

Carrying Capacity & Stocking Rate

What Are They?

by Paul D. Ohlenbusch



Carrying capacity and stocking rate are terms that are related but very different. Many folks tend to confuse them. Others don't know what to do. So, let's see if we can get a better understanding of both and how they relate.

Stocking Rate - Wikipedia, the online "encyclopedia," defines stocking rate as the number of farm animals that can be effectively grazed on any area of land. The rate will vary greatly depending both on the type of livestock, the fertility of the land, and the climatic conditions. Stocking rates are expressed in terms of number of stock per hectare or acre.

Similar definitions include "the amount of land allocated to each animal unit for the grazable period of the year (Society of Range Management) or "stocking rate is the number of animals stocked per acre of grazing land in a management unit for a defined period of time (University of Maryland). Another is "stocking rate is the number of animals on a pasture during a month or grazing season, and is usually expressed in animal unit months (AUM) per unit area (Agriculture and Agri-Food Canada).

Carrying Capacity - Wikipedia defines carrying capacity as the population level that can be supported for an organism, given the quantity of food, habitat, water and other life infrastructure present. Carrying capacity is thus the number of individuals an environment can support without significant negative impacts to the given organism and its environment.

Other definitions of carrying capacity, also known as grazing capacity are available. From the University of Maryland, "carrying capacity is the stocking rate that achieves a targeted level of animal or economic performance over a defined period of time without causing deterioration of the pasture ecosystem."

Dr. Barry Dunn, South Dakota State University, has defined carrying capacity as "the maximum stocking rate possible year after year without causing damage to the resources base."

Agriculture and Agri-Food Canada suggests carrying capacity describes the average number of animals that can be placed on a pasture for a season without harming it. It is expressed in AUMs. It is a measure of a pasture's ability to produce enough forage to meet the requirements of grazing animals.

Animal Unit Month (AUM) - AUM is the link that is important. But what is it? AUM is defined as the amount of forage required by one animal unit (AU) for one month. One animal unit is defined as a 1,000 lb. beef cow with or without a nursing calf with a daily requirement of 26 lb. of dry matter forage. Therefore, on AUM is equal to 780 lb. of dry matter forage (30 days x daily forage requirement). (Agriculture and Agri-Food Canada)

Colorado's Ag in the Classroom material defines an AUM for deer as 0.20 AUM. This is the same as sheep and goats (also llamas). Does size of the deer make a difference? Yes! As with cattle, the weight of the animal is important. A 1,200 pound cow requires roughly 20% more forage than a 1,000 pound cow. So, a 125 pound deer should require less forage than a 175 pound deer. Also, cattle, sheep, goats, and deer have different dietary preferences. Cattle are primarily grass eaters, sheep forb eaters, goats and deer browse eaters. How you arrive at carrying capacity changes as you change the type of animal.

An Example A trained and experienced individual determines by a pasture survey estimate there is 3,500 pounds of dry matter per acre, does that mean there are 4.5 AUMs per acre? No. What makes up the dry matter and the type of animal determine the AUMs available plus a "harvest factor" normally considered to be 50%. Looking at the make up of the dry matter, the estimate is 2,500 pounds of grass, 700 pounds of forbs and 300 pounds of browse, what is the deer and cattle carrying capacity? Here are the results: deer = 3.2 AUMs and cows (1,000 lb) = 1.6 AUMs. The calculations are deer: 700 pounds of forbs plus 300 pounds of browse divided by 780 pounds times 0.2 AUM times 50% available; cows = 2,500 divided by 780 times 1.0 AUM time 50%.

To take this further, if the forbs and browse were primarily species that are not quality deer forage, does that make a difference? Yes! That means the deer will utilize more grass and compete with the cows. With competition, both deer and cattle will suffer.

Other factors also are important. Slope must be considered. A recent change in the determination of carrying capacity is adjustment for slope. The general adjustment, developed by Dr. Jerry

MANAGEMENT NOTES FOR MARCH-MAY



- Review rainfall history and current soil moisture status. Soil moisture is needed for early season good growth. Limited or no soil moisture can mean little plant growth.

- South Texas and Gulf Coast - monitor for introduced and invasive weed and brush

Holechek, is no reduction for 0-10% slopes, 30% reduction for 11-30% slopes, 60% reduction for 31-60% slopes, and 100% reduction for slopes over 60%. This is due to the tendency for animals to prefer the more level areas for grazing and browsing.

Common Ground Let's look at the above definitions and see if we can formulate a "working" definition of each term.

Carrying capacity should be determined by estimating the dry matter available for each type of animal and determine how many of a given sized animal the area will support without damaging or causing deterioration of the grazing resource. The resulting number should be the proper stocking rate. Change the animal or the forage production and the relationship changes.

However, stocking rate is often determined by tradition, history, neighbor-to-neighbor, and other ways. Even the stocking rate definitions above have no link to the forage resource and its future. What is your stocking rate? How did you determine it? Interesting questions?

Want to look at the references? Go to www.grassbydesign.com/tda.htm

Next time: Stocking rate and economics

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