Managing during and after drought – Part II

Management considerations for central and eastern Nebraska

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In a state with such a diverse grazing land resource as Nebraska, one might think that drought management techniques would also be quite different in Scottsbluff as compared to Beatrice. After all, the average annual precipitation in the Scottsbluff area is just over 15.5" – half of the 31" figure for the Beatrice area. This difference in precipitation produces different annual production and different plant communities; however, management considerations are very similar.

In western Nebraska, drought seems to be on ranchers' minds every year, but not in central and eastern Nebraska. Is that because drought is more frequent in the western part of the state? One would expect that to be the case, but the records show that drought is common throughout the state. In the past 50 years, drought has occurred five times in the Norfolk area, seven times in Scottsbluff, Oshkosh and Kearney, nine times in Valentine and Imperial, and ten times in Pawnee City. Since 2000, drought was most common in the southern part of the state, with five years at Pawnee City and four years at Imperial.

In terms of when precipitation occurs, there is little difference from west to east. The proportion of precipitation that occurs each month is very similar from east to west and north to south. By April 1, 25% of the growing year precipitation will have occurred, by May 1, 35%, and by July 15, 70%.

If precipitation patterns are similar across the state, we would expect the timing of forage production to be similar. Timing of forage production on sands and sandy sites matches precipitation and temperature. In southern Nebraska, approximately 75% of forage production is completed by about July 10. That amount of production in central and northeast Nebraska is reached about two weeks later, and northwest Nebraska slightly later. However, on loamy sites, the timing of production is the same for southern and northwest Nebraska because the plant community in northwest Nebraska has more cool-season grasses. This causes more of the forage production to occur earlier in the season.

In terms of the potential plant community, there are significant changes in the species composition that drives production across Nebraska. Much of the difference is due to climate, particularly precipitation and relative humidity, but some of the difference is due to soils and their water-holding capacity. The difference in plant communities is most pronounced on loamy upland sites, which are some of the most productive sites in all of Nebraska. Production on loamy upland sites ranges from an average of 1800 lb/ac in extreme northwest Nebraska to 4250 1b/ac in southeast Nebraska, and precipitation ranges from 15.2" at Harrison to 34.4" at Falls City. In eastern Nebraska, native tall warm-season grasses – big bluestem, switchgrass, Indiangrass and eastern gamagrass – are the dominant grasses in the reference plant community. Other common grasses are little bluestem, sideoats grama and porcupine grass. Moving west, the amounts of tall warm-season grasses decrease and mid-grasses increase significantly. In western Nebraska, tall warm-season grasses make up less than 10% of the plant community, which is

dominated by western wheatgrass, green needlegrass, needleandthread and sedges. The production reflects the change in plant community from tall grass to cool-season mid-grasses.

The drop in forage production on sands and sandy sites from east to west is also significant. In northeast Nebraska, production on sands sites averages 2800 lb/ac, 1900 lb in northwest Nebraska and 2100 lb in southwest Nebraska. In all parts of the state, the reference (or potential) plant community is dominated by tall warm-season grasses, with significant amounts of warm-season mid-grasses.

So, there are significant differences in precipitation that cause significant differences in production, and differences in the plant community. But do these differences in plant communities and production mean that the basis of management decisions should change across the state?

To answer this, we need to monitor the grass to determine the amount of drought recovery. Things to monitor include:

1. Current forage production and whether supply and demand are balanced
2. Amount of bare ground and litter cover
3. Death loss and amount of reproductive capacity
4. Amount of leaf area (canopy cover) before and after grazing
5. Plant community composition including weedy, invasive or poisonous plants

After a drought, people comment about how green the pastures are, thinking that grass production has returned to "normal." After a drought, the individual forage grasses are tall, but the stand is thin. Cool-season grasses have a flush of growth and utilize a large percentage of the available moisture. The warm-season grasses will often produce less than normal not only because fewer buds were produced during the drought years, but also because the cool-season grasses have utilized a large percentage of the soil moisture. It is always important that the stocking rates are balanced with forage production, but during drought recovery, it is doubly important. In eastern and central Nebraska, unbalanced stocking rates tend to favor cool-season grasses, and smooth brome will increase at the expense of warm-season grasses.

In semi-arid and arid areas, bare ground and litter cover are very important for drought recovery and rangeland health. One might think that bare ground is not an issue in eastern Nebraska unless stocking rates are unbalanced. However, research by Dr. John Weaver during the 1930s found that bare ground was common in the tall and mid-grass prairies of Iowa, Nebraska and Kansas during and after dry years. In years with average or above precipitation, canopy and litter will provide high levels of cover. On healthy tall and mid-grass prairies, ground cover will be 90-95%. This includes canopy cover and litter cover. It is just as important to delay grazing until plants have produced adequate cover in the tall grass prairie as it is in semi-arid portions of the state. Litter cover can be below desirable levels even in wet years if leaf removal is excessive or if pastures are grazed multiple times without adequate recovery.

Death loss is a serious problem in arid areas during and after a drought. In higher rainfall areas, reduced reproductive capacity is more of an issue, if plants are given adequate recovery times. But, dead plants can be an issue in times of extreme drought. Dr. Weaver's study of tall grass prairie plants during the 1930s also found that during periods of extreme drought, big bluestem survives, but grasses with

shallower roots such as little bluestem, prairie junegrass and needleandthread, or plants that require more water such as Indiangrass, experience death loss and are replaced by less productive but more drought tolerant grasses such as blue grama and western wheatgrass. If the plants are given adequate recovery time, the reproductive capacity will recover and the plants will increase in abundance. If the plants are not given adequate time to recover, the less desirable plants will replace the more desirable plants.

In all environments, plants need to have adequate recovery time after being grazed and after breaking dormancy. The amount of leaf area is an indication of recovery. NRCS has some guidelines for the amount of growth that should be present before and after grazing. Tall grasses – big bluestem, Indiangrass and switchgrass – can safely be grazed when the leaves are 10" long, while grazing should be delayed for eastern gamagrass until the leaves have 18-20" of growth. Mid-grasses can be safely grazed when 7-8" are present. The amount of forage removal is also important. The long-time recommendation of take half/leave half is still a good guide, but not until the grass has adequate growth. If you have difficulty visualizing what half looks like, you can look at the amount of leaf remaining after grazing to estimate how much of the plant was grazed. Six inches of leaf length should remain after grazing tall grasses (10" for eastern gamagrass) and 3" should remain after grazing mid-grasses. Due to the smaller stature of grasses found in the Nebraska Panhandle, the leaf lengths can be reduced by 25% in that area.

The amount of leaf area not only impacts plant recovery, but also impacts the amount of ground cover. Ground cover is important for water infiltration, erosion control, reducing evaporation and reduced soil surface temperatures.

Several long-term studies in the Great Plains found that management before, during and after drought was the key to permanent impacts on the plant community. Shifts in plant communities will occur, but will reverse after several years of average precipitation if the plant community is healthy. During the drought of the 1930s, little bluestem shifted from a co-dominant in the plant community to a small component of the community. Rhizomatous grasses, especially big bluestem and western wheatgrass, did well when the precipitation returned to average. It has been said that the mixed grass prairie moved 100 miles east during the drought. In situations where the range was in a healthy state going into the drought, the plant community eventually returned to the diverse community it was prior to the drought. In other situations, the community did not recover to pre-drought diversity. Management, especially after the drought, determined which plant community persisted.

As the land recovers from a drought, nature moves to cover the areas that are left bare due to death of plants and the reduced number of tillers. The plants that move into the bare areas include more drought tolerant grasses like blue grama, buffalograss and tall dropseed and annual forbs like marestail or horseweed and sunflowers. These forbs are quite numerous for one or two years and then their numbers reduce to a relatively small amount. This is part of the normal recovery process for rangeland. Weedy forbs offer cover that provides the same benefits that grass canopy and litter cover provide and are important to the recovery process

Most of our rangelands contain small amounts of poisonous plants; poisonous plants are usually unpalatable or palatable for only a short period of time. They are also usually a small part of the plant community so they usually are not a problem. However, after a drought, a poisonous plant may be the plant that moves into the bare areas. After a drought, it is advisable to scout your pastures before turning in. If you notice any forbs that aren't usually in your pasture, make sure that they are not poisonous. This year prairie larkspur has been a problem in western Nebraska, causing a number of livestock deaths.

Although the differences in precipitation from east to west result in different plant communities across the state that differ significantly in annual production, management considerations from east to west are quite similar. The principles of plant recovery, the value of canopy and litter cover, balancing forage demand and forage supply, and the importance of a healthy root system apply to our grasslands – be they tall-grass, mid-grass or short-grass prairie ecosystems.