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### **Soil and Fertility Effects on Carrying Capacity**

In our cool season grass production systems, fertilizer applications are a given. Brome and fescue respond to fertilizer – and suffer when it is lacking – so we soil test or come up with a good fertility management program and then apply annually accordingly. Most of the time that application gets us a nice response and we don't think much about it. Sometimes, responses may seem inconsistent and a deeper dive into what's going on might be needed.

Analysis of weather patterns is always a good place to start. There's a neat chart in our *Kansas Grazingland Management* handbook showing how 'front loaded' in the early part of the growing season of our cool season grass production systems are with almost 50 percent of the season's production occurring in the month of May. If conditions (moisture or temperature) trend toward the extreme and forage growth is affected, there's not a lot of room for recovery.

Weather isn't the only factor to consider, however. We know the previously mentioned fertility programs can be an issue, and a fertility program's interaction with soil can affect things as well. In that same handbook, there's a chart outlining average animal carrying capacities as a function of both soil depth and fertility level. A moderately deep soil with medium fertility (average soil/average fertility, so to speak...) might give you a carrying capacity (or yield) of around 1.2 animal unit months per acre (or AUMs – an AUM being the amount of forage consumed by 1000 pounds of animal in a month). Increase fertility to the high range and you might increase production by a third. Reduce fertilizer levels and production drops in half.

Soil depth is a big player as well. Deeper soils might provide 2.2 AUM/A whereas even a moderately deep soil – even within the same farm – might yield 50-60 percent of that. Start to increase fertility levels on a site and the difference becomes even greater. It's a good reminder that whether you're dealing with a grazing animal or putting up a site or hay, production differences *do* exist and they *can* be large.

Most of the time we have a pretty good idea of a site's overall productivity because we're familiar with it. If you are trying to enhance grazing management– or troubleshooting a lack of production – take a second look at the site to see if there are differences in soil depth that need to be considered. The USDA Websoil Survey (<https://websoilsurvey.nrcs.usda.gov/app/>) is a great place to start. Other grazing productivity sites might have some application as well.

Drop me a line for more information on the brome data from the *Kansas Grazingland Management* handbook. It's an interesting look at the differences we know exist across our forage acreages, with numbers to show how great those differences really are.