Forage News

MISSISSIPPI STATE UNIVERSITY EXTENSION SERVICE

Optimizing Livestock Allocation During Winter Grazing

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Winter annuals (ryegrass and small grains) are the backbone of any winter grazing system in Mississippi. These forages are costly to establish, but are efficiently converted into gain by grazing the proper livestock class and using rotational grazing that maximize gains per acre. Depending on moisture availability and seeding method, grazing could start as early as December in the southern part of the state while mid-January grazing in more common for the central and northern parts. Every year many producers make a resolution throughout the year to feed less hay during the coming winter, but sometimes they find themselves feeding more hay than planned because of overestimating the stocking rates in ryegrass grazing systems and limiting grazing availability. However, if you start developing a grazing plan now, you can put yourself in a position to drastically reduce the amount of hay that need to be fed.

Some of the common questions that we need to think about include: determining when the pasture might be ready to graze and how many animals will it might support? With good grazing management, livestock are usually moved to a new pasture every 12 hours to 3 days. The longer the animals stay in a paddock has shown that dry matter intake (DMI) could decrease significantly (**Fig. 1**). Livestock may return to the pasture when it has fully recovered by re-growing to 8 to 12 inches of height. This may be as soon as 20-30 days in early January when the plants are growing slower, but it may be 15 days or shorter in March when temperatures are optimum for rapid ryegrass growth and recovery. While there are numerous ways to calculate how many animals can be carried on a particular pasture, based on what is available and what is being eaten, the following information is a starting point.

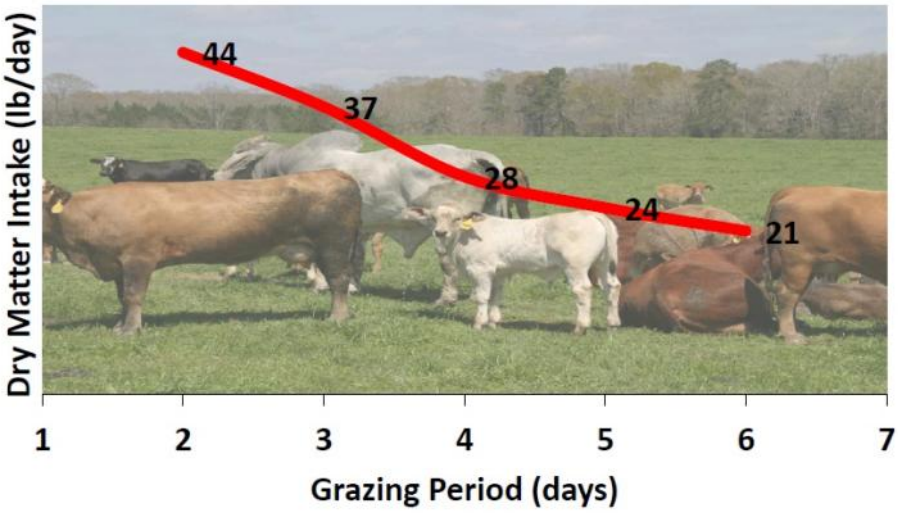

Figure 1. Estimated dry matter intake based on how long animals stay in a pasture.

Carrying Capacity (CC)

Carrying capacity is the number of animals that a piece of land can support to be economically and environmentally sustainable for a particular class of livestock throughout the grazing season. There four major factors that will determine carrying capacity: (1) annual forage production, (2) seasonal utilization rate (%), (3) animal daily forage intake (lb of forage/lb live weight), and (4) the length of the grazing season (days, months). Seasonal utilization rate is the percentage of the annual forage production that will actually be harvested by the grazing livestock. The utilization rate can vary from 30 to 70% and it will depend on the type of grazing rotation. Faster rotations with longer rest periods will have higher utilization rates. Length of the grazing period is also a function of how many paddocks are available and the required rest period. Carrying capacity can be determined by experience gained over the years or by calculating long-term forage yields for the area being utilized. Keep in mind that forage production is affected by planting method, fertilization and va-

riety selection. Once the area been defined, a stocking rate can be calculated. If larger or smaller animals are placed on the pasture, the carrying capacity does not change, but the stocking rate will.

$$\text{Carrying Capacity} = \frac{\text{Annual Forage Production x Season Utilization Rate}}{\text{Avg. Daily Intake x Length of Grazing Season}}$$

Let's assume that annual ryegrass will produce 5000 lbs DM forage/acre. A producer has a stocker operation and his expected average daily gain is 2.0 to 2.5 lb/head. This moderate level of performance might require a daily forage intake equivalent to 3.0 % of body weight which is .03 lb. of forage/lb. of live weight. His anticipated grazing period is from January 15 to May 15 or 120 days. Using the equation above, his carrying capacity will be:

CC = (5000 lb forage /ac * 0.70)/(0.03 lb forage/day/lb live weight * 120 days)

CC = 972 lb live weight/ac.

Stocking Rate (SR)

The stocking rate is the number or animal units that a livestock producer decides to put on a piece of land for a specific period of time. It is usually expressed as animals per unit area. If a producer purchase 400 lb steers, he would be able to stock 2.2 steers to the acre (972 lb live weight per ac/400 lb). This calculation will only be good for the first day of the grazing season. One thing that a producer needs to take into consideration is that the calculated stocking rate will not be effective until the everyday gain weights are taken into consideration and quite likely the average forage availability in March will be higher than in January. If the expected average daily gain is 2 lb/hd/day, the average mid-season weight for a 400 lb steer will be 520 lb (400 lb + (60 days x 2 lb/day). In this case, the initial stocking rate should be 1.9 steers/ acre. Keeping in mind that this information is just a guideline to help on estimating the initial stocking rates and not an indication of economic efficiency. Low stocking rates usually result in higher individual animal performance (higher reproductive success, higher individual gains and decreased need for supplementation) while high stocking rates result in high gain per acre and decreased individual gains. Available forage, animal health, weather conditions, mineral supplementation and other relate factors could affect animal performance as well.

Stock Density (SD) for a Grazing Period

Once a producer has defined the carrying capacity and the stocking rate for the grazing season, determining the grazing period and the stocking density become the final components for the grazing strategy for the season. Stocking density is the number or animals on a particular paddock at a particular point in time. A producer needs to make a decision on how place the electric fence and how many animals to allocate to a particular paddock. The carrying capacity equation becomes the stocking density equation with slight modifications:

$$\text{Stock Density} = \frac{\text{Available Forage x Grazing Period Utilization Rate}}{\text{Avg. Daily Intake x Length of Grazing Period}}$$

Available forage is the quantity of forage dry matter that is actually available at the time of initiating grazing period. A lot of producers use the simplest approach to estimate available forage by looking at a pasture and making an educated guess as to what the forage availability is likely to be. Usually this educated guess is not the best option when it is being made for a vehicle moving at 30 mph. A rapid method to determine forage availability will be using a grazing stick and walking the pasture. With a grazing stick, measure the average height of the forage prior to turning cattle into the pasture. Multiply the height in inches by the estimated dry matter yield in pounds per acre-inch for the type of pasture you have. Forage availability for annual ryegrass varies depending on the type of seeding method. Fall drilled ryegrass will have an average of 200 lb/ac/in while fall broadcast ryegrass could be approximately 170 lb/ac/in. While using the grazing stick, if you measure that the forage is 8" high, keep in mind that we would like to keep 3" residual. This means that only 5" are available for grazing. When using this method, make sure that sufficient readings are taken throughout the pasture to obtain a good average. **Publication P258** offers a more detailed explanation of the methods that could be used for estimating forage availability.

Let's assume that a producer is trying to determine where to place the temporary fences in an annual ryegrass pasture drilled in the fall to create a paddock that will sustain 100 steers weighing 400 lb/head for 3 days of grazing. His objective is to have an average daily gain of 2 lb/hd/day. The pasture of ryegrass is 10 inches tall. That means that 7 inches are available for grazing and the total forage production is 1400 lb/ac. To maintain an intake rate of 3% then a utilization rate of 70% utilization rate is assumed. This means that the stocking density is:

SD = (1400 lb/ac * 0.70)/(0.03 lb forage/lb live weight * 3 days) = 10,889 lb live weight/acre

The steers weigh 400 lbs/head, so the pasture can support 27 steers/acre for a 3 day grazing period. The total herd will need 3.7 acres/paddock (100 steers/27 steer/ac). Remember that animals will be gaining weight over the season so it might a good idea to allocate 20% more land for grazing and to compensate for waste due to trampling and avoid limiting intake. Let's assume then that there will be 4.5 acres per each feeding strip. The pasture is 30 acres and 800 ft wide. To determine where to place the fence, it will be good to calculate the total square footage in the 5 acres (4.5 ac x43560 ft^2/ac = 196,020 ft^2). Divide the square footage by the known width to determine where to place the temporary fence. In this case, the fence should be placed at approximately 245 ft to allocate enough forage for a 3-day grazing period.

Summary

One of the keys to a successful livestock operation is to proper utilize the available forage. To properly manage a pasture, a producer must be familiar with the potential amount of dry matter forage the pasture could provide and the amount of forage required over the grazing season by each livestock class and the herd as a whole. Knowing the combination of forage production, animal requirements, land availability, time, and number of animals will ensure that a sustained and productive winter grazing system could be optimized. This will increase efficiency, reduce waste, and will allow quick and complete forage recovery.

If a producer is running out of grass during the winter, there is a chance that they are running more livestock than the pasture could sustain. As the season progresses, winter forage production increases substantially (especially with annual ryegrass), making difficult for the livestock to keep up the projected rotations. If you find yourself with more forage production than your cow herd can consume, it will be easier to bring some extra stockers to convert some of that excess forage into a marketable product, "beef," instead of having to remove animals earlier in the season. Another option that will be beneficial is retaining your weaned calves for some extra months and put some cheap gain on them. A producer needs to develop a satisfactory frame work to make sound decision as to proper stocking rates, methods of grazing, and alternatives for handling periods of low forage production during the winter season. Keep in mind that stocking rates need to be flexible because of variations in total season forage production and variations in the seasonal pattern during the grazing period. Make sure that realistic values are used in these calculations to reduce chances of inflated numbers that will lead to erroneous conclusions or inefficient management practices.