

**PLANNING PROCEDURES FOR
BALANCING FORAGE SUPPLY
WITH LIVESTOCK DEMAND**

One of the most critical aspects of efficient pasture utilization is the maintenance of an appropriate balance between the amount of forage required by the grazing herd and the amount of forage that is actually available for grazing. If a herd's forage demand exceeds the amount of forage available, over-grazing is likely to occur along with a decrease in milk production and a shortened grazing season. Conversely, if the amount of forage available for grazing exceeds the herd's demand, while milk production may remain high in the short-term, a high percentage of this forage will be trampled, fouled and, thus, wasted. Unless this forage is clipped post-grazing, the forage that was not utilized will continue to grow and eventually exist as low

quality over-mature vegetation at the next grazing. In the long-term, this will cause a decrease in the amount of forage actually utilized and result in a compromised level of milk production. Thus, while it is extremely important to ensure the adequacy of the forage supply, it is equally as important to minimize the occurrences of surpluses and deficits.

In using the methodology described to calculate the total number of acres required, keep in mind, the number of acres planned is for mid-summer when forage growth rates are at their slowest and the forage supply is at the minimum. During the spring and early summer there will be approximately twice as much forage available as can be effectively grazed by the number of livestock planned. Hence, to efficiently utilize this forage, you should plan to mechanically harvest between 40 and 60% of the planned acreage as an early cut hay or silage.

Although it is impossible to predict exactly when you should begin to mechanically harvest your surplus forage, we generally recommend that it be done prior to the start of your third rotation and definitely before you begin your normal hay harvesting activity. Mechanically harvesting early in the season allows ample time for re-growth to occur before you need this land for grazing.

Appendix 1.

Prescribed grazing management plan worksheet to be used with rotational stocking methods.

Step 1. Estimate the Forage Demand:

The forage demand is the amount of forage dry matter (DM) required to feed the herd for one day. It is calculated based on the rule of thumb that lactating dairy cattle require an amount of forage dry matter equal to about 3% of their body weight per day.

$$\text{Average Weight/Animal (lbs)} \times .03 = \text{lbs DM/Head/Day}$$

$$\text{\# of Animals} \times \text{Total Forage Demand} = \text{lbs/day}$$

Step 2. Estimate the Forage Supply:

This is the amount of forage dry matter that is estimated to be available after a 15 day growth period in the spring and a 30 day growth period in the summer and fall.

Note Actual pasture growth rates are extremely variable. As a result, the numbers presented are for planning purposes only. Actual growth periods and yield estimates may be different than those provided.

Unless actual measured yields are available, use estimated hay yields obtained from the Natural Resources Conservation Service or Cooperative Extension and use the following table to convert annual hay yields to forage availability on a rotational basis.

FORAGE AVAILABILITY ESTIMATES	
Hay Yield Tons/Acre/Year	Forage Availability Pounds/Acre/Rotation
5.5	2,200
5.0	2,000
4.5	1,800
4.0	1,600
3.5	1,400
3.0	1,200

$$\text{Forage Supply} \div \text{Lbs/Acre/Rotation}$$

Step 3. Select Residency Period:

Lactating dairy cows should not remain on a particular paddock for longer than 1 day. Half day residency periods are recommended. In other words, move the cows after each milking.

$$\text{Residency period} \div \text{days}$$

Step 4. Determine Paddock Size:

The paddock size is based on meeting the forage demand of the herd for the time or residency period selected.

$$\text{Forage Demand} \div \text{Forage Supply}$$

$$\times \text{Residency Period} = \text{Paddock Size (Acres)}$$

Step 5. Calculate the Number of Paddocks:

The number of paddocks required is based on meeting the longest regrowth interval recommended i.e., 30 days.

$$30 \div \text{Residency Period} + 1 = \text{Number of Paddocks}$$

Step 6. Estimate the Total Number of Acres:

$$\text{Paddock Size} \times \text{Number of Paddocks} = \text{Acres Planned}$$

****NOTE**** This planning procedure is designed to balance the forage supply with the forage demand during the mid-summer period when forage growth rates are generally 50% less than what they are during an average spring and early summer, only about 40 to 60 % of these planned acres will be required for grazing. The remaining 40 to 60% should be mechanically harvested or planned to be grazed by another group of livestock following their own prescribed grazing management plan.

Estimating Intake

When cows are fed stored forages under confinement situations, it is quite easy to determine their dry matter intake (DMI). If a known quantity of feed is placed before them as either total mixed ration (TMR) or individual feeds, and a quantity of feed is refused at the end of the day, the estimation is a simple math problem. However, in a grazing situation, it is not always known exactly how much is available or how much has been eaten.

This apparent "black hole" of feeding cows on pasture is a frustration for many producers and their nutritionists. There are many theories on how to estimate the amount of pasture consumed. Some of them involve using formulas to predict intake or herbage availability, while others involve some general "artwork" using common sense and back calculations. In other words, this is where prescribed feeding management is both an art and a science.

For those who only want a general idea of pasture intake, the easiest way to estimate it is to assume the cows will eat to their dry matter intake requirements. Whether or not this happens will depend on 2 factors; 1) there is enough forage in the paddock for every cow to eat to her fill, and 2) the cows are not being fed so much in the barn that they're not hungry enough to eat from the pastures. The second one is critical when considering how much supplemental forage to feed in the barn, because there is a substitution effect of other feeds in the diet. If the amount of dry matter being fed in the barn is known or can be estimated by use of scales or a mixer wagon, calculating pasture intake is a simple subtraction. Dry matter intake requirements for a given level of production minus dry matter fed in the barn results in the amount of pasture the cows are consuming.

Another way to obtain a fairly general estimate of intake is to follow the thumb rule that the pastures will yield 250-300 lbs. of dry matter per inch of herbage height per acre. This is based on research with fairly dense swards, and adjustments may need to be made in swards that are less dense. If an estimate can be made pre-grazing of the amount of forage available in a paddock and then again post-grazing, an estimate of the amount of dry matter consumed can be made.

The use of measuring devices, such as rising plate meters, sward sticks, and pasture probes can be helpful in determining dry matter intakes. However, it is important to remember that these tools need to be calibrated to each specific farm and plant species by actually clipping and weighing samples of pasture forage. Also, there is an expense that is incurred with each measuring

tool, and this needs to be taken into consideration and compared to "homemade" methods of estimation which may be less expensive. Each of these devices in itself is excellent to use as a means of teaching oneself how to estimate forage availability, however.

More specific methods of determining intake are also used. Research studies at Penn State and the University of Vermont have been done that have attempted to measure the dry matter intake of grazing cows. Generally, it has been found that forage dry matter intakes will range from 25 to 35 lbs per cow when the cows are fed a supplement. These levels of intake are dependent upon the same factors as discussed previously, such as amount of dry matter fed in the barn. It is possible for cows to eat more pasture dry matter, especially if body capacity (and therefore rumen capacity) is large enough and level of milk production is very high.

In recent research trials at Penn State, Kolver and Muller found that high producing cows fed only pasture consumed 48.1 pounds of dry matter. The ability of cows to exceed predicted dry matter intake levels can occur in any feeding management system and is not unique to pasture based systems. However, it may happen more often in pasture feeding systems due to the higher rates of digestion and passage in the rumen of fresh forage.

There are formulas commonly used to estimate intake based on body weight (BW) and 4% fat-corrected milk production levels (FCM) that can also be utilized to obtain more specific predictions.

One formula commonly used is as follows:

$$DMI = (.0185 * BW) + (.305 * FCM)$$

As can be seen, this formula helps to determine a fairly exact prediction. The limitation of using this formula is much the same as discussed before in relation to the quality of the forage being grazed (i.e., higher digestibility, higher rates of digestion and passage, etc.). Using the NDF values of the pasture forage can also give a more specific estimate of intake. The general rule of thumb is that cows will consume 1.1 to 1.2% of their bodyweight as NDF from forage. Once again, however, this may underestimate intake of pasture.