H. contortus*. Note eggs are shed in fecal pellets and several larval molts are required before the parasite reaches the infective L-3 stage. Photo 3 illustrates L-3 larvae suspended in dew on a blade of grass, awaiting ingestion by a host.

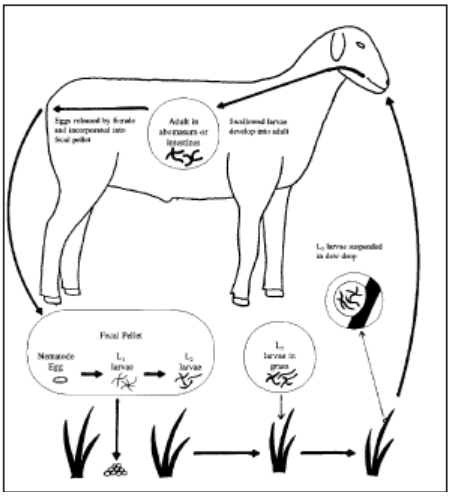


Figure 3. *Haemonchus contortus* life cycle. From "A *Haemonchus contortus* Management Plan for Sheep and Goats in Texas" by Rick Machen, Frank Craddock, Tom Craig, and Tom Fuchs, Texas Agricultural Extension Service publication L-5095.

Photo 3. *Haemonchus contortus* infective larvae suspended in dewdrop.

The Southern Consortium for Small Ruminant Parasite Control (SCSRPC) is devoted to addressing the problem of parasite resistance to dewormers. Their research with copper particles and certain tannin-containing plants show promise as potential non-chemical parasite control measures. Nevertheless, producers still rely heavily on anthelmintics (dewormers; see Table 1 for dewormer classes). Dr. Des Hennessy of Australia coined the term "Smart Drenching" to describe selective treatment of certain animals and the SCSRPC advocates this approach.

The goal of Smart Drenching is to maintain animal health and production while decreasing the rate of development of parasite resistance to anthelmintics. Smart Drenching encourages producers to used dewormers selectively, judiciously and effectively.

Table 1. Anthelmintic (Dewormer) Classes for Nematodes (Roundworms)

Class	Examples
Benzimidazoles	fenbendazole, oxibendazole, albendazole, mebendazole
Avermectin / Milbemycins	ivermectin, eprinomectin, doramectin, moxidectin, etc.
Imidazothiazoles / Tetrahydropyrimidines	levamisole, pyrantel, morantel, etc.

THE SMART DRENCHING SYSTEM

1. Identify which wormers are effective on your farm. This is done by pre- and post-treatment fecal egg counts (see third reference below) or submitting fecal samples to the University of Georgia College of Veterinary Medicine's parasitology laboratory for "DrenchRite" diagnosis of resistance. Resistance is less than 95% reduction in fecal egg counts post-treatment.

2. Weigh each animal to be treated and administer the correct amount of dewormer to each animal. Administer the entire dose over the animal's tongue to the back of its throat. Consult your veterinarian when treating goats because extra-label dosages are usually recommended.

3. Hold animals to be wormed off feed for 12-24 hours before treating with benzimidazoles, ivermectin, doramectrin or moxidectin. This slows the digestive processes, allowing the dewormer to remain in the animal's body longer for increased effectiveness. DO NOT hold pregnant ewes or does off feed in late gestation. Benzimidazole effectiveness will be enhanced if animals are re-dosed in 12 hours.

5. ONLY DEWORM ANIMALS THAT NEED TREATMENT. Use the FAMACHA© system (described below) to assess animals with clinical anemia due to *Haemonchus contortus.* For other parasites, base treatment on body condition, age (parasitism is a large concern in younger animals), fecal egg count, performance/production, pregnancy/lactation status (dams are under higher stress and have reduced immunity), signs of illness and short-term weight gain.

The benefits of Smart Drenching are three-fold: fewer animals are dewormed, so costs are reduced; there is less pressure on parasites to develop resistance; and more parasites in the "refugia" remain susceptible to dewormers. The refugia are the portion of the parasite population not subjected to dewormers and therefore not under pressure to develop resistance; it includes parasites in untreated animals as well as eggs and larvae on pasture. According to Dr. Kaplan, the refugia provide a pool of sensitive genes that dilutes resistant genes selected for by deworming.

Signs of Parasitism

Animals affected by internal parasites can display any or all of these signs:

- Pot belly
- Rough coat
- Poor body condition
- Diarrhea
- Bottle jaw
- Weakness
- Lack of stamina
- Poor production or performance
- Pale mucous membranes
- Death

THE FAMACHA© SYSTEM

The FAMACHA© System originated in South Africa. It is a method of identifying individual sheep and goats that are heavily parasitized, based on physical evidence of anemia caused

by *Haemonchus contortus*. A colored chart (see Figure 4) is placed next to an animal's conjunctiva (pinkish tissue inside the lower eyelid) to assess each animal's level of anemia. A scale of one to five is used; a score of one is the reddest and most healthy and a score of five is palest and most anemic. Animals with scores of four and five should be treated or culled; those with scores of one or two do not need treatment; various factors will help a producer decide whether or not to treat those with a score of three.

This system helps producers identify the problem animals in their herds: 20 to 30% of animals harbor 70 to 80% of the herd's worms and are responsible for the majority of environmental contamination with worm eggs. The FAMACHA© system helps identify heavily parasitized individuals so producers can make appropriate management decisions (treat or cull).

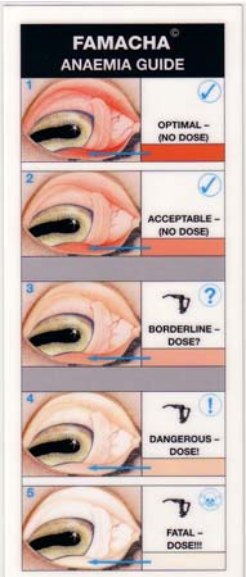


Figure 4. FAMACHA© chart. FAMACHA© is subject to copyright rules and no part may be altered or copied in any way without the written permission of the copyright holders, the Livestock Health and Production Group of the South African Veterinary Association. Colors shown in this reproduction of the FAMACHA© card are not accurate to the original and should not be deemed as an accurate representation of an actual FAMACHA© card.

PARASITE CONTROL VIA MANAGEMENT

Non-chemical parasite control measures will become even more important as resistance to dewormers grows. Here are some key practices that can help producers reduce the need for chemical deworming:

1. Never graze pastures below 3". Infective parasitic larvae live in water droplets on pasture plants and are much more common in the lower 3" of forage.
2. For similar reasons, try not to let animals graze on wet pastures.
3. Rotate pastures and allow as much rest time as possible between re-grazing—at least three weeks; six months is much more effective in ensuring larval death.
4. If possible, practice multi-species grazing. Only a few parasites are transmissible between species, so following sheep or goats with horses, for example, will help reduce the number of small ruminant parasites on pastures.
5. Do not overstock animals—never graze more that six to eight small ruminants per acre of irrigated pasture.
6. Select animals that are robust despite parasite infections; cull individuals that require repeated deworming to survive.
7. Do not feed directly on the ground.
8. Protect feed troughs, water sources and trace-mineral salt feeders from manure contamination.
9. Provide browse for goats.

IF YOU MUST DEWORM

Unless you decide to use intensive genetic selection for parasite resistance and cull affected animals heavily, you will need to deworm some animals when warranted. First, know which dewormers are effective in your herd or flock (see Step 1 of Smart Drenching above). Another recommendation is to confine and deworm herd/flock additions with a dewormer from each of the three major classes simultaneously; drylot these new animals and do not allow access to pastures and the rest of the herd/flock until fecal egg counts are negative.

Use dewormers sparingly and intelligently to prolong their effectiveness on your farm. Practice the non-chemical means of parasite control mentioned above to increase the sustainability of your small ruminant flock or herd. Parasite resistance to dewormers is currently not a huge problem in the PNW; let's keep it that way through judicious use of anthelmintics.

--Susan Kerr
WSU Klickitat County Extension

For More Information

www.scsrpc.org
www.attra.org/attra-pub/PDF/parasitesheep.pdf
http://animalscience.tamu.edu/images/pdf/sheep-goats/L5094-monitor_parasites_ruminants.pdf
www.aces.edu/pubs/docs/U/UNP-0006/
www.aces.edu/pubs/docs/U/UNP-0078/UNP-0078.pdf?PHPSESSID=0caa21459f41703df80919f2f8c46f71

Forage and Forage Management

Timing of Spring Fertilizing Makes a Difference in Pasture Production

Maximizing production in irrigated pastures with cool season forages has a lot to do with removing growth-limiting factors. These factors are physical, environmental or physiological forces that are less-than-ideal for optimal plant growth. There are many growth-limiting factors and each field or area within a field may have different limiting factors. Irrigation frequency, soil pH, soil depth, soil type, rocks, plant competition, soil minerals and plant nutrition are just a few of the potential growth-limiting factors for plants. Nitrogen, phosphorus and sulfur availability are some of the most common limiting factors. We can and do manipulate plant nutrition by applying fertilizer. The rest of this article will refer to chemical fertilization instead of the use of manure, but forage production management applies to either.

In irrigated pastures with cool-season forages, the timing of spring fertilizer application correlates highly with the amount of forage produced. In six years of field-testing, urea nitrogen broadcast application was timed according to accumulated Celsius degree-days using data supplied by Washington State University public access weather stations (http://weather.wsu.edu) for the region of the test site. Applications occurred at 100 degree-days, 150 degree-days, 200 degree-days, 250 degree-days, 300 degree-days and March 15. In addition, a control of no-nitrogen application was included in the study. It was not surprising that any nitrogen application significantly increased forage production over no-nitrogen fertilizer application. The increased production from using nitrogen over the no-nitrogen control was approximately 35 pounds of forage for each pound of nitrogen applied. The most significant difference between application treatments was seen between 200 degree-days when compared to March 15 nitrogen applications. A 30% increase in first cutting production occurred if nitrogen was broadcast earlier than March 15. This increase persisted throughout the entire growing season.

Applying nitrogen at 200 degree-days is significantly earlier than traditional applications. A key to increased forage production in these trials appears to be that the nitrogen was available early, as the plants left dormancy. Plants are very active below ground before any activity is noticed above ground. Waiting to fertilize until fields are greening up (March 15 treatment) is not optimal for forage plants. These studies support a very early spring application of nitrogen to remove a growth-limiting factor for forage.

Remember, some common sense must be used in early nitrogen fertilizing. Nitrogen is water-soluble, so it will leach below root zones and can be wasted with rain or snow runoff. Excessive nitrogen runoff is an environmental hazard. Fertilizing on snow or in areas that could have excess runoff is not recommended.

These field tests showed that nitrogen fertilization is extremely cost effective. Whether using chemical or natural fertilizers, it makes economic sense to supply enough nitrogen for maximum production. In the future, consider using your local public access weather station to time nitrogen fertilizer applications and maximize forage production.

--W. Frank Hendrix
WSU-Yakima Co. Extension

Editor: Susan Kerr
Washington Animal Agriculture Team members' contact information and publications can be found at http://animalag.wsu.edu.