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Planning Ahead to Save AUMs and the Cow Herd in Times of Forage Shortage

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Introduction

Drought is a recurring phenomenon with potential to significantly impact the livestock industry. During the past 14 years, the majority of livestock producers in the Great Plains and western states have experienced some level of drought ranging from moderate to extreme or even exceptional. Many grazing experts recommend developing a ranch drought plan to reduce their drought risk (Nagler et al. 2007). Most of these plans are specifically customized to an individual operation and include both short-term and long-term strategies and objectives. Producers with a drought plan actively monitor resources; build ecological, financial, and social resilience into their operations; and are proactive during drought in order to minimize short- and long-term damages. Many existing drought education efforts take place focus on short-term response and recovery. Such ad-hoc responses often fail to enhance long-term rangeland sustainability and ongoing drought vulnerability (Wilhite, 2005). Drought response programs that encourage ranchers to "wait and see" may result in overgrazed and degraded rangelands (Thurow and Taylor 1999). In addition to drought, other events such as grasshopper infestations, wildfire, or severe hail also can result in forage shortages. These events must also be included as part of an overall plan.

Variability in Precipitation and Forage Production

Varying amounts of precipitation from year to year or during periods within a year has presented a challenge to agriculture for centuries. By one definition, drought conditions exist when precipitation is 25% below the average for a defined period of time. For many Great Plains and western states, it is not uncommon for a location to have recurring drought whether it is described on a yearly basis or during a critical period during the growing season (Fig. 1).

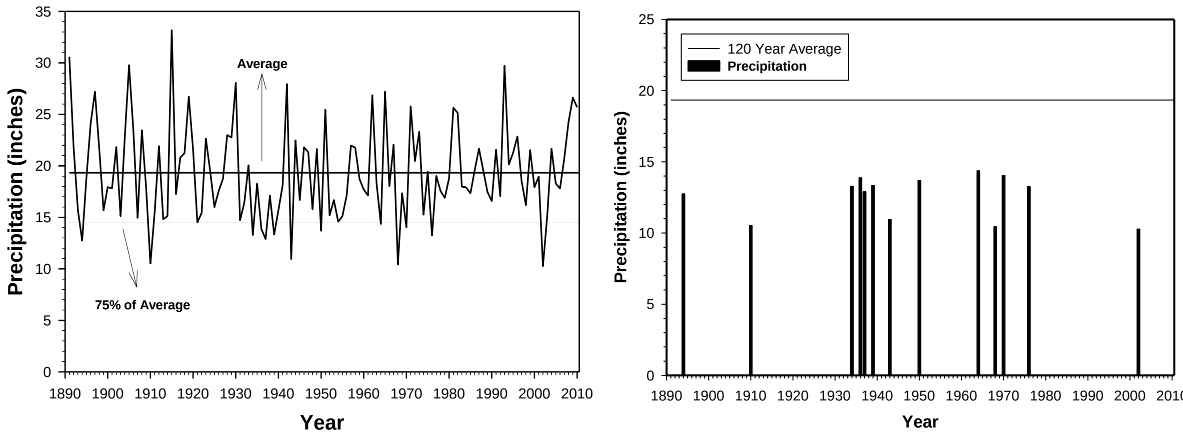

Figure 1. Long-term annual and average precipitation (left) and occurrence of drought years (< 75% of average) (right) at Imperial, NE.

It is well known that precipitation is the most important factor affecting forage production from native rangelands or seeded pasture. As a result, typical year to year variation in precipitation results in variable forage production. For example, data from the University of Nebraska-Lincoln Barta Brothers Ranch in the east-central Sandhills show upland range annual production ranging from 880 lb/acre during a moderate drought year (2002) to as high as 2630 lb/acre during 2009 (Fig. 2). The range of production observed over this 12-year period has important implications associated with grazing management and stocking rates. Based on the average production (1770 lb/acre), a suggested stocking rate for this rangeland would be about 0.75 AUM/acre. However, a calculated "proper" stocking rate based on actual yearly production would range from 0.37 AUM/acre in 2002 to 1.11 AUM/acre in 2009. In general, all rangeland types experience this wide range in annual production. On mixed grass prairie in eastern Wyoming, Derner and Hart (2007) reported a production range from about 100 lb/acre during a severe drought to over 2000 lb/acre with wet conditions.

Equally important is the timing or seasonal distribution of precipitation. Forage production responses also will vary or interact with precipitation timing depending on the pasture composition of cool- and warm-season species or soil water holding capacity. For the warm-season grass dominated Sandhills range (Fig. 2), total May, June and July precipitation was found to have the greatest correlation with production (Fig. 3). In western South Dakota on mixed grass plant communities, Smart et al. (2007) reported spring (April, May, and June) precipitation as the best predictor of production. For the eastern Wyoming mixed grass prairie, April and May precipitation had the greatest correlation with production (Derner and Hart 2007).

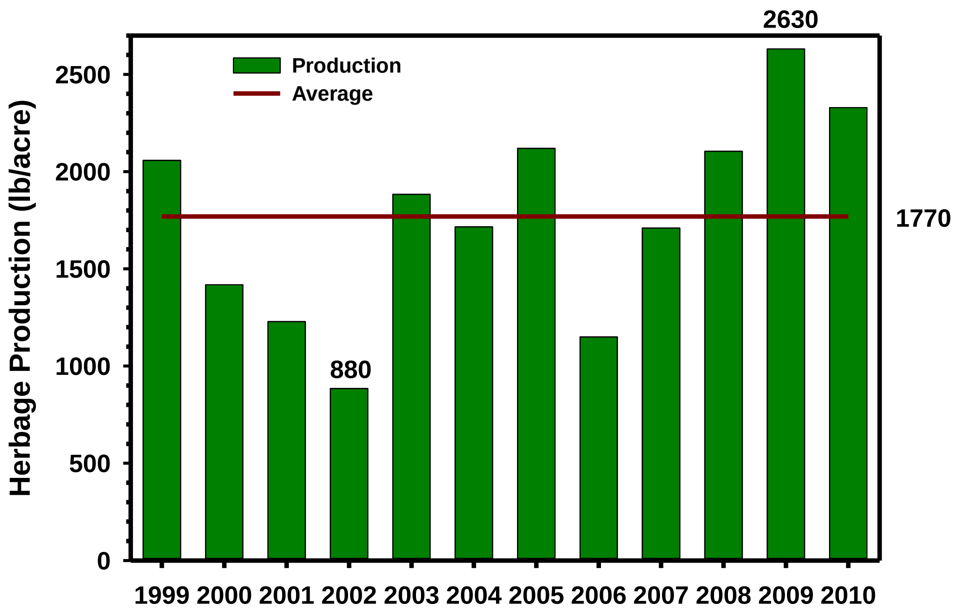

Figure 2. Average and annual herbage production at the UNL Barta Brothers Ranch located in the eastern Nebraska Sandhills, 1999 – 2010.

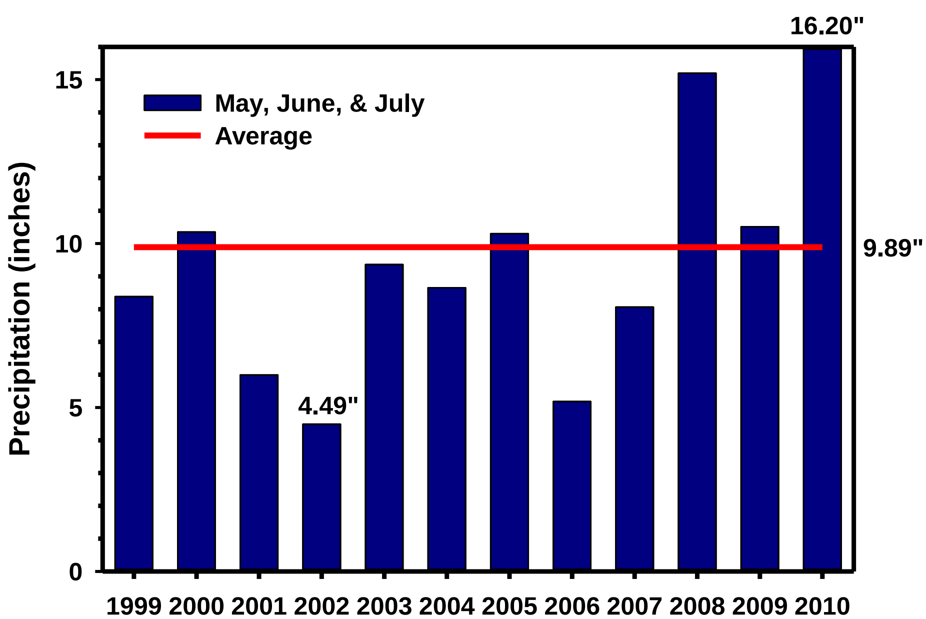

Figure 3. Average and annual precipitation during May, June and July at the UNL Barta Brothers Ranch located in the eastern Nebraska Sandhills, 1999 – 2010.

These relationships between precipitation timing and amounts can enable rangeland managers to estimate herbage production before the end of the growing season and assist them in making informed decisions regarding stocking rates or other management strategies. Because production responses can vary with type of plant community, managers should have knowledge of plant composition of their pastures and maintain or have access to current weather records and information.

Effects of Drought on Rangeland

Aside from the reduced aboveground plant growth and forage production, there are short-term effects of drought on range grasses. These include reduced root growth, reduced rhizome and bud development for vegetative reproduction, or summer dormancy as a self-protection mechanism. In some cases, plant death may occur. Over the long-term and on a landscape basis, it is common to see some changes in species composition. For most ecological or range sites, there is a tendency for plant communities to shift to an earlier successional stage with prolonged drought. The extent to which these events occur is dependent of the duration and severity of a drought as well as range health prior to a drought.

Another effect of drought that has implications to livestock nutrition is that plants may reach maturity much earlier in the season which is directly related to their nutritional value. Reduced availability of current-year grass growth might also force consumption of low quality residual forage from previous years. An example of this effect is shown in Table 1.

Table 1. Crude protein (CP) and total digestible nutrient (TDN) content of cattle diets on Sandhills range from non-drought average years and during the drought year of 2002.

	CP (%)		**TDN (%)**	
Date	**Average**	**2002**	**Average**	**2002**
June 7	12.3	12.7	69	53
July 16	11.0	8.2	63	49
July 30	10.3	5.9	60	50
August 20	9.3	5.6	57	49
September 5	8.6	7.5	56	48
October 14	6.7	5.9	54	48

Strategies to Save Pasture AUMs

Planning ahead is critical to offset the reduced forage supply caused by drought. In addition to finding additional forage, reducing animal numbers and weaning early are commonly applied strategies that will save pasture. An example using these strategies to save AUMs is shown in Table 2.

Table 2. Summary of herd management actions used at the UNL Gudmundsen Sandhills Laboratory during the 2002 drought and resulting AUM savings.	
Action	**AUMs saved**
Kept inventory current – culls sold as identified (n = 18)	18
Identified 15 cows as culls in May. These were sold in June as pairs instead of at weaning. (n = 15 pairs less for 5 months)	113
Weaned March born calves in September (1 month early). (n = 300 calves less for 1 month)	120
Steer calves shipped within 10 days of weaning (included in above action)	
Surplus heifer calves sold 3 weeks after weaning (2 months early)	24
Reduced March calving herd by 5% (15 cows) and sold remaining open and culls in September. (30 fewer cows due to June sales and the 15 reduction for 9 months (Sept. thru May)	324
20 open cows sold in Sept. (2 months early)	48
110 cows to corn stalks in early November to late February	475
25 pregnant June calving cows sold in January rather than in April	75
Total AUMs Saved for Cows (58 days for 520 cows)	**1197**
Estimated savings in hay = 140 tons or about 18 days for the entire herd.	
TOTAL COW DAYS OF FEED SAVED FOR 520 COW HERD = 58 (grazing) + 18 (hay) = 76 Days	

The pasture forage savings and benefit of early weaning is a result of the reduction in nutrient requirements for the cow as well as calf forage consumption. It is estimated that about 10 lb of forage is conserved for each day that a calf is weaned. Ten pounds of forage is about 40% of the daily requirements for a cow. With early weaning, cow weight and body condition later in the fall will also be greater compared to cows that had calves weaned at more traditional fall dates (Ciminski, et al. 2002).

Whether done on pasture or in drylot, feeding hay during traditional grazing months to overcome pasture forage deficits can be a viable option for some producers. The effects of limit feeding grains on cow forage consumption on pasture are not always predictable. Recent research has shown that wet distillers grains mixed with low quality forage and fed to cow-calf pairs while grazing summer pasture will reduce grazed forage intake (Nuttelman, et al. 2010). Similar results were found for dry cows and yearling steers (Doerr et al. 2012). The amount of grazed forage replaced will depend on the proportion of wet distillers and forage in the mixtures and the total amount fed. For limit feeding in drylot, it is recommended to feed dry cows and not pairs. The analysis of feeds is essential and the diets should be formulated to meet cow requirements.

Alternative Forages

Seeded annual or perennial forages to increase forage supply during drought can be an option for producers that have cropland available. Although irrigated land would have the greatest potential, there are several forage choices possible for dryland seeding.

The primary cool-season perennial grasses that have been used in irrigated pasture in Great Plains include orchardgrass, smooth bromegrass, meadow bromegrass, creeping foxtail, intermediate wheatgrass, and pubescent wheatgrass (Volesky and Anderson 2010). Mixtures of several grass species are most often recommended rather than the use of a single species. The species in a mixture should be similar enough in animal preference to allow management of the pasture as a whole, but diverse enough to contribute to a range of beneficial traits. Most fields have variation in soil type, fertility, and moisture, and each of the grass species have some differences in their adaptation to the sites within a field. Creeping foxtail, for example, is a species that is well adapted to low, wet soil sites. Irrigated cool-season perennial grasses offer flexibility with regards to use whether it be grazing at different times of the year, haying, or combinations of haying and grazing (Nichols et al. 1993).

Annual forages grown under irrigation have potential for use in several situations. This would include such things as a short-term or an emergency need for forage. Some cool-season annuals that may be used include the winter annuals, wheat, rye, and triticale; spring planted oats and barley; or summer planted oats and turnips. Warm-season annuals include sorghum-sudangrass hybrids, sudangrass, and pearl millet. With proper planning, cool- and warm-season annuals can be successfully used in a double-cropping plan. Forage production from a double-crop of annuals can be comparable or even greater than perennial forages; however, there are the extra costs associated with seeding the annuals. Limited irrigation techniques are also available for all of these forages (Volesky and Berger 2010). A number of these annual forages do have the potential to accumulate nitrates when growing under drought-stressed conditions, so testing these forages prior to grazing or feeding is advised.

Table 3. Annual crops grown for supplemental grazing or hay production.

Type	**Planting time**	**Period of grazing or hay harvest[1]**
Cool-season		
Winter wheat	mid-Aug. to Oct.	some fall grazing, primarily Apr. - June
Rye	mid-Aug. to Oct.	some fall grazing, primarily Apr. - May
Triticale	mid-Aug. to Oct.	some fall grazing, primarily Apr. - June
Oats, annual ryegrass	March - April	May – July
Oats, annual ryegrass	July - August	September – November
Turnips, forage rape, radishes, other brassicas[2]	July - August	September – November
Peas, lentils[3]	July - August	September – November
Warm-season		
Sudangrass	late-May to Aug.	July – November
Sorghum-sudangrass hybrids	late-May to Aug.	July – November
Sorghums	late-May to Aug.	July – November
Pearl millet	late-May to Aug.	July – November
Foxtail millet	late-May to Aug.	July – November

Teff	late-May to July	July – September
Crabgrass	late-May to July	July – September
Corn	May – June	July – October
Cowpeas	May – July	August – September

[1] Period of grazing or hay harvest will vary with planting date.
[2] All brassicas can be spring planted, but yield is often greatest with summer planting.
[3] Most often planted in a mixture with oats.

Drought and Drought Planning Resources

There are several sources where producers might look for information related to drought management strategies and drought planning. One recently developed site by the University of Nebraska-Lincoln National Drought Mitigation Center (NDMC) features a comprehensive web-based drought planning guide for rangeland managers, "Managing Drought Risk on the Ranch" (Fig. 4). The website provides planning guidelines that assist producers in setting goals and determining critical dates and decision points; developing inventory and monitoring strategies; identifying appropriate management options before, during, and after drought; and finding help and resources.

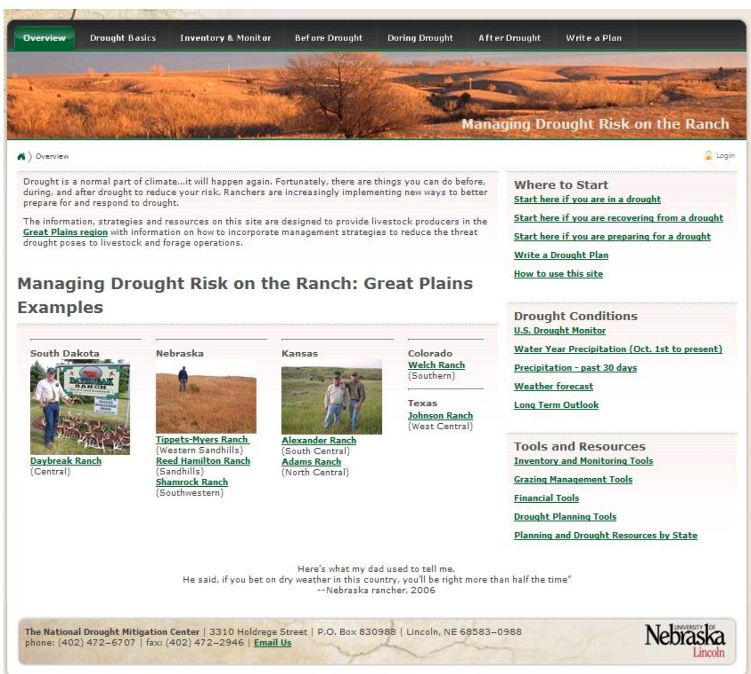

Figure 4. National Drought Mitigation Center website: "Managing Drought Risk on the Ranch" available at: www.drought.unl.edu/ranchplan

The website was developed with the input of ranchers and advisors through project planning meetings, interviews, and a regional workshop. Ranchers and advisors from eight states (ND, SD, WY, NE, CO, KS, TX, and CA) were interviewed during the project. The website specifically addresses the needs of livestock producers in the Great Plains states.

Supporting the Managing Drought Risk on the Ranch planning methodology are new tools such as VegDRI, a new vegetation drought response index providing valuable information for sustainable rangeland management; GPFARM, designed by the USDA-ARS Great Plains Systems Research Unit in Ft. Collins, CO, to support sustainable stocking rates and grazing management; and financial decision-making tools, including a partial budgeting program for ranch drought management available through UNL's AgManager's Toolbox; and other new tools.

The FCIC's Pasture, Rangeland, and Forage Insurance program is also relatively new to livestock and forage producers in this region, and may be underused as a drought mitigation tool. The program requires users to develop the capacity to identify key forage production months, acres critical to production, and pasture productivity. Many producers currently lack this capacity, and lack understanding of when use of this and other crop insurance tools is recommended, and may mistrust the program for relying on area-wide effects rather than individual losses.

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