Writing Your Drought Plan

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Drought is a natural part of every rancher's production environment. In the Great Plains, the frequency and duration of drought tend to diminish from west to east as average annual precipitation and length of the frost-free period increase and from south to north as evaporation rates decline and growing-season day length increases.

Computers, cell phones, and digital cameras are an inseparable part of our lives. Information is processed by our electronic equipment according to numerous default settings unless we take time to understand and select other options. If we ignore the defaults on our electronic equipment, most of us are satisfied. In contrast, the default settings of drought all have extremely undesirable outcomes. Collectively, drought default or do-nothing settings provide the best possible opportunity for business failure.

The best management decisions are always on the front side of a drought. Preparation of a drought plan and maintaining a positive attitude are guaranteed to reduce anxiety and prevent management paralysis.

Ranchers who use written drought plans are much more likely to avoid costly and sometimes career-ending mistakes than those with no drought plan. Risk of business failure is greater during and following drought than at any other time. Increased cost of production, damage to rangeland resources and depressed livestock markets can cause measurable changes in the solvency and recovery potential of range livestock enterprises.

The "Managing Drought Risk on the Ranch" website (drought.unl.edu/ranch plan) contains a wealth of information for ranch management. Guidelines for developing your drought plan are a subset of the available information. Most of the content is organized into the categories of (1) during, (2) after, or (3) prior to drought. Start with the category that matches your current conditions. The website will be equally valuable for dealing with

forage deficits caused by fire, hail, or grasshoppers. The entire website is of considerable value for ranching success regardless of current climatic conditions.

It is wise to annually check or review the personal, financial, and ecological health of your ranch. The personal health and wellness of you, your family, and other hands-on folk can be affected by physical, relational, mental, or spiritual issues. A check of the financial health of the ranch should include liquidity, solvency, and unit costs (Fig. 1). An understanding of your current financial health and the potential financial crises of allowing drought to proceed in default modes should be a strong motivation for preparing a written drought plan.

Knowledge of the average carrying capacity in years with near-average precipitation and your current rangeland condition (Fig. 2) and residual herbage will be critical for determining when to reduce forage demand as drought develops. A rangeland inventory is also important for pastures that have the potential for improved species composition and herbage production during non-drought years. For example, western wheatgrass or needlegrass remnants may be low in vigor, but relatively abundant on loamy plains sites dominated by blue grama. If so, carrying capacity of these pastures could be increased up to 50% during non-drought years. Resilience of rangeland vegetation after drought is directly related to range condition. In contrast, overgrazing blue grama/ buffalograss sod with cool-season remnants during drought will reduce or eliminate cool-season midgrasses and cut herbage production potential in half compared to good to excellent condition rangeland (Fig. 2).

We highly recommend a team approach in the development of your written drought plan. Ideally your team should be composed of on-ranch people and off-ranch mentoring or advisory folk. Be sure to gather information and

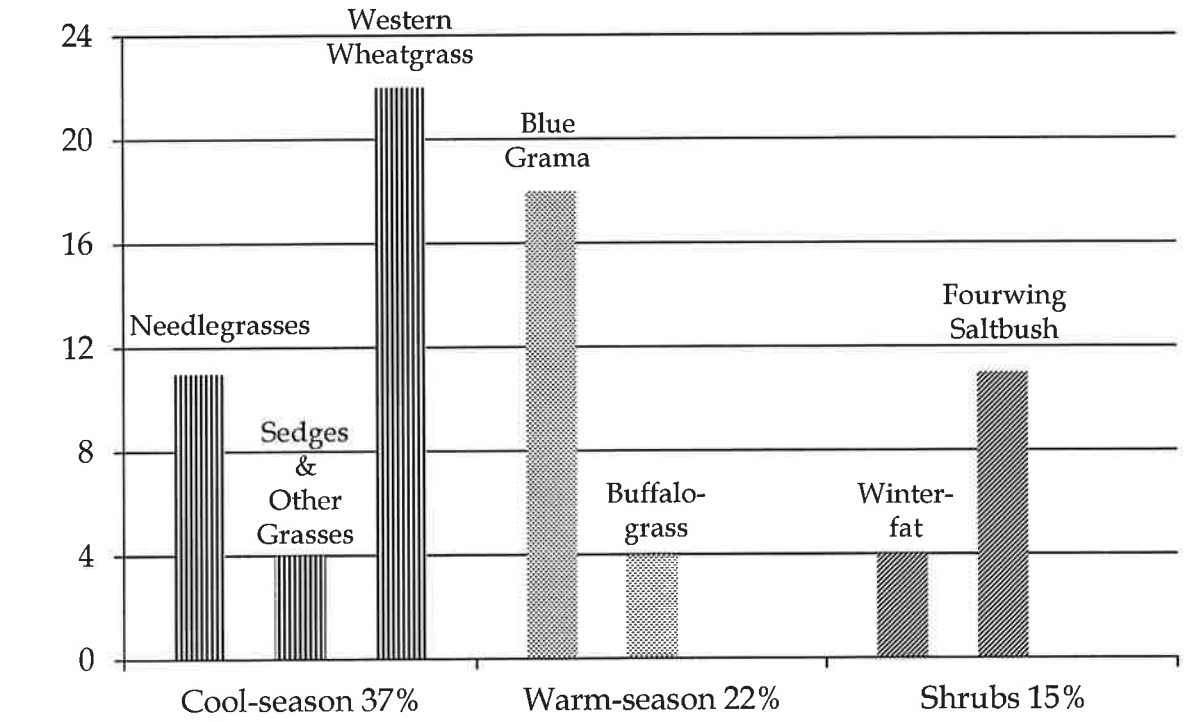
Liquidity	Not A Problem	Caution	Serious Problem
Net Cash Flow: Annual Inflow -- Outflow	Large Positive	Small Difference	Large Negative
Solvency	**Not A Problem**	**Caution**	**Serious Problem**
Debt/Asset	< 40%	40 - 60%	> 60%
Networth: Total Assets – Total Liabilities	Large	Moderate	Small
Change In Net Worth	Positive	Small	Large Negative
Unit Cost	**Not A Problem**	**Caution**	**Serious Problem**
$/cwt[1]	Low	Above Average	High

[1]Compared to benchmark herds.

Figure 1. Guidelines for evaluating financial health.

(Hughes, et al 2010)

(A) Loamy Plains Ecological Site



(B) Loamy Plains Ecological Site

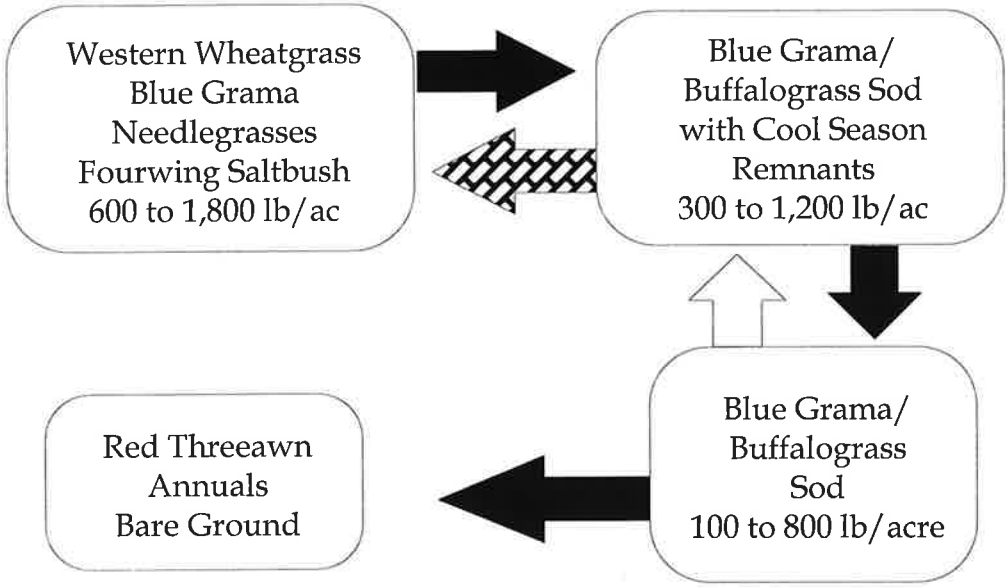


Figure 2. Guidelines for evaluating ecological health (websoilsurvey.nrcs.usda.gov). The example is for the Loamy Plains ecological site, (A) potential species and their contribution to herbage production in average years, (B) state and transition model.

consider Risk Management Agency (RMA) designed rangeland insurance. You will also need to review federal tax codes for drought induced sale of livestock.

The planning process should not begin until ranch goals and strategic objectives have been written. The Alexander family in Kansas has a clearly written set of ranch goals and strategic objectives (Fig. 3). They also have a drought plan that enhances the likelihood of accomplishing their mission.

Alexander Ranch Goals (Kansas)

① Manage all integrated resources to maximize protein production, in order to ② Shape a harmonious existence with nature, and to ③ Maintain economic viability.

Strategic Objectives

① Regenerate the range while using the optimum percentage of herbage grown.
② Enhance water and nutrient cycling and energy flow.
③ Continue the management education process (Ancora Imparo, I am still learning).

Figure 3. Examples of clearly written ranch goals and strategic objectives.

Use your ranch goals and strategic objectives to select action plans when managing forage demand. For example, if you have a registered or other specialized cow-calf enterprise, initially you may choose to manage forage supply more than forage demand. In contrast, commercial livestock producers should primarily focus on reducing forage demand with early sale of livestock subsets. Replacing grazing days with hay days dramatically increases cost of production. Complete liquidation of commercial cow herds is always a viable alternative to minimize loss of financial and ecological health.

Overgrazing is the level and date of grazing beyond which preferred plant species cannot recover before pastures are grazed in a subsequent year. The primary plant response to overgrazing is reduced root length. Percentages of root loss increase as soil depth increases, e.g., deep roots are most at risk.

Plant recovery after grazing is dependent on available soil water and

favorable air temperatures. Soil water deficits are maximized by drought. The combination of grazing and drought stresses is the primary mechanism for long-term loss of rangeland productivity.

Failure to leave adequate plant cover reduces the effectiveness of precipitation during and after drought. Optimum levels of remaining herbage for hydrologic condition for different kinds of rangeland are listed in Figure 4. With the exception of shortgrass prairie, remaining herbage on grazed pastures during drought is nearly always below the optimal levels. There is an industry-wide opportunity for improved stewardship of rangeland during drought.

Optimum Total Remaining Herbage

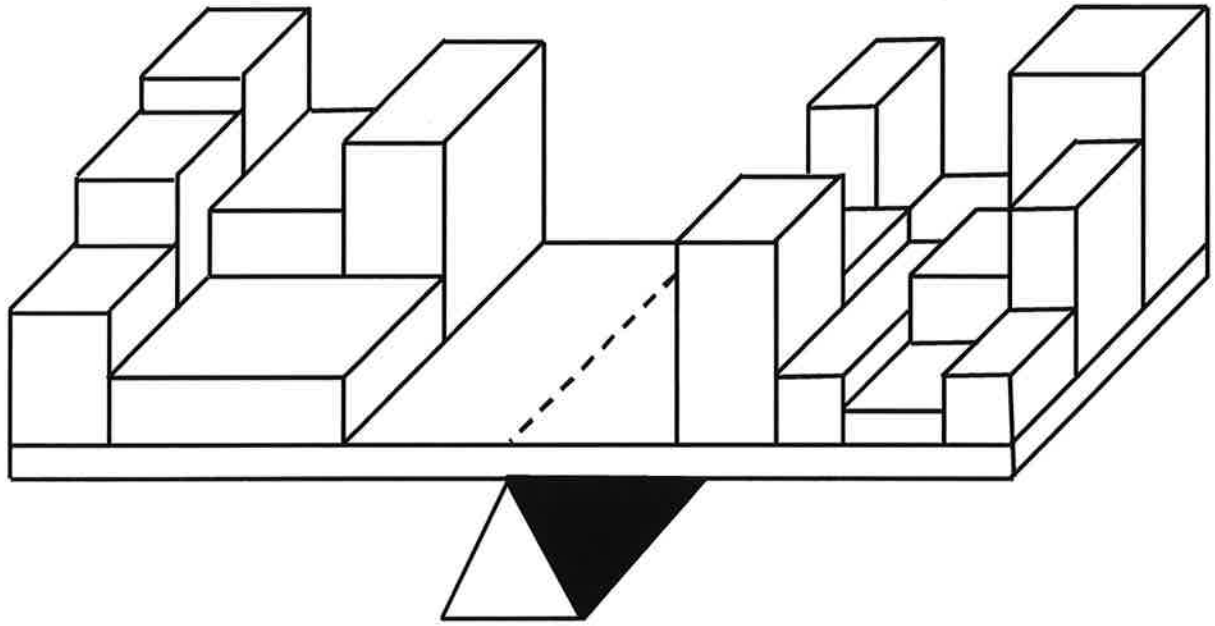
Prairie	lb/ac
Shortgrass	300 - 500
Mixed-grass	750 - 1,000
Tallgrass	1,200 - 1,500

Figure 4. Amount of remaining standing herbage at the end of the grazing season needed to optimize hydrologic condition and to improve vigor and composition of preferred mid- and tallgrasses (Hanselka 1995).

A strategic objective of every ranch should be to strive for drought resilience. Avoiding overgrazing then becomes a critical objective especially for native rangeland during drought. Herbage deficits can occur at different times of the year and the magnitude of these shortages differs among years. Consequently, drought plans need to identify prioritized subsets of livestock for sale or relocation. Sorting criteria should be based on ranch goals and objectives. They may include those listed in Figure 5.

When action plans involve removing livestock, they need to be implemented quickly. When the likelihood of drought is relatively high, put the first-to-go livestock subsets in separate herds at turnout. Put a drought clause in

(A) Forage Supply Forage Demand



(B) Reducing Pre-drought Demand

Class	Sort By
• Stocker Steers • Stocker Heifers • Breeding Heifers • Heiferettes • Cows • Bulls	Ownership Enterprise Risk Quality Age Weight Pregnancy Weaning

Divide average weight by 1,000 lb = AU

Figure 5. Timely adjustments must be made in rangeland forage demand to minimize risk to carrying capacity and animal performance (A). Drought plans should identify livestock class and sorting criteria for specific target dates (B).

every grazing lease and the necessary terms to make early removal of cattle efficient and equitable. Attach a copy of your drought plan to each grazing lease.

"Drought effects are not linear, they ramp up!" This common observation includes all of the undesirable default options. The antagonistic increase in feed and forage costs, while livestock prices plummet, ramps up weekly. Imbalances between forage supply and forage demand ramp up daily. Even in non-drought years, herbage production rates decline as the summer grazing season progresses while forage demand increases 35% to 40% as cattle gain weight (Fig. 6). In average years, plants "outgrow" livestock on the front half of the season. When this does not happen in drought years you must act quickly. Drought-induced

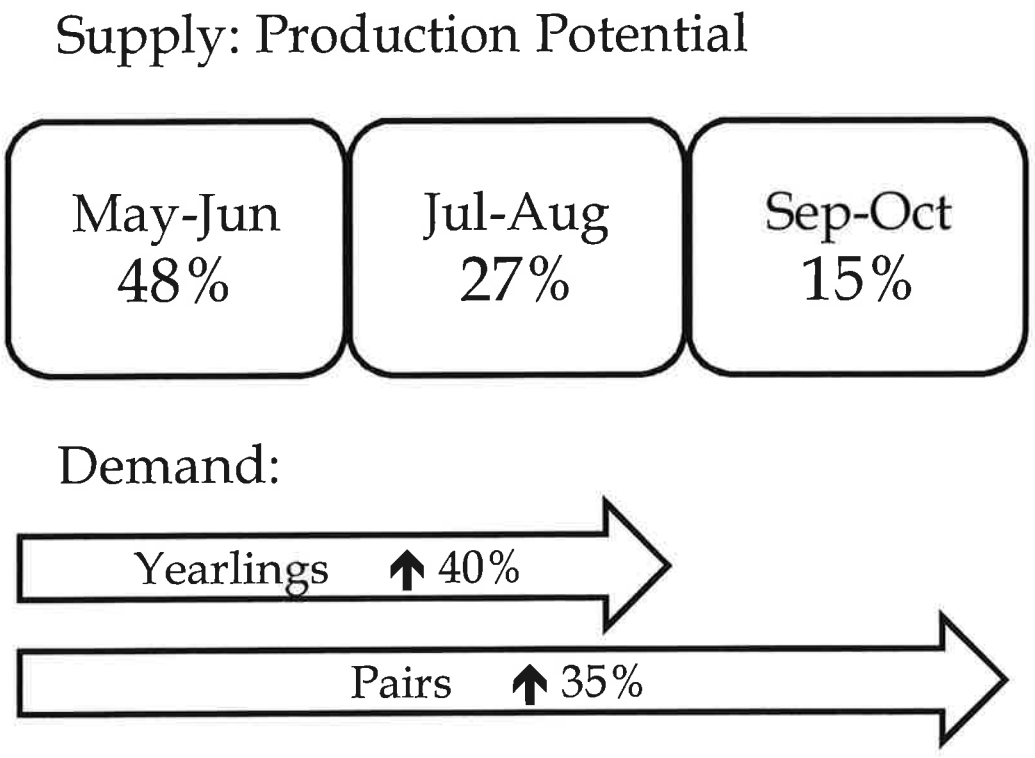


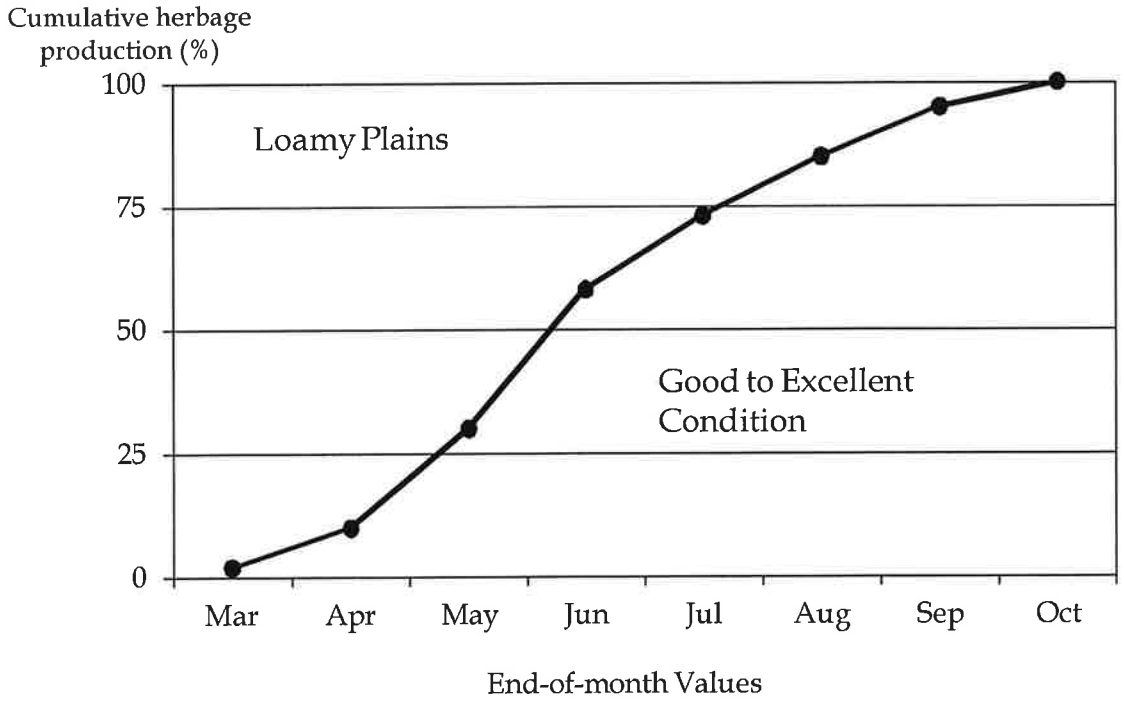
Figure 6. Relationship between herbage supply and herbage demand on loamy plains sites during years with average precipitation.

movement of cattle to the market can drop sale prices by 10% to 20% in a week or two. Prolonged delays can result in tens of thousands of dollars in lost revenue.

Knowing when forage deficits are eminent requires monitoring and knowledge of average seasonal plant growth and precipitation patterns for your location (Fig. 7). Measurable shortages in soil water prior to and into the beginning of rapid plant-growth intervals cause measurable forage deficits. Additionally, average pounds of herbage produced per inch of precipitation declines from the beginning to the end of the growing season. Measurable forage deficits caused by early precipitation/soil water deficits will not be recovered during the balance of the growing season.

The National Resources Conservation Service (NRCS) provides plant growth-curve information (Fig. 7A) for many range sites on websoilsurvey.nrcs.usda.gov. The information may be limited to range sites in good to excellent condition (historical climax plant communities (hcpc)). Check with local NRCS and university range management advisory personnel for additional information. Precipitation and temperature forecasts and an enormous amount of summarized climate data are available at droughtmonitor.unl.edu. Site specific precipitation and temperature records including long-term and monthly data are available at regional climate centers. Enter hprcc or wrcc into your search engine for the high plains and western climate centers, respectively.

(A)



(B)

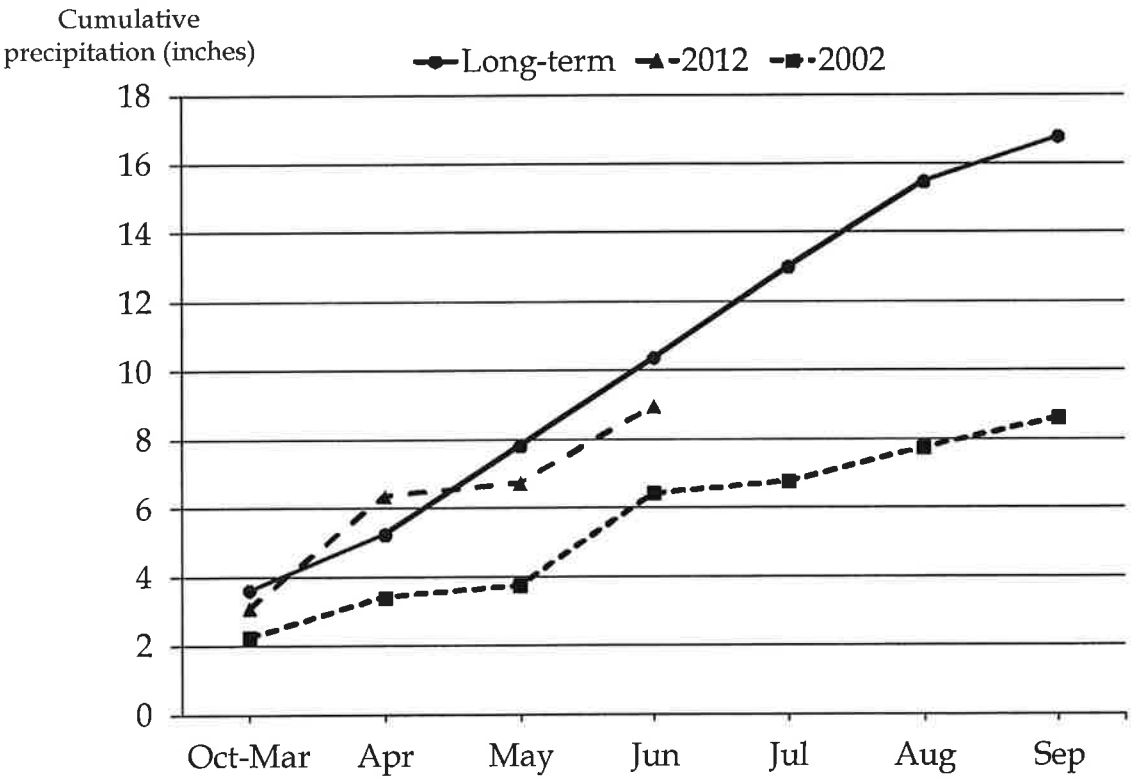


Figure 7. Seasonal pattern of herbage production (A) and long-term precipitation (B) for loamy plains range sites near Burlington, Colorado.

Plant growth on good to excellent condition rangeland is almost always correlated with dormant-season precipitation, October-March. In contrast, the effect of dormant-season precipitation on blue grama/buffalograss sod communities may be insignificant. They are very responsive to spring and summer precipitation.

Work with NRCS and university folk to identify the earliest possible indicators of pending forage deficits. Indicators often include, but are not limited to, climate variables, soil water, or vegetation. Use the most important indicators to select critical levels and trigger dates for removing pre-drought forage demand. Potential indicators include:

- Soil water
- Preceding-year growing conditions and plant growth
- Plant-year precipitation
- Precipitation in recent months
- Near-term precipitation and temperature forecast
- Current standing herbage
- All residual herbage

Examples of possible trigger dates, levels of important indicators, and reductions in pre-drought forage demand are provided in Table 1. Additional examples are on the "Managing Drought Risk on the Ranch" website (drought.unl.edu/ranch plan).

The objectives of your written drought plan are to reduce financial hardship, and minimize risk to animal performance and carrying capacity. You are now ready to fulfill my favorite admonition. It is from a west Texas rancher: "Put your pastures to bed properly." It is a simple and priceless guideline. Whenever the grazing season is ended, your pastures will have adequate

Table 1. Reductions from moderate stocking based on forage deficits that are likely to occur by the trigger dates on Loamy Plains sites in good to excellent range condition, 15-18 inches.

Trigger Date and Indicator		Reduce Pre-drought Demand	
		Initial	Additional[1]
① Before Spring Turnout:			
≥ Severe drought last year during May, June, & July		40%[2]	
May & June, or June & July		30%[2]	
② April 1:			
October-March precipitation			
< 65% of long term (LT)		15%	
③ April 30:			
May, June, & July air temperatures are forecast @ above average and precipitation @ even chance		20%	
④ May 1:			
No meaningful precipitation (≤ 0.10 in per event) during March & April		15%	
⑤ June 1:			④
March-May precipitation	< 75% LT	25%	10%
	< 50% LT	45%	30%
⑥ July 1:			⑤
May-June precipitation	< 75% LT	35%	25%
	< 50% LT	75%	45%
⑦ July-August:			
If plant growth slows or stops earlier than in a near-average year, estimate remaining animal-unit days of grazing based on the **usable** percentage of standing **palatable** herbage. Remove cattle incrementally or when estimated herd days have occurred.			

[1]Added to the preceding trigger date and indicator reductions.
[2]Consecutive years of severe, extreme, or exceptional drought may require complete rest to avoid long-term damage to rangeland vegetation.

remaining plant cover for optimum infiltration of rainfall and snowmelt. Midgrasses and tallgrasses have not been grazed down to the level of a billiard table. You are a good steward and a wise business person.

There are 3 critical guidelines for grazing management after the drought breaks:

- Do not graze weed infested pastures.
- Restock based on the recovery of mid- and tallgrass by looking at the **cover** and height of preferred species.
- Delay entry of summer pastures by 1 to 2 weeks.

Drought can cause considerable tiller mortality even in rested pastures. When drought breaks, preferred species can look robust because more soil water and nutrients are available to remaining plants. Give them time to fully recover before fully returning to pre-drought levels of forage demand. Ride slowly through all of your pastures after drought, frequently looking down.

After-drought assessments need to include annual inspections of personal, financial, and ecological health. Use grazing and precipitation records to study cause and effects when recovery differs among pastures. You may also want to add reliable livestock water and add or modify cross fences based on drought experiences or the potential of improving plant vigor or species composition with rotation grazing.

Never forget that drought resilience of rangeland increases as the vigor and relative abundance of preferred midgrasses and tallgrasses increase, these changes are nearly impossible with season-long continuous grazing. When adequate remnant populations of preferred species occur, range condition can be efficiently improved with deferred- or rest-rotation grazing. A minimum of 4 pastures of similar carrying capacity and reliable livestock water are required. An upper limit of 5 to 8 pastures for yearlings and 6 to 8 for cows will provide

cost effective control over timing of grazing and provide the opportunity to rest selected pastures (Fig. 8).

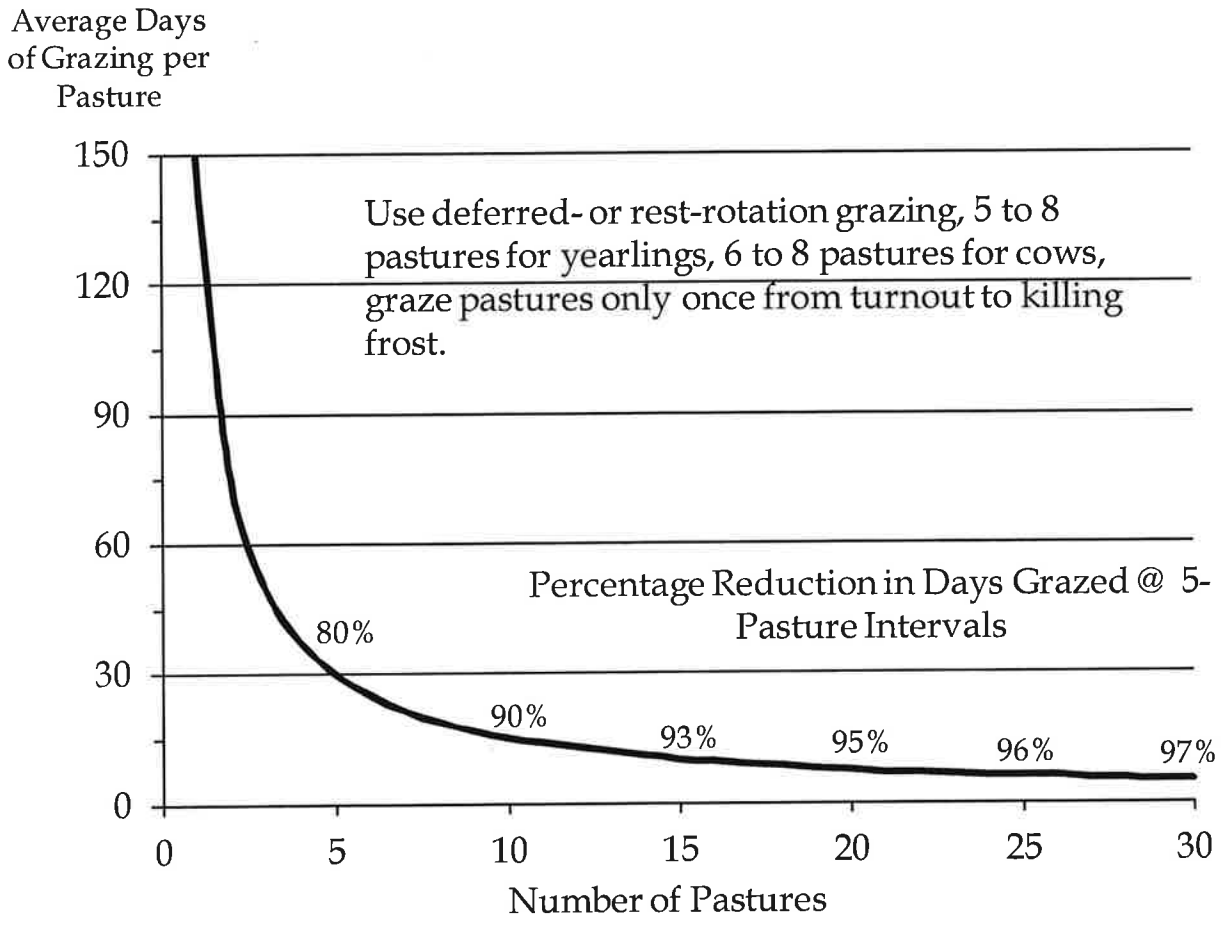


Figure 8. Relationship between number of pastures of similar carrying capacity on the average days of grazing per pasture for a 5-month grazing season. Upper limits of pastures needed to sustain herbage production are also suggested.

Multiple growing-season grazing periods are counter productive to increasing the vigor and relative abundance of preferred species. On semi-arid rangeland, graze pastures only once from turnout to killing frost to optimize drought resilience of rangeland. Additionally, pastures must not be grazed during rapid-growth windows of preferred species in consecutive years. Pasture-use sequences need to be changed every year. Providing full growing-season deferment to every pasture once every 3 to 4 years will maximize drought resilience of semi-arid rangeland. Use moderate stocking rates and use grazing and precipitation records to critically evaluate your management.