

Unit III – Grassland Management Practices

Lesson I: Grasslands and the Nutritional Needs of Livestock

This unit examines grassland management. Managing grasslands effectively is very important for livestock production. It is important to know the nutritional needs of livestock to be better able to meet those needs. Nutritional needs vary according to the type of production required, and the producer needs to be able to adjust daily forage dry matter intake to meet them. The focus of this unit will be on beef cattle, since beef production takes place in nearly every county in Missouri.

Nutritional Needs of Livestock

The nutritional needs of livestock are determined by the type of production (function) that the animals perform. All animals have nutritional needs for maintenance, in which nutrients (carbohydrates, fats, protein, and minerals) are used to maintain vital bodily processes and normal body temperature, with no weight gain or loss and no additional production. Increased amounts of certain nutrients are needed for the other production functions—growth, fattening, reproduction, rebreeding, lactation (milk production), and work.

The specific nutrients needed by the animals depend on the production function. The nutrient needs for each production function are as follows.

- ◇ Maintenance – carbohydrates, fats, protein, and minerals
- ◇ Growth – protein, carbohydrates, fats, minerals, and vitamin D

- ◇ Fattening – carbohydrates and fats
- ◇ Reproduction – protein, carbohydrates, fats, and minerals
- ◇ Rebreeding – carbohydrates, fats, protein, and vitamins
- ◇ Lactation – carbohydrates, fats, protein, and minerals
- ◇ Work – carbohydrates and fats

The total amount of nutrients needed varies from animal to animal. The level of output required for production affects the amount of nutrients required by a particular animal. For example, a horse that performs in a rodeo will have higher nutritional needs than a horse that provides rides for children at a fair, although both are working. The quantity of nutrients required varies with body size as well. Large animals need more nutrients than do smaller animals.

The nutritional needs of animals can be met by quality forages. The amount of forage required by an animal is given in terms of dry matter (DM), which is the total amount of matter in a forage minus any moisture it contains. Table I.1 gives guidelines for estimating the forage daily dry matter intake (DMI) requirements for cattle. These figures are given as a percentage of body weight (BW) to account for the differences in requirements due to body size.

Changing Nutrient Requirements

Nutritional requirements of livestock change as the animals go through different stages of production. For example, forage quality must be higher for growing animals than for mature animals. Growing animals, such as steers or heifers, need high quality feed to maintain

Table I.1 – Forage Dry Matter Intake Requirements by Production Class

Class	Forage Dry Matter Intake Requirements Per Day (% of BW)
Dry beef cow	2%
Lactating beef cow (average milk production)	2.5%
Lactating beef cow (superior milk production)	3%
Bull (during breeding season)	2.5%
Bull (out of breeding season)	2%
Growing steers and heifers	3%

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growth. Shortages in quality will sharply reduce gain and decrease profits. As they mature, the animals' nutritional needs will change since they no longer require nutrients for growth. The forage quality needed by mature animals changes as production varies throughout the year. Mature bulls, for example, need good quality forages during the breeding season but can use lower quality forages at other times of the year.

The forage quality needed by mature animals changes as production varies throughout the year. A mature beef cow goes through four stages of production each year, and its nutritional needs will be different in each of these stages. Figure 1.1 illustrates the changing energy needs of the cow.

Stage 1 follows calving and lasts 90 days. Since the cow has just had a calf, her nutrient needs are now the highest of the entire year. She is lactating at her highest level, and her uterus is returning to its normal size after being enlarged during pregnancy. The cow must also cycle and rebreed within 90 days of calving to stay on schedule for production, since cows must rebreed in time to have a calf every 365 days. Failure to do so results in an unprofitable operation due to the added costs of maintaining open, unbred cows. With all the physical demands on the cow, a lack of nutrients during this period results in lower milk production and failure to rebreed. The cow must therefore be fed high quality forages at this time.

In Stage 2, the cow is in the early stages of pregnancy and is lactating to nurse her calf. This stage usually lasts 115 days. Nutritional needs drop slightly during this period because the calf is getting some food from creep feeding, but the cow should be gaining some weight due to pregnancy.

Stage 3 is mid-gestation and lasts about 100 days. The cow has just weaned her calf and is dry. Her nutritional needs are at the lowest point of the entire year, since she only has to maintain herself and the developing fetus. She can get by on much lower quality pasture.

Stage 4 precedes calving. This stage lasts about 60 days and is nutritionally the second most important period during the year. During this stage, 70 to 80 percent of

fetal development occurs. The cow is gaining weight and preparing for lactation. Inadequate nutrition during this stage will often cause weak calves and inhibit rebreeding. The cow needs good quality pasture or hay to make sure that both she and the calf will be strong and healthy.

The herd has the highest forage quality requirement after the majority of the cows have given birth, when they are in Stage 1 and require energy for lactation and rebreeding. The growth of cool-season grasses such as tall fescue and orchardgrass meets the nutritional needs of both spring- and fall-calving cows. See Figures 1.2 and 1.3. In spring calving, cows calve just before the peak of grass growth in May and June, when forage quality is very high. The cow's nutritional needs peak when the grass growth peaks. Fall calving also works well in Missouri, since it matches the period of the cow's highest nutritional needs with another peak in forage growth in October. The calves will be weaned in the spring in time to take advantage of the lush spring pasture growth, ensuring high weight gain.

Summer calving is not recommended. The cow's nutritional needs and cool-season pasture production are mismatched. See Figure 1.4. The pasture is at its poorest quality and lowest production right when the cow needs the highest quality feed, after calving. Summertime heat and humidity also reduces rebreeding success; conception rates are low. Warm-season forage could help improve pasture quality but will not offset problems due to heat and humidity.

Calculating Daily Forage Dry Matter Intake

Although cattle need quality forages at specific stages of production, they also need an adequate quantity. Estimating the total amount of forage needed by a herd is not difficult but requires a calculation. The formula for determining daily forage dry matter intake for cattle is as follows.

$$\text{Daily dry matter intake} = \begin{matrix} \# \text{ of animals} \\ \text{in a class} \end{matrix} \times \begin{matrix} \text{avg. weight} \\ \text{per animal} \end{matrix} \times \begin{matrix} \text{forage dry matter} \\ \text{intake requirement} \end{matrix}$$

The pounds of forage dry matter needed per day for a herd is equal to the total of the daily dry matter intake

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Figure I.1 – Energy Needs of a Mature Beef Cow for Spring Calving

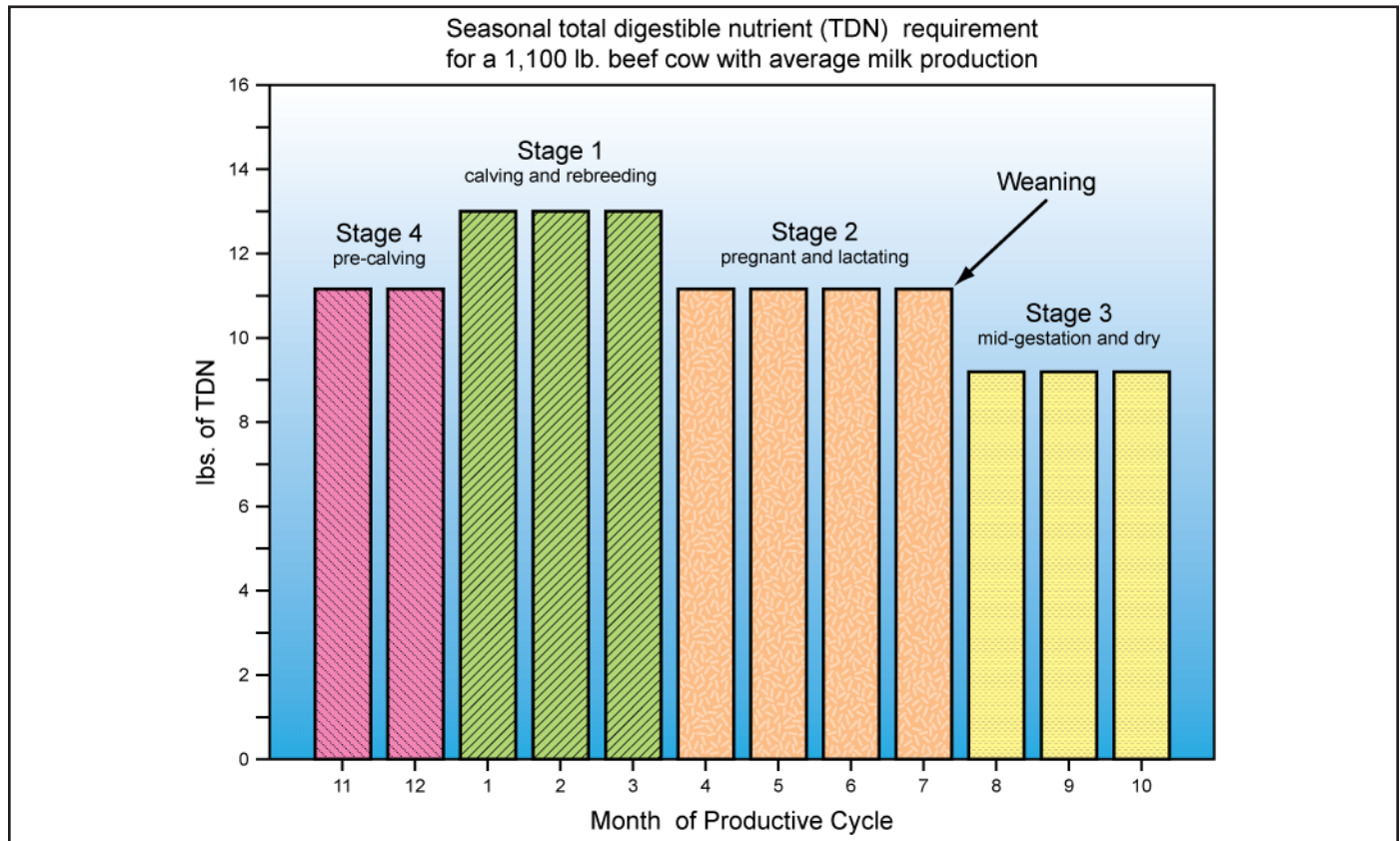
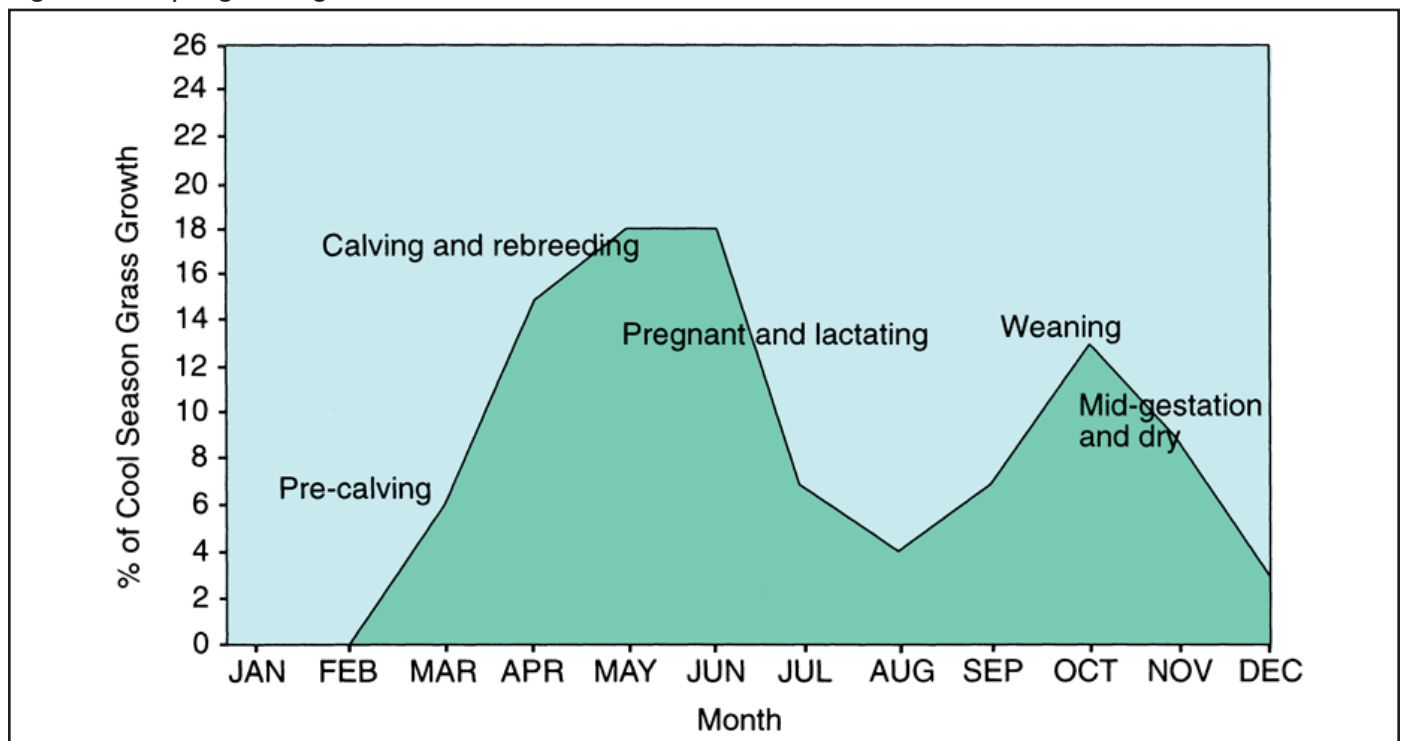


Figure I.2 – Spring Calving on Cool-Season Grass



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Figure 1.3 – Fall Calving on Cool-Season Grass

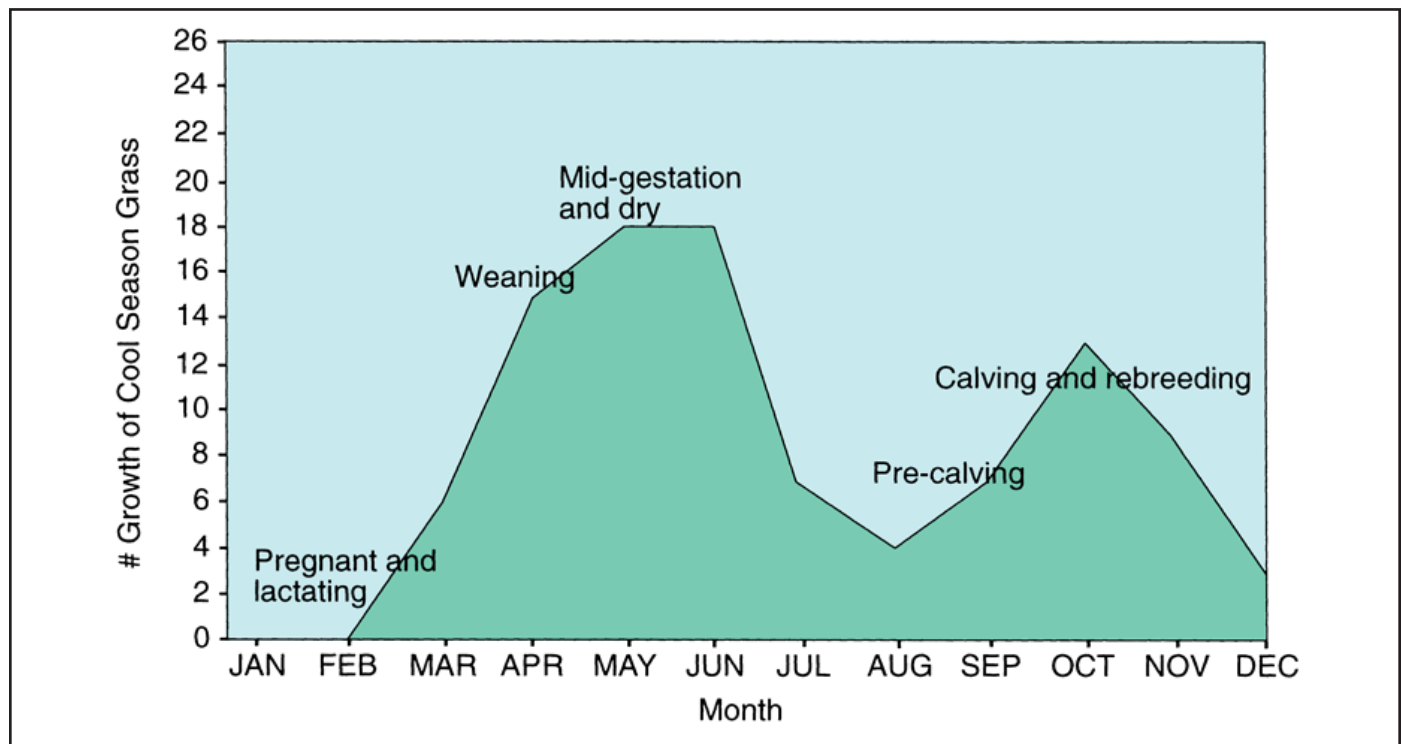
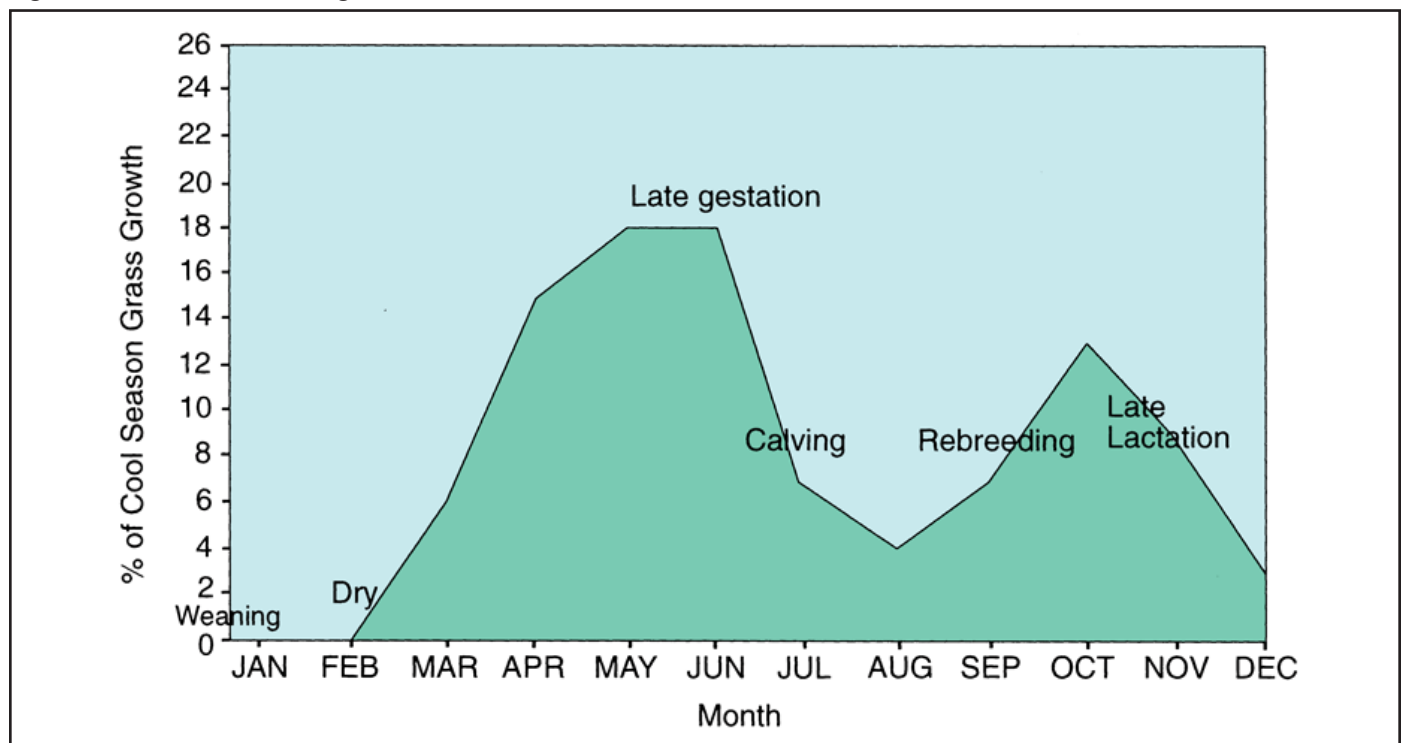


Figure 1.4 – Summer Calving on Cool-Season Grass



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for all the classes of cattle in the herd. The following example illustrates how to calculate forage dry matter intake requirements for a herd.

Example: 1 bull – 2,000 lbs., during breeding season
10 heifers – average weight of 750 lbs.
30 lactating cows – average weight of 1,100 lbs., average milk production

Solution: 1 breeding bull $\times$ 2,000 lbs. $\times$ 2.5% = 50 lbs.
10 heifers $\times$ 750 lbs. $\times$ 3% = 225 lbs.
30 lactating cows $\times$ 1,100 lbs. $\times$ 2.5% = 825 lbs.

The total for the herd is 1,100 lbs. (50 + 225 + 825 = 1,100 lbs.) of forage dry matter per day.

To calculate the forage dry matter intake requirements for a specific season, the pounds of dry matter needed per day are multiplied by the number of days in the season. For the above example, the seasonal dry matter intake requirements for spring (100 days) would be 110,000 lbs.

Summary

Understanding the nutritional needs of a livestock herd and how to meet those needs is the key to optimal production. Knowing the quality and quantity of forage needed for optimum livestock production allows the manager to make informed decisions concerning feeding practices. The manager can then use the grasslands more efficiently to meet the nutrient requirements of animals.

Credits

Blakely, James, and David H. Bade. *The Science of Animal Husbandry*. 5th ed. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1990.

Coambes, Howard, John Jennings, and David E. Pitts. *Grassland Evaluation Contest Study Guide*. University of Missouri-Columbia: Instructional Materials Laboratory, 1997.

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