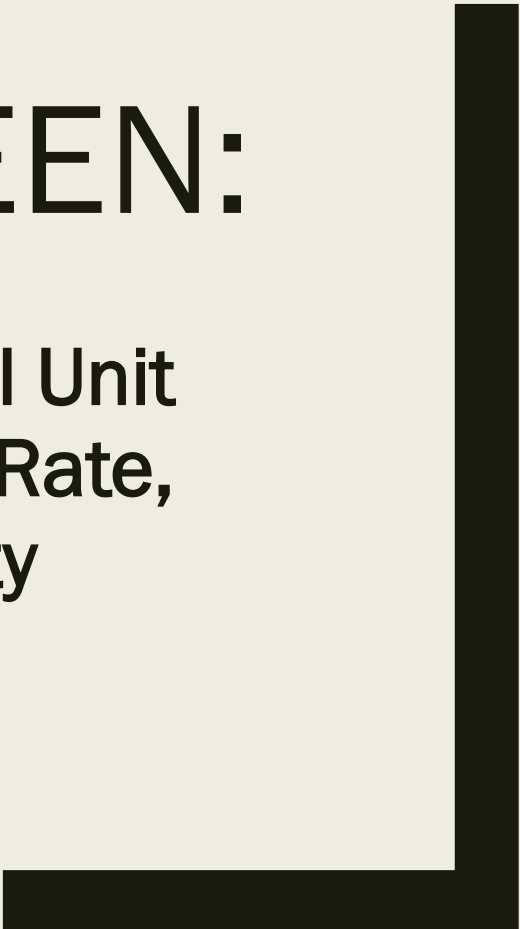




# LESSON FIFTEEN:

Animal Units (AU), Animal Unit  
Months (AUM), Stocking Rate,  
and Carrying Capacity



# Carrying Capacity

- Is the number of animals that a piece of land can support long-term without causing damage to the rangeland resource.
- Includes livestock and wildlife.
- Is sometimes called the grazing capacity.
- Is set by Mother Nature and determined by the ability of ecological sites to provide habitat to rangeland animals.
- Is controlled by the most limiting habitat factor within a home range.

# Stocking Rate

- Is the number of animals a land manager places or maintains on a piece of land over a specific time period.
- Refers to livestock and/or wildlife.
- Is set by humans through livestock and/or wildlife management.
- Livestock managers should account for forage consumed by wildlife (ungulates, insects, and other herbivores) when setting livestock stocking rates.

# Stocking Rates

Stocking rates should take into account livestock and when herbivores are numerous they should take into account wildlife.

The “take half, leave half” principle accounts for small numbers of wildlife, but when large herds of elk, deer or antelope are on the landscape, wildlife should be included in stocking rate calculations.

Stocking rates are important because they determine or affect:

- The amount of plant material that is left for wildlife habitat (food and cover).
- The amount of live plant cover and litter cover available to control erosion.
- The amount of organic matter in soil which aids in water infiltration.
- Livestock health and performance.
- Plant Health.

# Animal Units

Stocking rates are measured in terms of animal units and how much those animal units consume over a specific time period.

An animal unit is based the average amount of dry forage a standard sized beef animal will consume.

An animal unit (AU) is 1,000 pounds of grazing animal.

- A 1,000 pound cow is 1.0 AU
- The same cow with a calf averages 1.25 AU for the time that the calf is 3 month old through weaning.
  - With larger cows, 0.30 AU is added for the calf instead of 0.25 AU.
- A 1,200 pound bison is 1.2 AU.
- A 150 pound deer is 0.15 AU.

# Animal Unit Month

Animal Unit Month (AUM) refers to the amount of dry forage an Animal Unit (AU) will eat in a month's time.

According to the University of Nebraska-Lincoln, an animal unit (AU) will eat about 26 pounds of dry forage each day or 780 pounds each month.

Stocking rates are often rated as the number of AUMs produced per acre (AUM/ac) or the number of acres required to produce one AUM (ac/AUM).

- If the stocking rates of an acre of rangeland is 0.25 AUM/ac or 4 AC/AUM, 4 acres are needed to provide enough forage for 1 AU for one month.

The amount of forage that a site produces can be determined by clipping and weighing or by using the ecological site descriptions to estimate the average annual production for a site.



# Determining Appropriate Stocking Rates

It is important for the health and sustainability of the rangeland ecosystem to balance forage demand (what the animals require) with the forage supply.

Determining whether the number of animals is appropriate for the production on a site is as simple as using the following formula:

$$A \times U \times M = AUM$$

A = Number of Animals

U = Size of the Animals

M = Grazing time in Months

AUM = Animal Unit Months of Forage Required

Some managers like to calculate forage demand and supply in terms of days or AUDs.

# Stocking Rate Example #1

The US Forest Service issues a grazing permit for 600 AUM. The grazing period specified in the permit is June 1 through September 30. How many 1000 pound cows can be grazed in this grazing allotment?

$$A \times U \times M = \text{AUM}$$

In this case, we are solving for A:

$A=X$ ;  $U = 1000/1000 = 1.0$ ;  $M = \text{June} - \text{September} = 4 \text{ months}$ ;  $\text{AUM} = 600$

$$X \times 1U \times 4M = 600\text{AUM}$$

$$X = \frac{600 \text{ AUM}}{4.0 \text{ UM}}$$

$$4.0 \text{ UM}$$

$$X = 150 \text{ Animals}$$



# Stocking Rate Example #2

You are leasing a pasture that is rated at 1400 AUM of forage for the pasture. You have purchased 500 stockers that weigh an average of 600 pounds now and the planned weight at the end of the grazing period is 800 pounds. How long can this pasture be grazed

$$A \times U \times M = \text{AUM}$$

In this case, we are solving for M:

$$A=500; U=\{(600+800)/2\}/1000; M = X; \text{AUM} = 1400$$

$$500 A \times 0.7U \times XM = 1400 \text{ AUM}$$

$$X = 1400 \text{ AUM} / (500 A \times 0.7M)$$

$$X = 4 \text{ months}$$

# Stocking Rate Example #3

Your dad purchased 200 head of fall-calving bred cows. He tells you to lease enough rangeland to carry them from June 1 until the end of September (when they will go to deeded land). Average weight for the cows is 1250#. If you find acceptable rangeland with a carrying capacity of 0.8 AUM per Ac, how much land do you need to rent?

$$A \times U \times M = \text{AUM}$$

In this case, first we are solving for AUM and then acres.

$$A=200; U= 1250/1000; M = 4; \text{AUM} = X$$

$$200A \times 1.25U \times 4M = X \text{ AUM}$$

$$X = 1000 \text{ AUM}$$

$$1000 \text{ AUM} / 0.8 \text{ AUM/ac} = X \text{ acres}$$

$$X = 1250 \text{ Acres needed}$$

# Stocking Rate Example #4

You decide that running your Dad's ranch is too much work so you want to lease it out for 12 months. The ranch has 2000 acres with an average carrying capacity of 1.2 AUM per Ac. The ranch can carry:

$$\text{Total AUM} = \text{Ac} \times \text{AUM per AC}$$

$$\text{Total AUM for Ranch} = 2000 \times 1.2 = 2,400 \text{ AUM}$$

You think that 1 AU is equal to 1 beef animal, so you calculate the number of animals the ranch can support for 12 months:

$$X \text{ A} \times 1.0 \text{ U} \times 12 \text{ M} = 2400$$

$$X = 2400/12 \text{ Or } 200 \text{ Animals}$$

You sign a five year contract with your good neighbor. The contract allows the neighbor to graze a maximum of 200 "head of cattle including bulls" year long. You are happy that you leased your land so quickly.

**But then:**

# Stocking Rate Example #4

After the ink is dry and the contract notarized, your friendly neighbor brings in 192 cows that average 1500 pounds each and 8 bulls weighing 2200# each.

- A cow weighing 1500# is 1.5 AU.
- The calves from the age of 3 months until weaning at 6 months are 0.30 AU.(After weaning, the calves are sold).
- A bull weighing 2200# is 2.2 AU.

The total AUM needed by the cattle grazing your Dads ranch is:

192 cows x 1.5 AU/animal =288 AU

288 AU x 12 M = **3,456 AUM required for cows**

8 bulls x 2.2 AU/bull = 18 AU

18 AU x 12 M = **216 AUM required for bulls**

182 calves (assuming 90% calf crop) x 0.3 AU = 55 AU

55 AU x 3 M = **165 AUM required for calves**

**Total forage demand for the herd for a year: 3,837 AUM**

The ranch is supporting 3,837AUM/12 M or 320 AU.

**See next page.**

# Stocking Rate Example #4 - Consequences

Your Ranch can support 200 AU year round but your lease has the wording that 200 head of cattle including bulls could be on the property.

- Your neighbor is running 200 head but 320 AU.
- Your Dad's ranch is overstocked by 120 AU.

**You lost  $(120/200) * 100$  or 60% of lease fees that you could have had AND your range is going to be overgrazed for 5 years.**

By not understanding stocking rates you lost significant income and overgrazed the ranch which can have serious ecological consequences.



# Activities and Review

- Think about stocking rate example 4. What ecological consequences can occur due to the 60% overstocking in that example.
- Develop other stocking rate examples and solve for either number of animals, length of time, or AUMs needed.
- <https://www.ag.ndsu.edu/archive/streeter/2006report/aums/Doing%20the%20Math.htm>
- <https://articles.extension.org/pages/58097/calculating-stocking-rate>



END OF LESSON FIFTEEN