Grazing Management and Utilization of Cool-Season Annual Pastures

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Management and utilization of cool-season annual forages such as small grains, ryegrass, and clovers for optimum economic returns involve an integration of basic forage-animal production knowledge with the decision-ability to implement various events in a timely manner. The art and science of an economically successful grazing venture with winter pastures is not an especially easy task. Managers are required to make projections on forage DM growth and production as well as forage removal by grazing in order to establish an initial stocking rate. Then, successful managers are forced to revise these original estimates and project once again during another part of the season. This does not necessarily imply that managers must buy-and- sell to adjust stocking rates, however, the dynamic nature of growth rate of cool-season annual forages requires some management flexibility in stocking density used to optimize animal gains. Thus, the primary management decisions involved with successful winter pasture grazing ventures are those of setting and manipulating stocking rates.

Forage Production and Timing of Events for Small Grains

The timing of events is generically important in the success of any endeavor. With cool-season annual forages, timing of planting, fertilization, grazing initiation, grazing duration, defoliation severity, selection of weight-class of livestock, and purchase-sell decisions control economic returns.

Forage DM Production: Small grains have a bimodal function of dry matter (DM) production during the fall-winter-spring period. And, when annual ryegrass is included in the forage mixture for pasture, then the late-winter-spring DM production skews the forage response heavily toward February through May. For example, small grains with or without annual ryegrass can provide grazing in November-December, but the magnitude of DM is based on establishment and fertilization schedules. Forage DM from these pastures accelerates in the fall until climatic conditions (temperature and/or rainfall) cause a dramatic reduction in growth rate usually in late December to early February. Thus, in the case of small grain-ryegrass pastures, there may actually be three distinct "seasons" in which a different stocking rate would be deemed as "optimum". The opportunity for management decisions, therefore, to capitalize on this predictable bimodal DM growth curve is to be prepared for the occurrence of erratic DM production. This does not imply that managers become meteorologists; however, within specific regions of the state, long-term weather data are available that will assist with predicting periods of climatic-risk for forage production.

Perhaps one of the best grazing management scenarios is that of having stocking rates which provide the opportunity for excess forage through the winter, and then expose the pasture(s) to sufficient stocking rate and severity of defoliation in the spring to maintain a vegetative stage of growth while allowing animals to make near maximum daily gains (2.5 to 3.5 lbs/day). Forage production is accelerated by proper timing of establishment and fertilization. During more than 20 years of rye-ryegrass grazing at the Texas A&M University Agricultural Research and Extension Center at Overton, the timing of these events has generally been as follows for over-seeded (sod-seeded) bermudagrass pastures:

1. Plant in late September to early October.
2. Discourage fall bermudagrass growth via delayed fertilization during late summer and/or forage removal via grazing, haying or shredding. Also, one may lightly disk (2-3"

depth) the sod without intent to permanently destroy the bermudagrass. In this case, the disks should not be set to "turn" sod and soil, but rather to create slight scarification of the sod. If a grain drill is used, then the drill openers will "fit" into the disk grooves. If a grain drill is not used, then seed should we applied with a low to no N fertilizer source to discourage bermudagrass growth.

3. After small grain-ryegrass has initiated growth to 3" to 5" and stand survival is relatively certain (barring inclimate drought or armyworm infestation), then fertilize by applying all of the P_2O_5 and K_2O requirements, and about 40 to 50 lbs/ac of N (according to soil test recommendations; usually this is mid to late October).
4. In late November to early December (after first killing frost) refertilize with N. (For sandy soils in East Texas, this will be about 50 to 65 lbs/ac N.)
5. Apply N fertilizer (50-65 lbs/ac N) in early February and once again in late March to early April. (At the TAMU-Overton Center, total N rates have ranged from 200 to 260 lbs/ac, but N rate should be based on soil tests and objectives or requirements for DM production.) Another N–fertilization (50-65 lbs/ac N) may be applied in mid-May to complete the ryegrass growth period and to initiate a "flush" of bermudagrass. The mid-May fertilization may likely be the last fertilizer applied during the summer months; however, stocking rate and forage DM requirements dictate this decision.

For other, specific soil-climate regions, fertilizer rates may vary. And, for prepared seedbed plantings, timing of events does not have to contend with bermudagrass; thus, earlier planting-fertilization schedules are in order. Using the above-mentioned outline timing of events, small grain-ryegrass sod-seeded into bermudagrass pastures are usually available for full-time grazing by late November to early December.

Method of Use and Stocking Rate: The utilization of small grain-ryegrass pastures varies with management objectives and risk associated with the grazing venture. Small grain-ryegrass pastures are not inexpensive, but this should not necessarily imply that they are too costly to justify for use in an overall grazing plan. On the contrary, positive economic returns from the use of winter pastures may likely be one of the most reliable aspects of the total forage-animal program. But, with pasture costs of $100 to $200/acre, utilization of forage DM and animal performance parameters (stocking rate) control the profit potential from these pastures. Although the following grazing strategies were not intended to be an all-inclusive listing, some decisions for method of use and stocking rates for small grain-ryegrass pastures areas may include:

- Stock pastures initially at the "optimum" spring stocking rate (1650-2000 lb BW/ac) and exercise a limit-graze scenario during the fall-winter period until the rapid spring forage growth rate occurs (usually late February to early March). This management strategy involves supplemental hay and protein in addition to an adjacent "sacrificed" area for animals to reside. Normally, these limit-graze systems would entail a 2- to 3-hr grazing per day with a 20- to 22-hour deferment, or some alternate-day grazing plan. The primary objective is to have some optimum number of cattle on hand and
- Stock pastures initially so that the low winter growth rate does not necessitate animal removal. In this scenario, additional cattle must be incorporated into the grazing scheme to increase stocking rates and/or excess spring growth must be harvested as silage or hay (hay is usually not a good alternative in March and April due to inclement conditions for curing). The "additional" cattle may be part of the resident cows and calves and/or may involve winter-spring purchased cattle.
- Graze during the fall with moderate to heavy stocking rate, vacate pastures during the winter, if necessary, supplement with hay and/or protein, and resume grazing in the spring. This necessitates an adjacent sacrifice area for cattle to reside during this potential 30 to 45-day winter period. This approach assumes cold, inclimate weather during December-January, and thus is site-climate specific.

available for grazing during the spring flush-growth period.

- Delay grazing winter pastures until late winter (late January to early February) or until the rapid spring forage growth rate occurs. A component of this grazing scenario is that cattle would be purchased at a time when prices are generally higher than during the previous fall season. However, there are limited hay and supplemental requirements for this approach. Or, if cattle are purchased during the fall, backgrounding on hay or standing forage, and supplemental protein is required.

Stocking rate, as alluded to earlier, becomes the single most important factor controlling forage regrowth, animal performance, and potential economic returns. Although stocking rate appears to be a "moving target", management can use some established "rules-of-thumb" for site specific areas.

For small grain-ryegrass pastures, any set stocking rate is likely not to be the "proper" stocking rate because of fluctuations in DM production. However, long-term grazing experiments with stocker cattle at the TAMU-Overton Center have shown that initial December stocking rates of 650 to 800 lbs body weight (BW) likely do not necessitate a reduced or de-stocking decision due to winter climatic conditions. However, at this initial stocking density, an abundance of forage usually accumulates from mid-March to late May which requires additional cattle (increase stocking rate) or mechanical harvesting. An integral part of the stocking rate decision for small grain-ryegrass pastures is the method of grazing used. For example, a multi-pasture (n = 8±) rotational stocking system that employs a 2 to 3-day residence grazing of each pasture may enhances forage DM production compared to similarly stocked continuously grazed pasture. Further, this magnitude of forage DM production is most dramatic during mid-winter when climatic conditions cause slow forage growth rates. If one chooses a rotationally stocked system, then cattle would likely have shorter residence time (n = 1 to 2 days) on any particular pasture in the fall and spring compared to a longer residence time (n = 2 to 4 days) during the mid-winter period. In general, as forage growth rate slows, then the movement of cattle among paddock slows (i.e., longer resident time on each paddock). And, with fast forage growth rate, the movement of cattle is increased (faster) from paddock to paddock (i.e., shorter resident time on each paddock).

Initial stocking rates of 1000 to 1250 lbs/ac BW in the fall are subject to increased risk or likelihood of providing supplemental hay during mid-winter. And, with these higher initial stocking rates, some system of graze-rest would be preferred over continuous stocking. One reason for choosing these higher initial stocking rates is to create some "optimum" stocking rate for the 60- to 75-day period during the spring which should approach 1650 to 2000 lbs/ac BW.

Management must choose the desired level of performance for stocker cattle. The age-old question for management of what do you want..... "more gain per animal or more gain per acre?", the answer is usually, "Yes". If the overall average daily gain (ADG) is to exceed 2.5 lbs/hd/day, then stockers require an abundance of forage DM from which to select their daily ration. However, if ADG of 1.8 to 2.0 lbs/day is acceptable, then less forage refusal areas (spot grazing) should be apparent, and utilization of the small grain-ryegrass pasture may range from 3" to 5" in height.

As evidenced by the above discussions, the best stocking rate plan by management exists when flexible alternatives exist and when management controls cattle numbers to fit the current situation. Some of the "best fit" stocking scenarios may exist when multiple (n = 2 or more) sets of cattle may be used to graze excess forage growth. Although many situations exist, most notable are: (a) use of additional stocker cattle in the spring which were either purchased late or backgrounded during the winter; and/or (b) use of resident fall or winter calving cows and their calves to graze excess forage on a full-time or limit-graze scenario.

Forage Production and Timing of Events for Ryegrass and Clover

Annual ryegrass has become the most widely

used cool-season annual forage in Texas and in the southeastern U.S. Ryegrass may be planted alone or in combination with small grains and/or clovers.

Forage DM Production: Although annual ryegrass will likely provide fall grazing when planted on prepared seedbed, or when used in the situation of a moist, warm, extended autumn period on a warm-season perennial grass pasture, most of the forage DM is produced during late winter to late spring (February through May). During a 25-year period at the TAMU-Overton Center, the average initial date for stocking ryegrass pastures has been February 24. However, this was at a time when adequate forage had accumulated to provide continuous stocking rates of about 2750 to 3000 lbs/ac BW on high stocked pastures. Thus, when lighter stocking rates are desired, then grazing could be initiated in late January to early February in East Texas. Initiation of grazing and stocking rate are site specific due to climate conditions as well as soil fertility and nutrient status for plant growth. In general, forage production of annual ryegrass increases with time from January to early spring (late April in East Texas). Plant maturation processes are usually visible via seedhead formation by early May; however, this is also a function of climate and nitrogen availability. It is not uncommon for annual ryegrass to remain at the vegetative-seed head stage in moderately to low stocked pastures until late May to early June in East Texas.

In general, annual clovers, usually produce adequate forage for grazing later than that for ryegrass at any specific site. In East Texas, newly planted clovers are usually available for continuous stocking by late February to early March. Naturally reseeding clover pastures, however, may be available for grazing as early as December, but usually provide adequate DM by late January to early February. Time of grazing initiation is species dependent as well as site specific. Usually, the earlier that clovers provide grazing, the earlier that they mature and vacate the pastures. In East Texas, for example, crimson clover varieties usually initiate flowering by mid-April and do not provide much forage by early May. Arrowleaf clover, on the other hand, may provide grazing until mid-June to early-July but this is climate dependent. The timing of necessary events for clovers pertains primarily to soil pH regulation and nutrient availability at emergence.

Method of Use and Stocking Rate: Stocking rates for ryegrass or ryegrass mixtures are similar to those mentioned for small grains during the late winter-spring months. Initial stocking rates which allow for an abundance of forage DM will provide stocker ADG of 2.5 to 3.0 lbs/day. In East Texas, this initial stocking rate would be about 1250 to 1500 lbs in early to mid-February. Pastures that are stocked sufficiently heavy to prevent forage heights from moving above 2 inches to 4 inches are likely to limit stocker ADG to less than 2 lbs/day.

Most ryegrass and/or clover pastures are used primarily by cow-calf operators rather than for stockers. A seven-year average of forage and cow-calf responses to multiple stocking rates at TAMU-Overton Center showed suckling, fall-born calf ADG of 1.94, 2.75, and 3.2 lbs/day, respectively at stocking rates of 2.13, 1.31, and 0.82 cow-calf units per acre (1 cow-calf unit = 1500 lbs). On these continuously stocked pastures in East Texas, a conservative stocking rate of 0.75 to 1.25 cow-calf units has been consistently risk-free with respect to the need to de-stock or reduce stocking rate from February to weaning in June-July. And, at the 0.75 to 1.0 CCU/ac level, there is usually an abundance of ryegrass-bermudagrass forage that can be harvested as hay by mid- to late-May.

The performance from clovers, during this same time period resulted in suckling calf ADG of 1.73, 2.40, and 3.00 lbs/day, respectively, at stocking rates of 1.91, 1.17, and 0.75 cow-calf units/ac. Although suckling calf gain and pasture stocking rates were relatively similar at low stocking rates, ryegrass was more resistant to severe defoliation regimens than were the clovers. Additionally, with most clovers, except arrowleaf, grazing management decisions usually dictate that cattle be removed for hay purposes or reseeding about 30 days earlier than for ryegrass pastures. Arrowleaf clover usually matures and flowers later than annual ryegrass.

Management Expectations

As always the case, grazing management expectations for forage production and animal response is site specific and is affected by the timing of cultural-management events and climate. For the most part, the expectations of various classes of livestock ADG under moderate stocking conditions would approximate 2.0 to 2.5 lbs/day for stockers, 2.5 to 3.0 lb/day for suckling calves, 1.75 to 2.0 lbs/day for yearling horses, .25 to .40 lbs/day for lambs, and .15 to .30 lbs/day for fallow deer. For the cool-season annual forages, and particularly small grain-ryegrass pastures, one of the most efficient methods of grazing management is to initiate a stocking rate that allows for adequate leaf area for rapid growth during late winter. Once the forage has initiated a "spring burst" of growth, then stocking rate adjustments (increases) may be made in an attempt to "catch" the pasture. However, management should not allow for such an abundance of growth that the small grain (especially rye) initiates premature flowering and flag leaf set.

The perception that rotational stocking is always better than continuous stocking is not a valid assumption. However, rotational stocking may allow for more forage growth, and judicious use of stocking rates may result in extra gain per acre as compared to continuously stocked pastures. Preliminary research at TAMU-Overton suggests that at low (650 to 800 lbs/ac BW at initiation) to moderate stocking rate (1200 lbs/ac BW at initiation) there may be no difference in method of grazing with respect to stocker ADG; however, even at these stocking rates, the rotationally stocked pastures had more forage "residue" for potential haying compared to the continuously stocked pastures. Rotationally stocked pastures at high stocking rates (1800 lbs/acBW at initiation) have been shown to have greater stocker ADG than stocker calves at similar stocking rates under continuous stocking.

Achieving the economic optimum grazing management and utilization of annual winter pastures is not an especially easy task. A knowledge base of forage growth expectations for a specific site and the art of managing judicious defoliation regimens allow for the greatest opportunity for positive economic returns and an acceptable transition from cool-season to warm-season pastures.