Following basic principles increases forage establishment success

By Anowar Islam

Good forage stand establishment relates to several important facts; for example, returning to forage production, increasing forage yield and desirable species, and improving sustainability and profitability.

Establishment success involves an understanding of the needs of forage and of several proven seeding methods. The basis for several years' production is determined within two to three weeks after planting. Forage seeding is costly, especially perennial forage seedings, which are more expensive than other crops. The failure rate of forage seedings is higher than any other traditional crop seedings; therefore, the risk and cost of forage establishment are substantial.

Thin and poorly established stands encourage weeds to invade, reduce forage yields, and, in the long run, shorten life of the stands. Considering all these negative consequences along with the risk and cost associated with poor forage stand establishment, it is essential to maximize the chances of success.

There are a few key factors that need to be considered for successful forage stand establishment.

Good Planning

Remember, "*Half the job is planning.*" Good, thoughtful pre-planning is the number one key for successful stand establishment. A number of activities that need to be completed well in advance before establishing a new forage stand include site selection, weed management, adjusting soil pH, fertilization, and species and variety selection. Once the forage is seeded, there is very limited option for controlling weeds. Soil pH adjustment is also very important. Many forage species can grow at a pH below 6.0; however, they will grow best and yield most at near neutral soil (pH closer to 7.0).

Matching forage species or varieties to the characteristics of the soil is very important. Type of soil, soil texture, soil pH (e.g., acidic, alkaline, sodic), soil fertility, water holding capacity, drainage, and cold tolerance all have effects on the selected forage species or varieties.

Care should be taken in selecting forage species or varieties without any biases. Unbiased, research-based information can be obtained by contacting neighbors who had success or extension personnel (e.g., UW Cooperative Extension Service educators or specialists). Species and varieties are often selected based on personal or industry preferences without considering site characteristics and soil properties. Mistakes made in the early planning and management phase cannot be corrected later. So, always remember the 7 *Ps* – pre-, prior planning prevents pasture poor performance.

Seeding Rate

Recommendations of forage seeding rates vary considerably depending on soil and environmental conditions. The larger the seed, the more pounds per acre needed. As a general rule, these rates of seeding will result in about 20-50 seeds per square foot (20 for the larger and 50 for the smaller seeds).

For example, 10 pounds of alfalfa seeds per acre will result in 50 seedlings per square foot – 50 seeds per foot of row with 12-inch row spacing; 25 seeds per foot of row with 6-inch row spacing (seed every ½ inch). If half of the viable seeds produce seedlings, a good stand is expected. If more than half establish, they will generally self-thin over the first three months or so to about 25 plants per square foot.

Less than ideal soil conditions (such as uneven stony field, poorly prepared seedbed, etc.) might justify planting the higher end of the recommended range. Mortality will be greater with smaller-seeded forages than with larger seeds because of the initial weak growth vigor in smaller-seeded seedlings.

Reducing seeding rates below recommended levels does not significantly cut the establishment cost of forage. Economic analysis suggests that less than 4 percent of the total costs associated with forage production is the seed cost. The major costs are associated with operation (e.g., labor, tillage, drilling, etc.) and maintenance (e.g., labor, herbicide, irrigation) which will be further accelerated by a stand failure. Calibrating the seeder, so it plants the right amount of seeds, may be a better option for saving money. Recommended settings on the seeder is a guide to follow but may not be appropriate for a given condition. Following the guideline, calibration can be adjusted by simply test planting on a measured area before final planting. Remember, this may initially cost a few extra labor dollars but will save real money by avoiding a costly failure.

Planting Depth

Planting too deep is the most common reason for forage seeding failure. The rule-of-thumb in agronomy is not to plant a seed deeper than five times its diameter. This means most forage seeds should not be planted deeper than 3/8 inch. Greater than 3/8 inch will greatly increase the risks of poor emergence and thin stands.

A firm seedbed is critical to assure accurate seeding depths. Fluffy seedbeds interrupt the function of the depth band wheels of a seeder, and, as a result, seeds are frequently placed too deep.

Planting too deep is usually the result of a loose seedbed – it is sometimes hard to sufficiently firm a seedbed. Cultipacking or roller-harrowing will help in leveling and firming soils. Planting too deep is probably not the most common reason for failure on no-till seedings (i.e., directly planting without seedbed preparation); however, not nearly as many acres are seeded with the no-till method. Sandy soils (such as in many areas in Wyoming) dry out faster; therefore, it is better to use the deeper (3/4- to 1-inch) depth, particularly for grasses. Much research shows that the number of seedlings established sharply diminishes as depth of seeding increases from the optimum.

Seed-to-Soil Contact

Forage seeds require ample amounts of water (about 100 percent of their own weight) to initiate germination process. This water must move from soil to the seed. So, it is crucial the seed is in close contact with soil as much as possible. Good seed-to-soil contact will result in good and uniform germination and increase the number of productive forage plants in the seeded stand. A well-prepared seedbed without clods will ensure good seed-to-soil contact.

To determine whether the soil is firm enough to plant, the following measures can be used: a footprint of an adult should not be deeper than ¼ inch on a well-prepared seedbed; about 10 percent of the planted seeds should be on the surface of the soil after planting. No seeds visible on the surface indicate the planting was too deep.

Planting Time

It is better to plant forage seeds at the time when odds are best based on rainfall patterns and temperatures. For proper germination, 40°F or higher temperatures are needed. Temperatures too high are detrimental because the soil surface will not be kept moist. Rainfall patterns east of the Rocky Mountains peak in May and June and then taper off until the end of the year.

The most common month for forage planting in Wyoming is May. There are usually several weeks of good growing conditions by then; however, it can get hot by the end of May in some areas, and poorly rooted seedlings desiccate resulting in poor stands. An alternative to May seeding is generally late summer (August) if water is available. This is a good time for forage seeding as weeds are less troublesome.

Dormant planting (a time in which conditions are such that seeds do not germinate) usually is November to March. This is common with perennial grasses in which seeds remain dormant in soil during the cooler months and get ready to germinate and grow as soon as conditions are favorable in the spring.

Early spring planting refers to March or April rather than May. This planting generally helps seedlings be better rooted before hot weather appears; however, slight frost injury, as with alfalfa, may occur due to hard frost after germination. Overall, there is less risk in early spring seeding than seeding in May (moisture stress) because of adequate rainfall and optimum temperature.

Seeding Method

There are many methods for forage seeding including broadcast, drill, and no-till. There has been a long debate over which seeding method is best. It is really not a concern as long as each method is properly done. This includes the right seeding rate, appropriate seeding depth, and, most importantly, good seed-to-soil contact.

Basic principles of forage establishment seem obvious but many unnecessary establishment failures occur every year. This is because one or more of the basic principles outlined above were not properly followed.

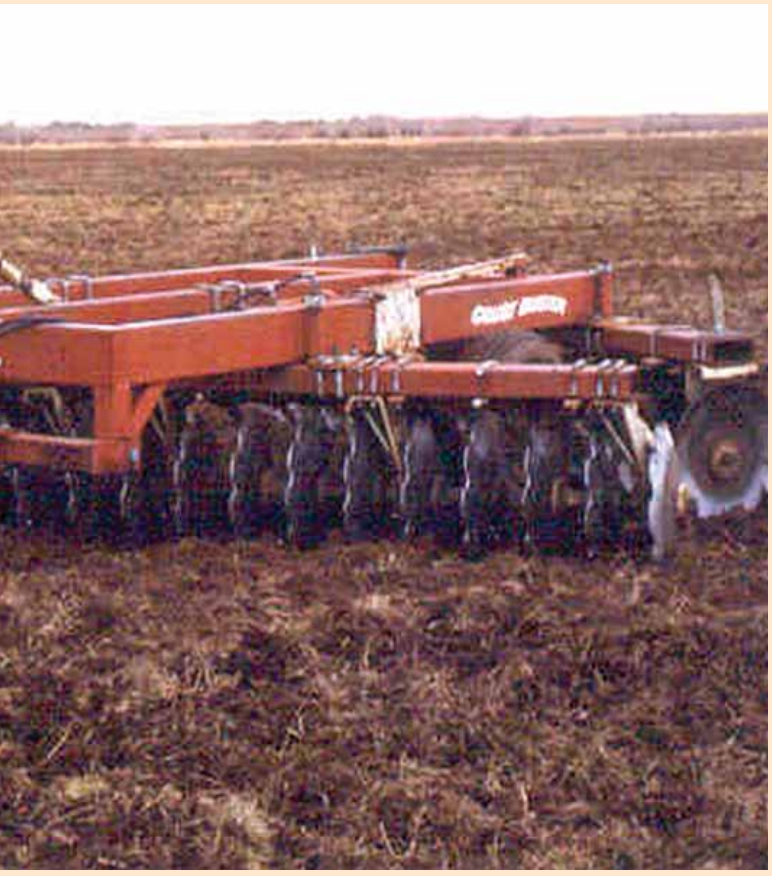
For additional reading or relevant information, please read/visit: Forages – An Introduction to Grassland Agriculture, Volume I, 6th Edition (2003) by Barnes et al. (ed.); http://hayandforage.com/ or http://www.progressiveforage.com/. More information or answers to specific questions can be obtained by contacting Anowar Islam.

Seedbed preparation usually starts with plowing to destroy previous vegetation, loosen soil, and mix fertilizer into soil

Cultipacking or roller-harrowing helps level soil, break up clods, push rocks into soil surface, and, finally, firm soil for good seed-to-soil contact.

Depth bands (front) and packer wheels (back) help keep the drill from placing seed too deep and help ensure good seed-to-soil contact.

Anowar Islam is an assistant professor and the University of Wyoming Cooperative Extension Service forage agroecologist in the Department of Plant Sciences in the College of Agriculture and Natural Resources. He can be reached at (307) 766-4151 or mislam@uwyo.edu.



Adjusting stocking rates to forage production can add profits

By John Ritten

Annual precipitation in Wyoming is quite variable, which can have a large impact on the state's livestock producers.

Adjusting stocking rates by utilizing expectations of weather and knowledge of existing range conditions can affect profitability. As much of the state's rangelands consist of cool-season grasses, annual forage production can be closely estimated early in the spring.

Yearly forage production is heavily affected by both early growing season precipitation and the state of the range from previous grazing decisions. Adapting herd requirements to forage expectations in a given year can improve overall ranch profitability.

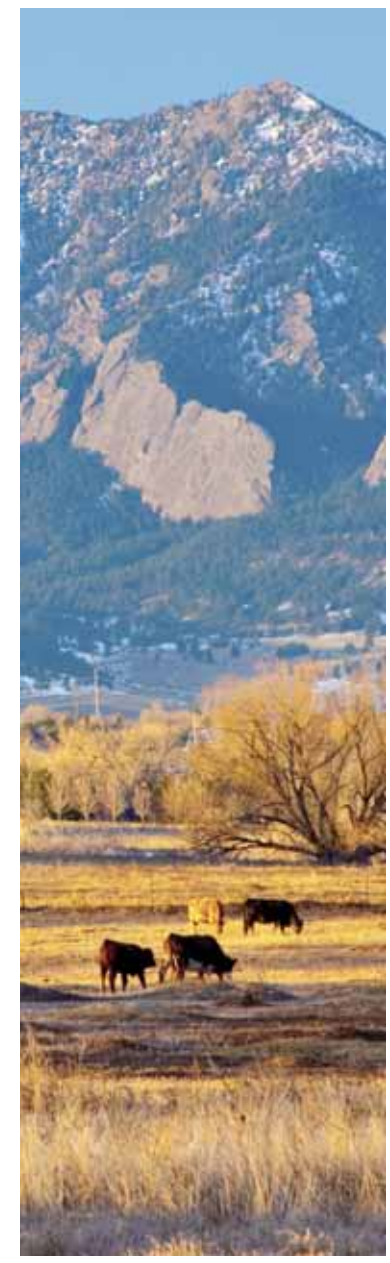
Producers who utilize a variable stocking rate across years are more likely to be able to take advantage of forage in all years but especially wet years due to the flexibility of their operations. The ability to take advantage of forage production can allow producers to increase average profitability and potentially decrease variation of net returns across years.

Fremont County Forage Production Model

For example, researchers at UW studied a forage production model based in Fremont County. Results show producers who utilize a variable stocking operation as compared to a fixed stocking rate set at moderate levels can increase average profitability by 42 percent while decreasing variability across years by 6 percent over a 100-year planning horizon.

The results of this study show the optimal forage utilization rate, economically speaking, is fairly close to the traditional range management rule of thumb of "take half, leave half." It is economically optimal to be slightly more conservative than this rule and take 45 percent while leaving 55 percent. While desirable to leave this amount, variable precipitation often affects forage production, affecting a producer's ability to obtain this level.

When variable precipitation was modeled in the forage response model, producers who practiced variable stocking, aiming to utilize 45 percent of forage production, ended up utilizing 48 percent of production on average. Producers who stocked at a fixed rate equivalent to a moderate stocking level for the study area were only able to utilize 40 percent of forage on average, with 50 percent more variability in forage utilization as compared to adaptive stocking rates.



Cow/Calf Producer Insights

While this study looked exclusively at comparison of operations consisting only of stocker cattle, there are some insights for cow/calf (C/C) producers as well. For example, some research has been done that compared alternative operational strategies for C/C producers given drought in Wyoming. This research suggests producers who utilize a Cow/Calf/Yearling (C/C/Y) operation can be more profitable as compared to a C/C operation. The main difference in the operations studied is that C/C/Y operators carry less breeding stock while keeping similar Animal Unit numbers over the year (AUYs) by carrying over all steers until the following year.

In the C/C/Y scenario, if forage production looks to be scarce by the end of spring, the producer has the option to sell yearlings to get herd requirements in-line with expected forage production. While not optimal to sell any short yearlings under normal conditions, it was more profitable to sell them early rather than purchase additional feed during dry years to cover forage shortages.

The C/C/Y option improved overall profitability by nearly 50 percent. While variability in returns slightly increased, it was skewed upward during wet years. Variability was decreased in dry years, but the option to take advantage of wet years resulted in higher variability in these years as profits were increased over average profits. C/C producers were unable to take advantage of these wetter years as there is a lag required in the restocking of breeding stock.

Match Herd Needs to Forage Availability

Regardless of strategy, matching herd needs to forage availability is important. Cattle producers can think of themselves as marketing grass in the form of beef. Forage production, which is dependent on precipitation and range condition, may very well be their most important input. While tempting to take advantage of years with higher cattle prices by stocking at higher rates, our research shows stocking decisions should be based on expected forage production and not cattle prices.

In the long run, it is better to keep forage in good condition to ensure future productivity rather than risk range degradation by chasing high prices.

Here are some useful links when analyzing your grazing system:

A useful discussion regarding how to estimate yearly forage production can be found in "Recognizing and Responding to Drought on Rangelands," available at http://ces.uwyo.edu/PUBS/MP111_09.pdf.

"Monitoring: A Tool for Effective Rangeland Management" can help producers get a better feeling for actual range utilization on their ranches, available at http://ces.uwyo.edu/PUBS/MP111_02.pdf.

Some options to improve utilization through better livestock distribution can be found in "Livestock Grazing Distribution," available at http://ces.uwyo.edu/PUBS/MP111_05.pdf.

And, some ideas for flexible strategies that allow producers to take advantage of wet years while still planning for dry years can be found in "Flexible Grazing Livestock Management Systems for Good and Bad Times," available at http://ces.uwyo.edu/PUBS/MP111_03.pdf.

John Ritten is an assistant professor in the Department of Agricultural and Applied Economics at the University of Wyoming College of Agriculture and Natural Resources specializing in production economics/systems analysis at the James C. Hageman Sustainable Agriculture Research and Extension Center near Lingle. He can be contacted at (307) 837-2000 or at jritten@uwyo.edu.

Originally published in the Barnyards & Backyards April 2010 newspaper insert. Found at http://insuringsuccess.org