The New Mexico Sustainable Agriculture Conference

Making Grazing Management Decisions

Uncertainty is the Only Thing You Can Count On

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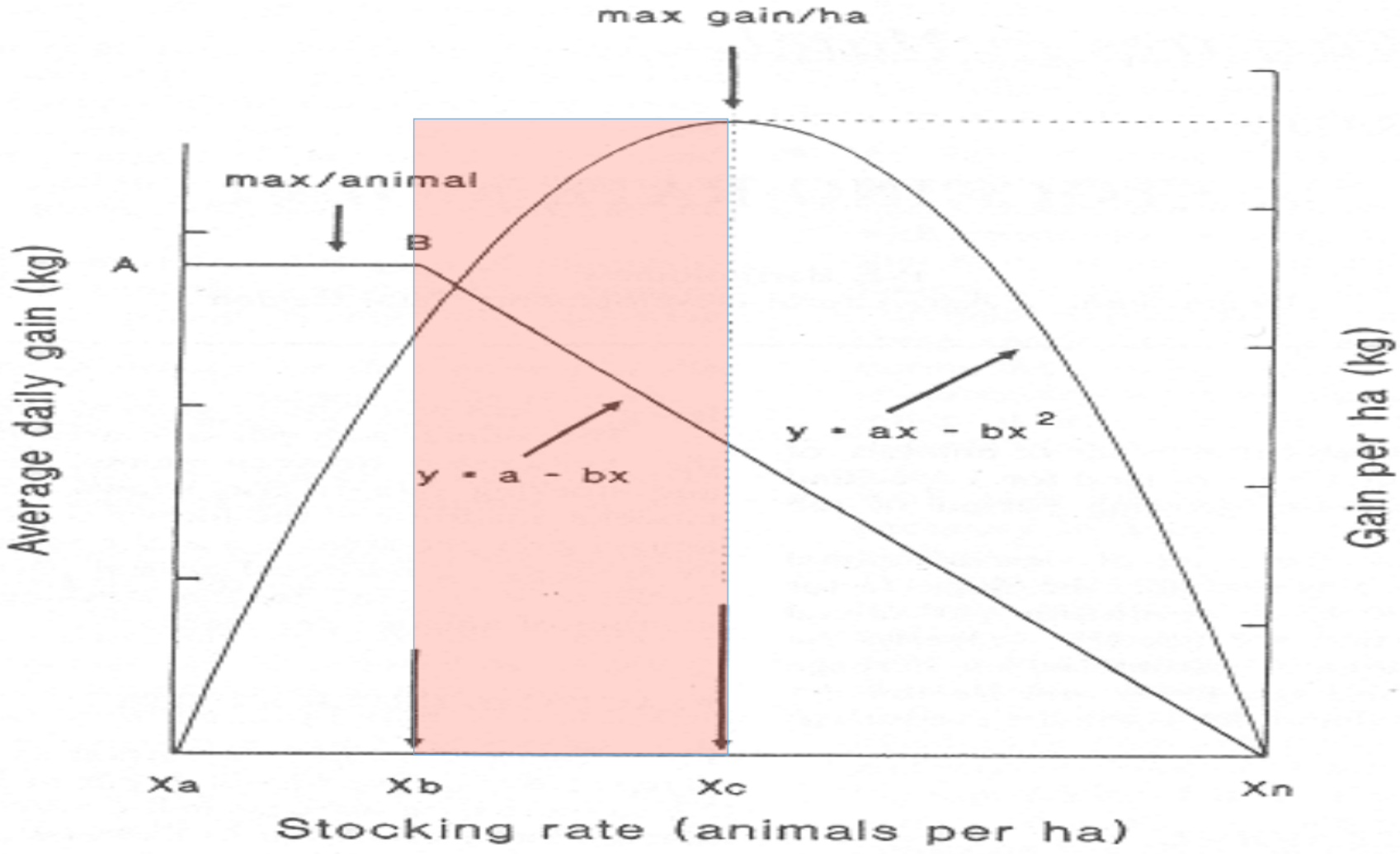
Making Grazing Management Decisions
some basic assumptions

Cattle eat grass

If they are not eating grass, you are not making money

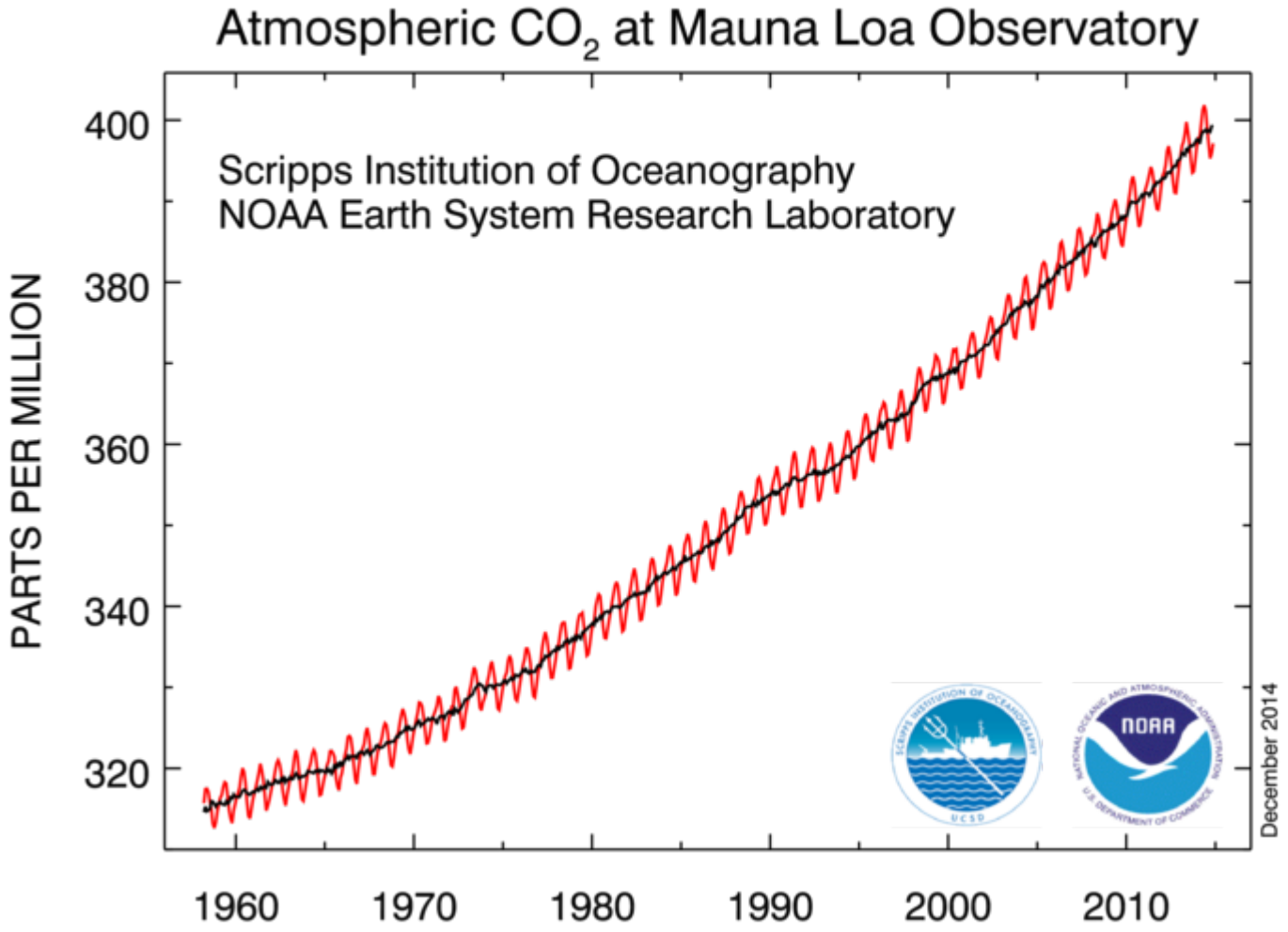
The objective is to maximize intake (gain/hd/d) with as little supplemental feed as possible

Maximizing intake requires the correct stocking rate for the current forage conditions



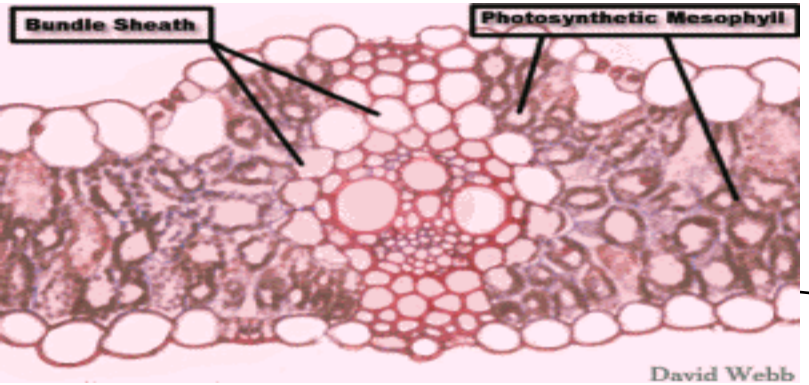
Forage supply fluctuates continuously—stocking rate is more difficult to adjust

ATMOSPHERIC CARBON DIOXIDE CONCENTRATION IS INCREASING

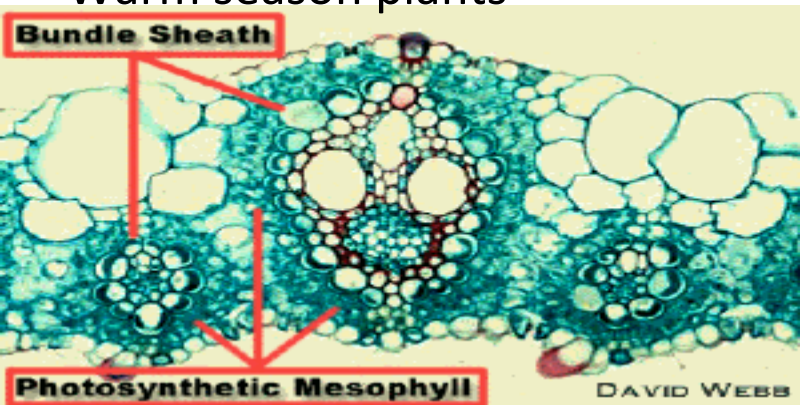


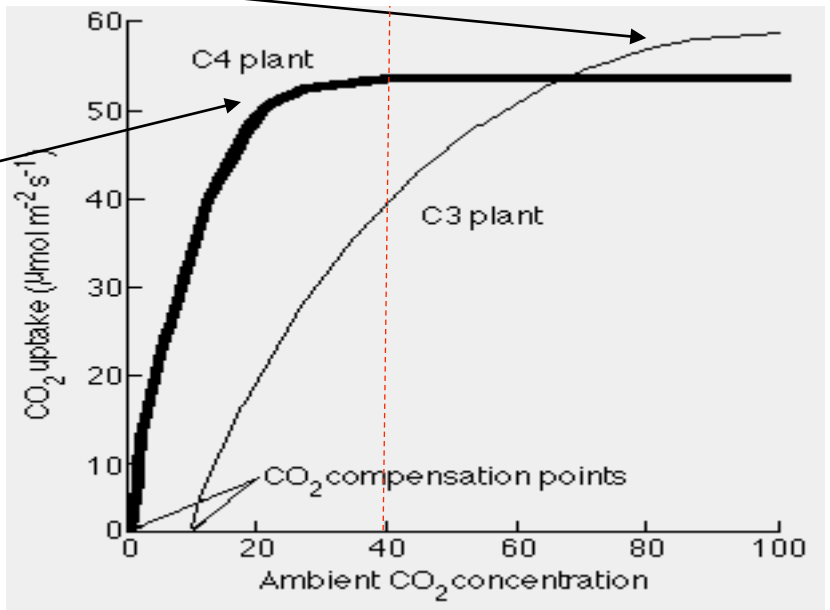
CO_2 affects plant growth

Cool season plants



Warm season plants





http://www.botany.hawaii.edu/faculty/webb/bot311/bot311-00/PSyn/PsynDark2.htm

CO_2 ALSO AFFECTS FORAGE QUALITY AND LIVESTOCK PERFORMANCE

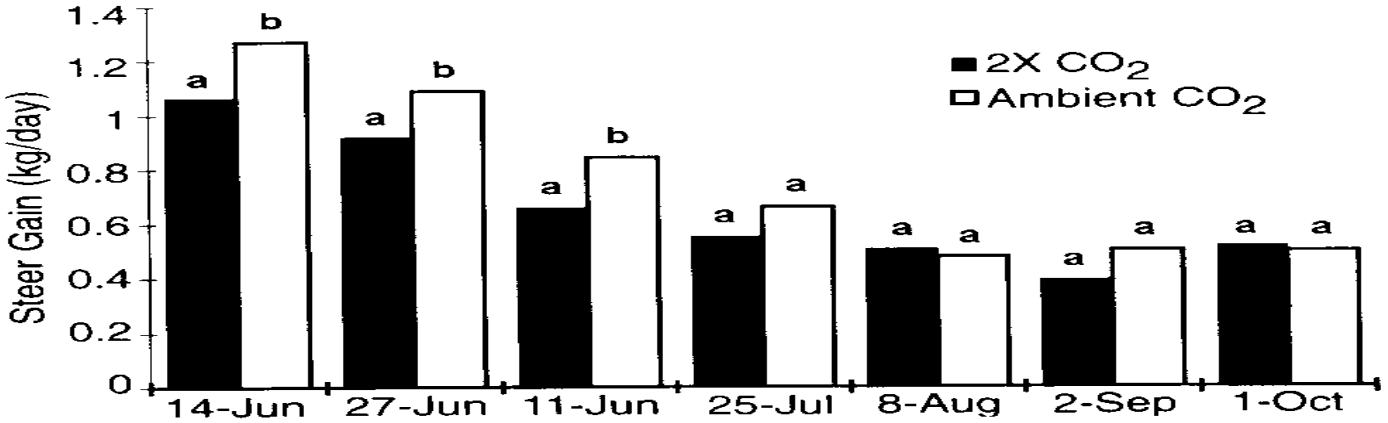


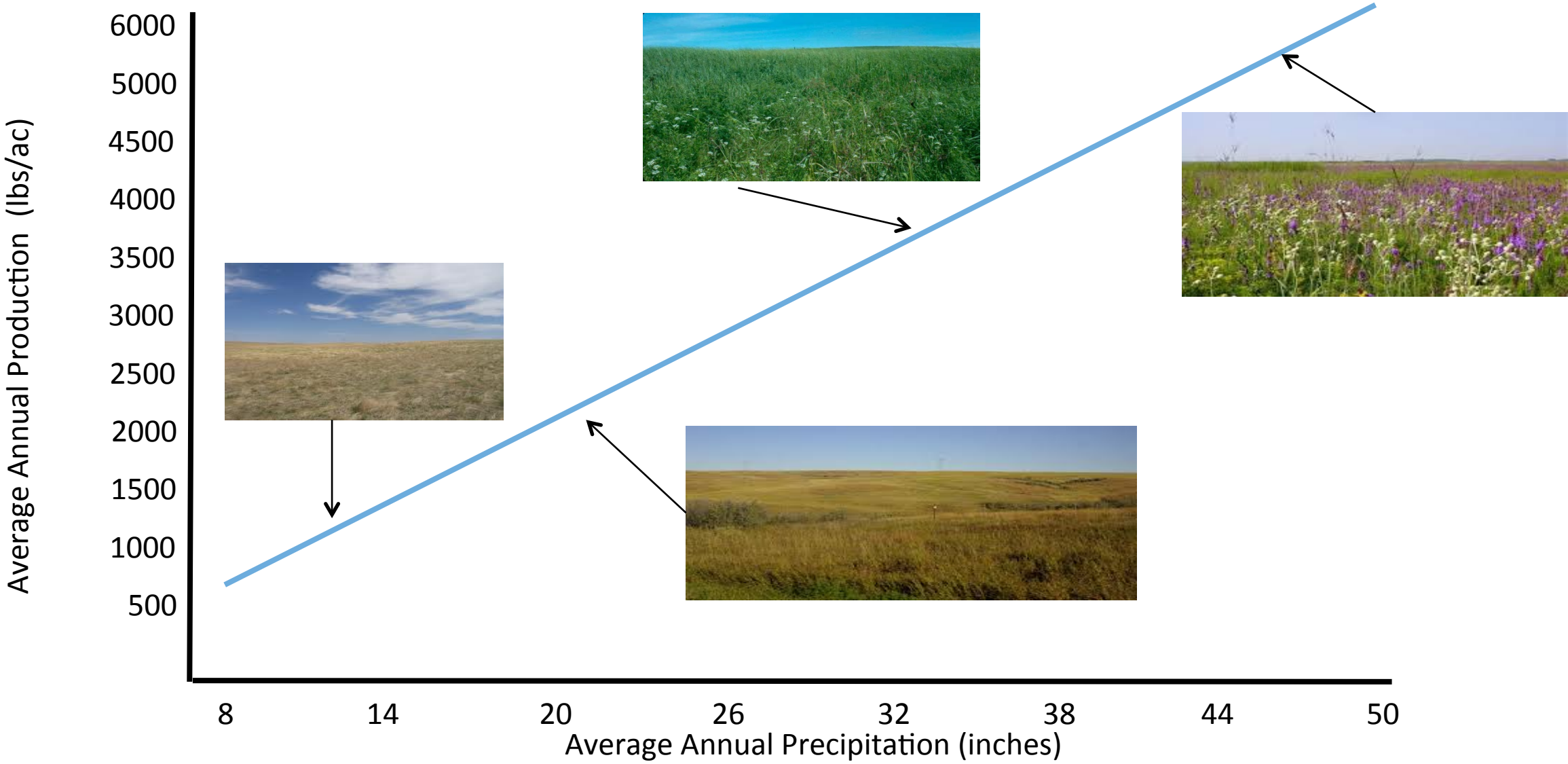
Figure 2 Estimated steer gain (kg/day) derived from acid detergent fiber and crude protein of diet samples collected on the indicated dates in 1989 by esophageally fistulated sheep from tallgrass prairie exposed to 2× ambient and ambient atmospheric CO_2. Means within a date with a common letter do not differ (LSD, $P < 0.10$).

"A future high CO_2 world seems destined to reduce individual animal performance …because of reduced intake of lower quality forage."

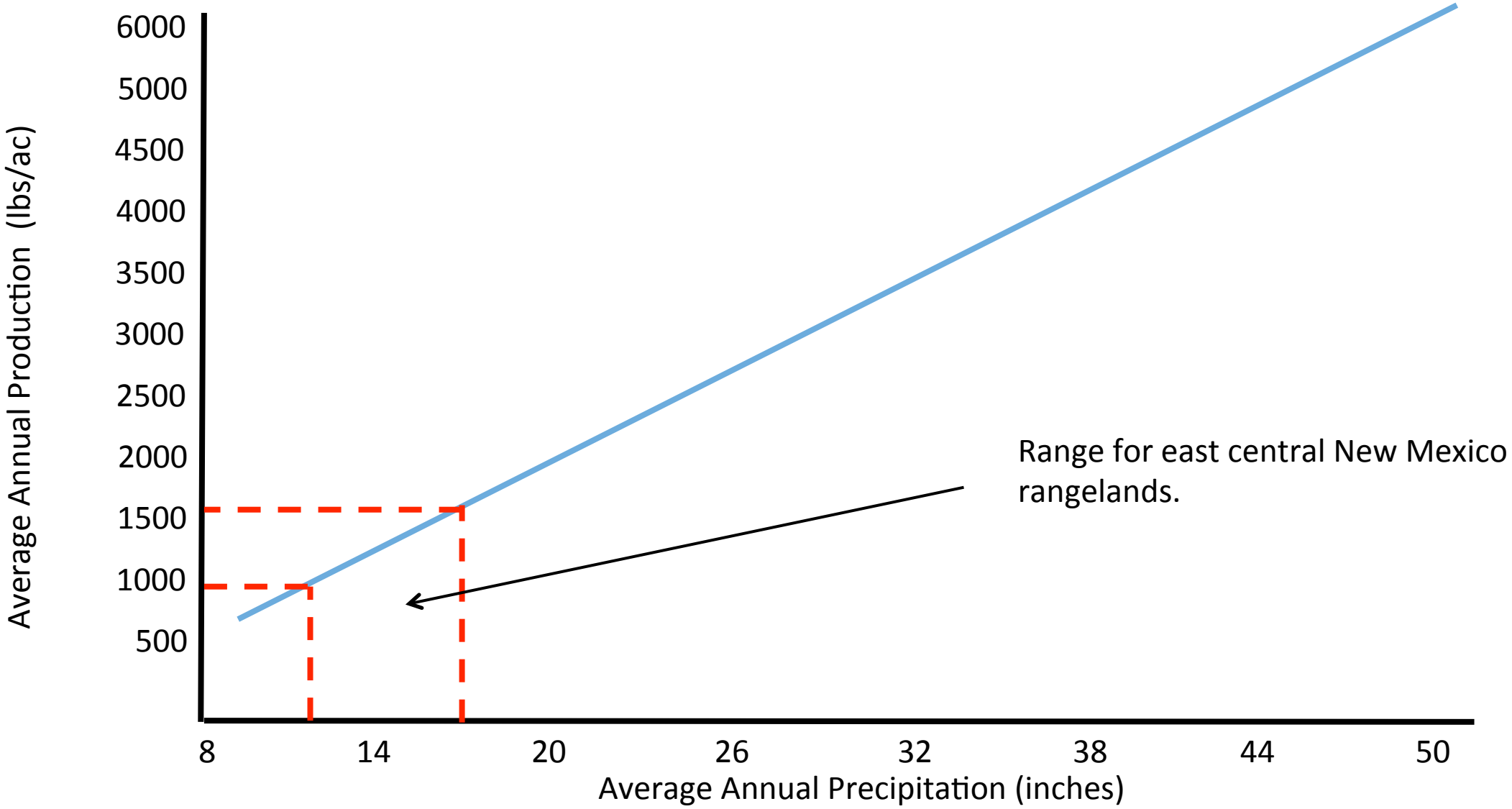
Owensby et al 1996

How Much Grass do I Have?

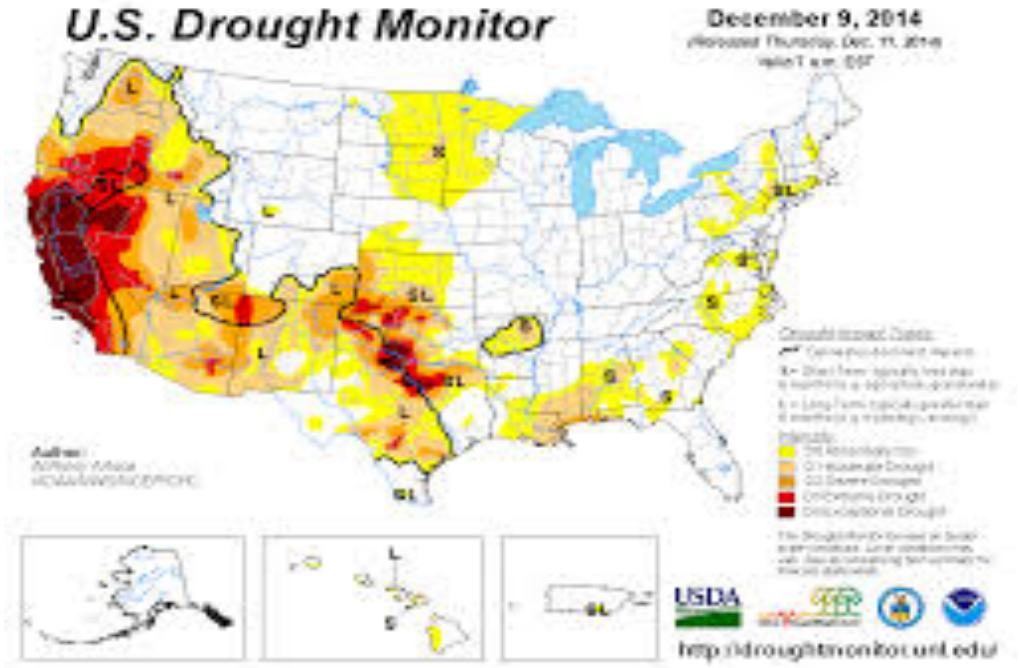
Relationship between average annual precipitation and annual aboveground production for 100 Grassland sites. ANPP=-34 + 0.06 * APPT. R^2=0.90. Redrawn from Sala et al 1989.

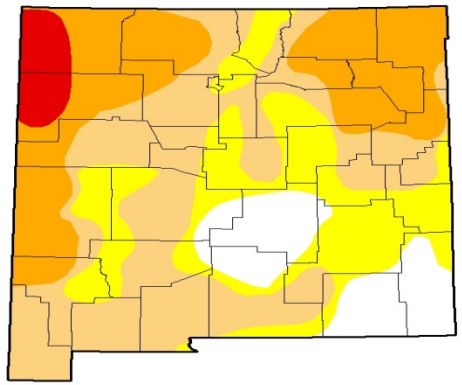


Relationship between average annual precipitation and annual aboveground production for 100 Grassland sites.
Aboveground Production =-34 + 0.06 * Annual Precipitation. R^2=0.90 *Sala et al 1989*



How Much Grass am I Going to Have?





U.S. Drought Monitor
New Mexico

December 9, 2014
(Released Thursday, Dec. 11, 2014)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	12.01	87.99	64.92	29.10	3.70	0.00
Last Week 12/2/2014	12.01	87.99	64.92	29.10	3.70	0.00
3 Months Ago 9/9/2014	2.63	97.37	69.85	39.85	6.97	0.00
Start of Calendar Year 12/31/2013	0.39	99.61	75.21	32.68	3.96	0.00
Start of Water Year 9/30/2014	16.70	83.30	62.57	30.04	8.08	0.00
One Year Ago 12/10/2013	0.08	99.92	76.91	36.30	3.96	0.00

Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

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USDA

http://droughtmonitor.unl.edu/

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Published by the Climate Assessment for the Southwest (CLIMAS), with support from University of Arizona Cooperative Extension, the Arizona State Climate Office, and the New Mexico State Climate office.

November Southwest Climate Outlook

Precipitation: Little precipitation fell in Arizona from mid-October to mid-November following the official end of the monsoon on September 30. New Mexico recorded some precipitation of note, mainly in the southeastern corner and in scattered pockets of the central and north-central parts of the state. This is a marked change from monsoon precipitation and the substantial contributions made by the incursions of tropical storms, but this drop-off in rainfall is typical for this time of year; November joins April as one of the driest months for the region.

Temperature: Most of Arizona and New Mexico were warmer than average in the past 30 days, a pattern that was consistent across much of the Southwest. The cold front that brought winter weather to much of the U.S. in mid-November also stretched into the region, but with limited effect and primarily in portions of eastern and southeastern New Mexico. There was a shift towards colder temperatures across the region in the last few days (at time of publication), and while the air feels colder given the previously above average temperatures, the temperatures are close to historical averages.

Snowpack: Sporadic early winter precipitation resulted in below to above-average snowpack levels across the region. It remains to be seen how much of this early season snowpack will remain, and an above-average snowpack is needed this winter to improve storage in the Upper Colorado and Rio Grande basins. **Water Supply:** In October, total reservoir storage was 46 percent (compared to 47 percent last year) in Arizona, while total reservoir storage was 22 percent (compared to 21 percent last year) in New Mexico.

Drought: Above-average monsoon precipitation and an active Pacific hurricane season provided some short-term drought relief in the Southwest. Long-term drought relief was limited by the inconsistency of precipitation coverage and the runoff and evaporation associated with high-intensity precipitation events. The likelihood of an El Niño event continues to offer hope for additional drought relief, as these events are typically associated with increased winter precipitation in the region.

ENSO: The latest ENSO projections indicate a 70-75 percent chance that an El Niño event will develop this winter. Some experts believe that conditions are already in place, and that it is only a matter of time before the El Niño event is officially declared. There is less confidence, however, that a moderate to strong event will form and uncertainty about whether a weak event will drive winter precipitation much above average.

Precipitation Forecasts: The NOAA-Climate Prediction Center is calling for elevated chances for above-average precipitation through the winter and into early spring. These predictions are thought to be picking up on both the possibility of an El Niño event this winter and the impact of the Pacific Decadal Oscillation.

Temperature Forecasts: The NOAA-Climate Prediction Center temperature forecasts are split across the region, with elevated chances for above-average temperatures along the West Coast, extending eastward into Arizona, and with increased chances for below-average temperatures along the Gulf Coast into New Mexico.

Tweet Nov SW Climate Snapshot

CLICK TO TWEET

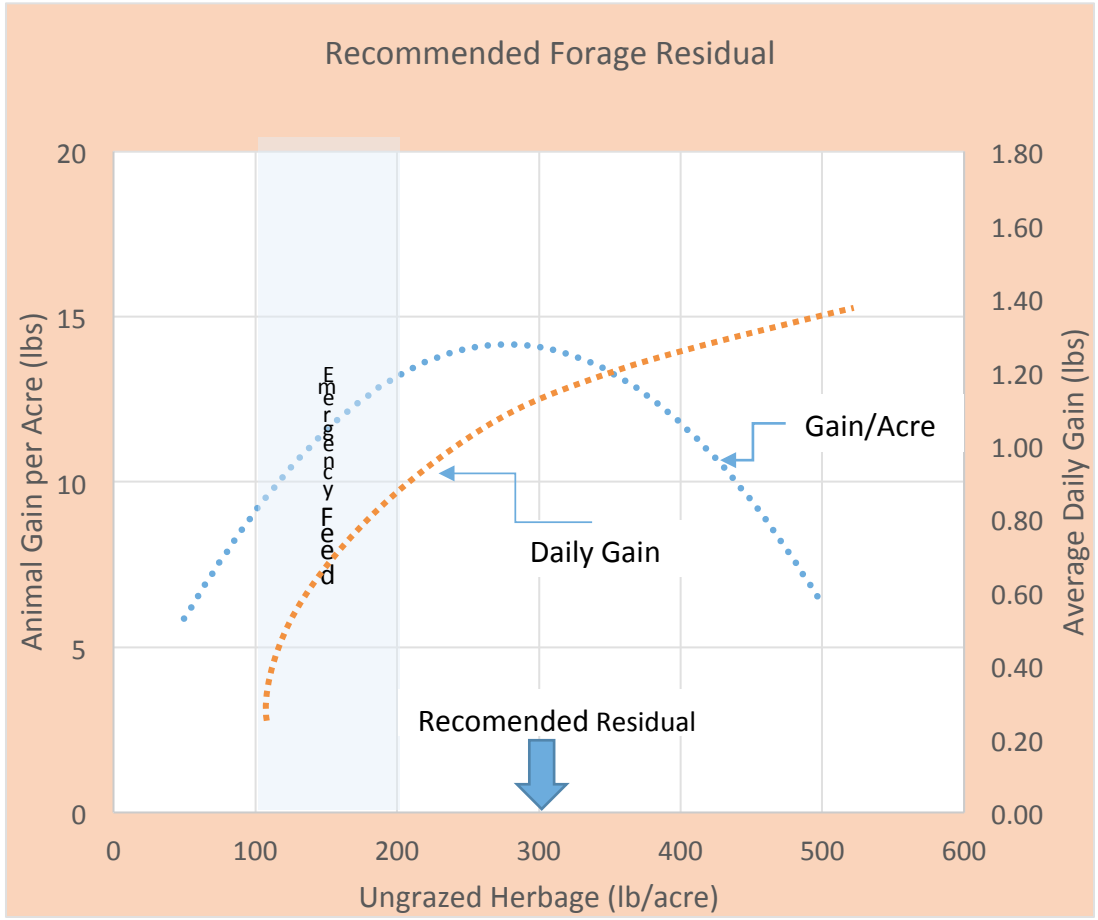
Nov @CLIMAS_UA SW Climate Outlook -Climate Summary, ENSO Forecast, Water Supply, Tropical Storm Redux, CLIMAS News http://bit.ly/1tmToXA

HOW DO I USE MY GRASS RESOURCE?

- Cover-erosion protection
- Reserves-plant health
- Fuel-burning
- Forage – livestock feed
- Habitat-wildlife populations

Bement Stocking Rate Guide for Blue Grama Rangelands

- Bement, R. E. 1969. *Journal of Range Management* 22:83-86.
- Peak animal performance was when about 300 lb/acre of residual forage remained
- Reduce below 300 lb/acre only during emergency feed shortages
- Take half-Leave Half
- Half of planned use is wasted
- 25% rule

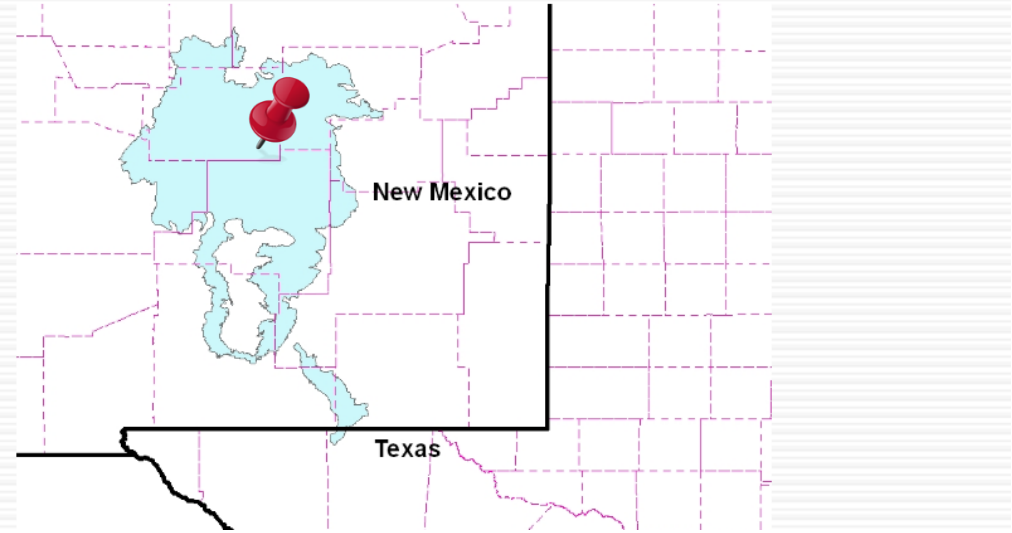


Forage Production on the CRLRC

Ecological Site Name- Loamy

Taipan-Dean Loam Soils, 0 to 5 percent slopes

Site name: **Loamy**
/ Atriplex canescens - Ephedra / Pascopyrum smithii - Bouteloua gracilis
(/ fourwing saltbush - ephedra spp. / pubescent wheatgrass - blue grama)
Site type: Rangeland
Site ID: R070CY109NM
Major land resource area (MLRA): 070C-Central New Mexico Highlands



Study Site Vegetation

- Primary grass species
  - Blue grama (*Bouteloua gracilis*)
  - Western wheatgrass (*Pascopyrum smithii*) a rare cool-season component.
- Minor grass species
  - Wolftail, sand dropseed, squirrel tail, galleta, ring muhly, threeawns
- Shrubs
  - Dominated by broom snakeweed when study initiated in 1990
  - Winterfat
  - Bigelow sage

Loamy
R070CY109TX

1. Grassland State

1.1 Mixed-bunchgrass Grassland Community
Historic Climax Plant Community

Mixed grassland of warm- and cool-season grasses, mid and short perennial grasses. Woody plant canopy 5-25%.

1.1B →

← 1.3A

1.3 Oneseed Juniper/Pinyon Pine Woodland Community

Juniper and pine dominates site. Grasses reduced in ground cover and density. Woody plant canopy 25-75%.

1.2A ↑

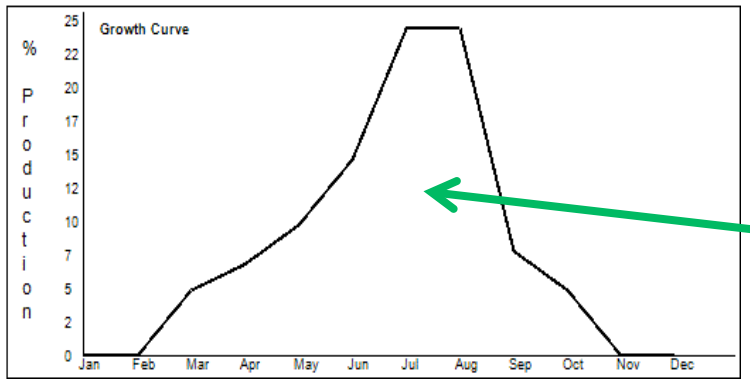
↓ 1.1A

1.2 Blue grama/Annual forbs Community

Sodbound blue grama dominant with annual forbs. Woody plant canopy 5-25%.

Legend

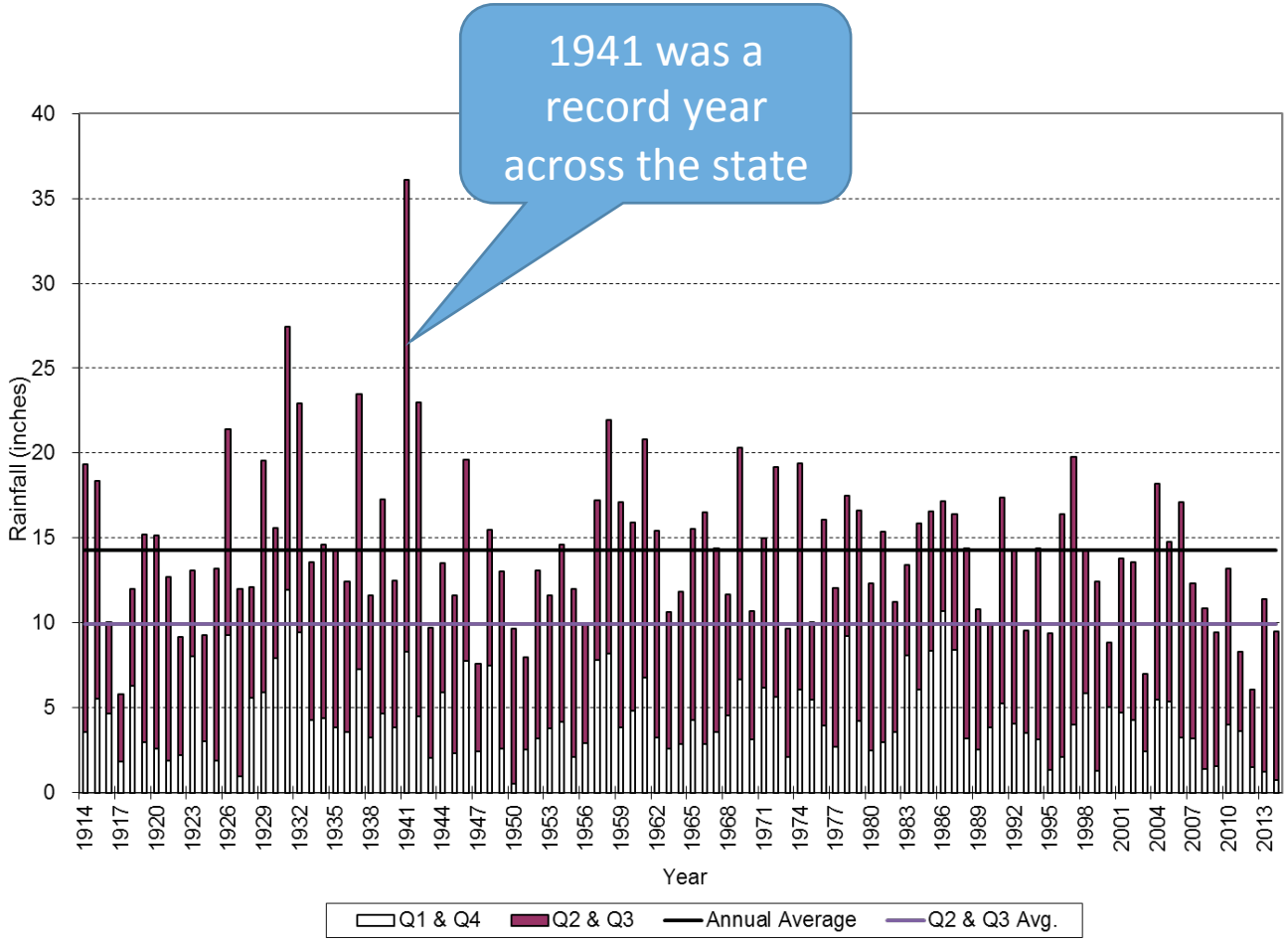
1.1A Heavy Continuous Grazing
1.2A Prescribed or No Grazing
1.1B Heavy Continuous Grazing, Fire Suppression, Brush Seed Dispersal
1.3A Prescribed Burning, Prescribed or No Grazing



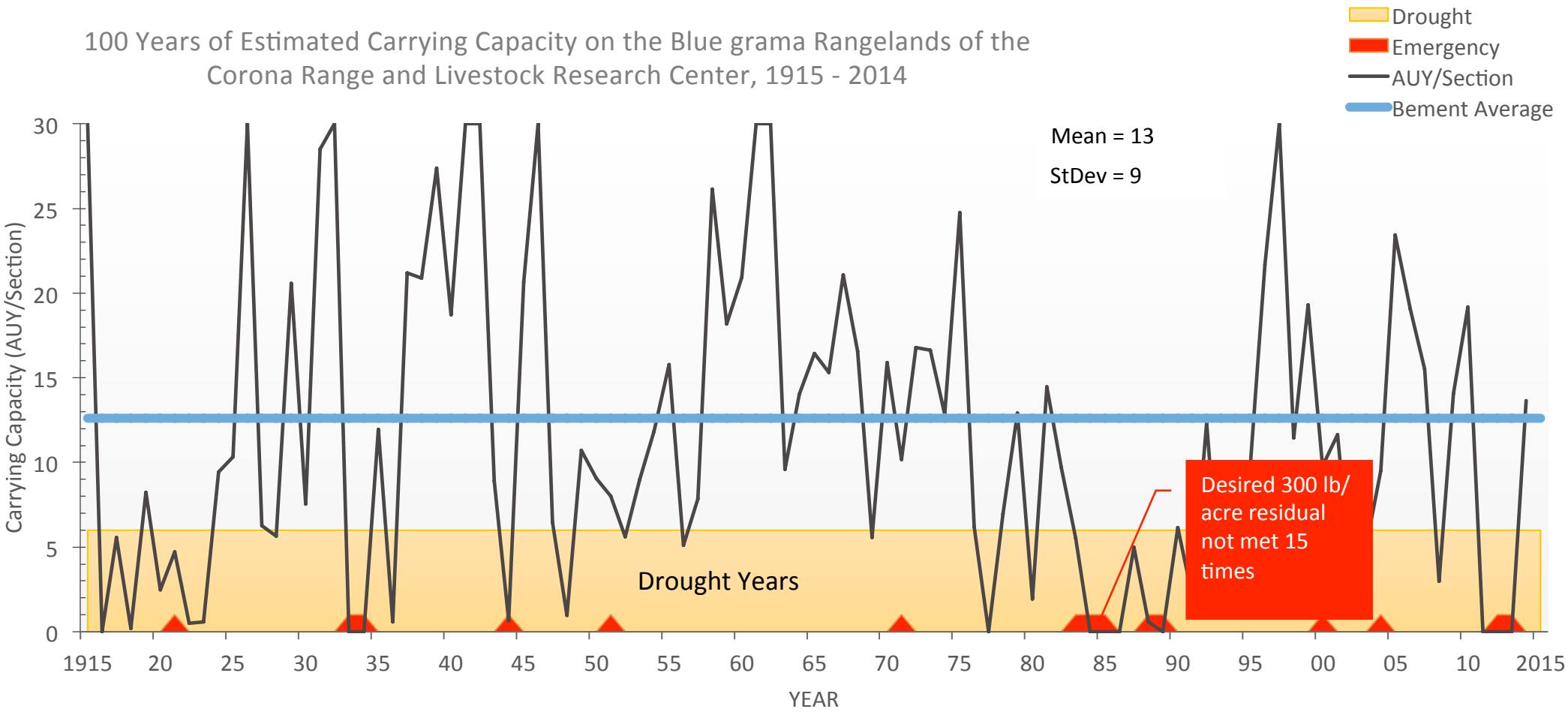
Dr. Angadi's Dream Crop

100 Years of Forage Production on the CRLRC

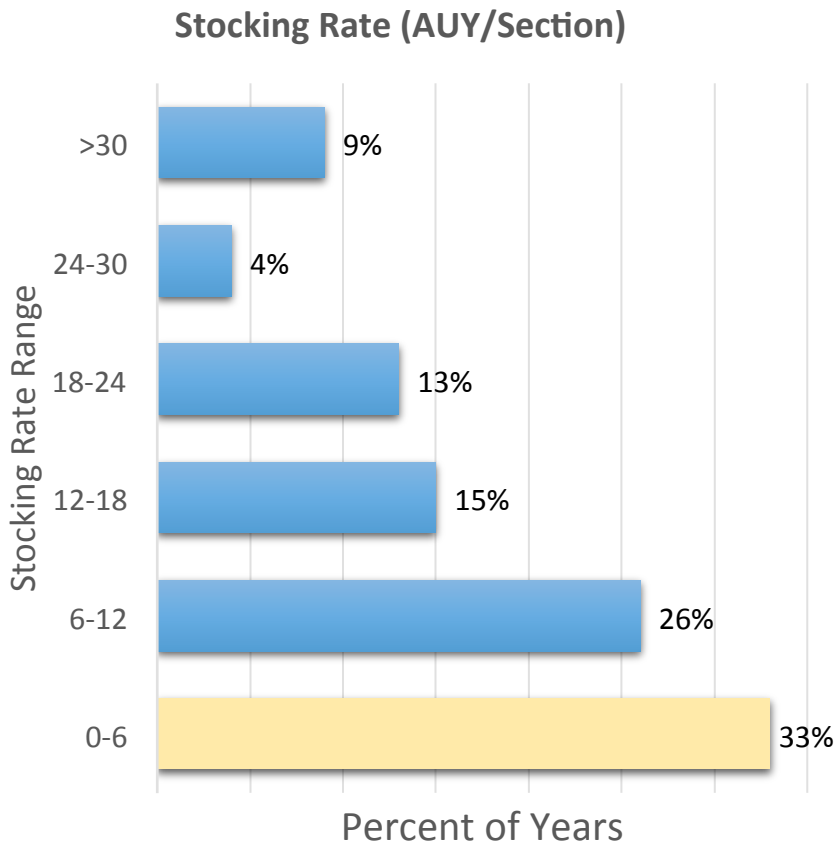
- Rainfall and temperature data for the CRLRC from 1914 – 2014
- Estimated 100 years of grass yields and carrying capacity for the study sites

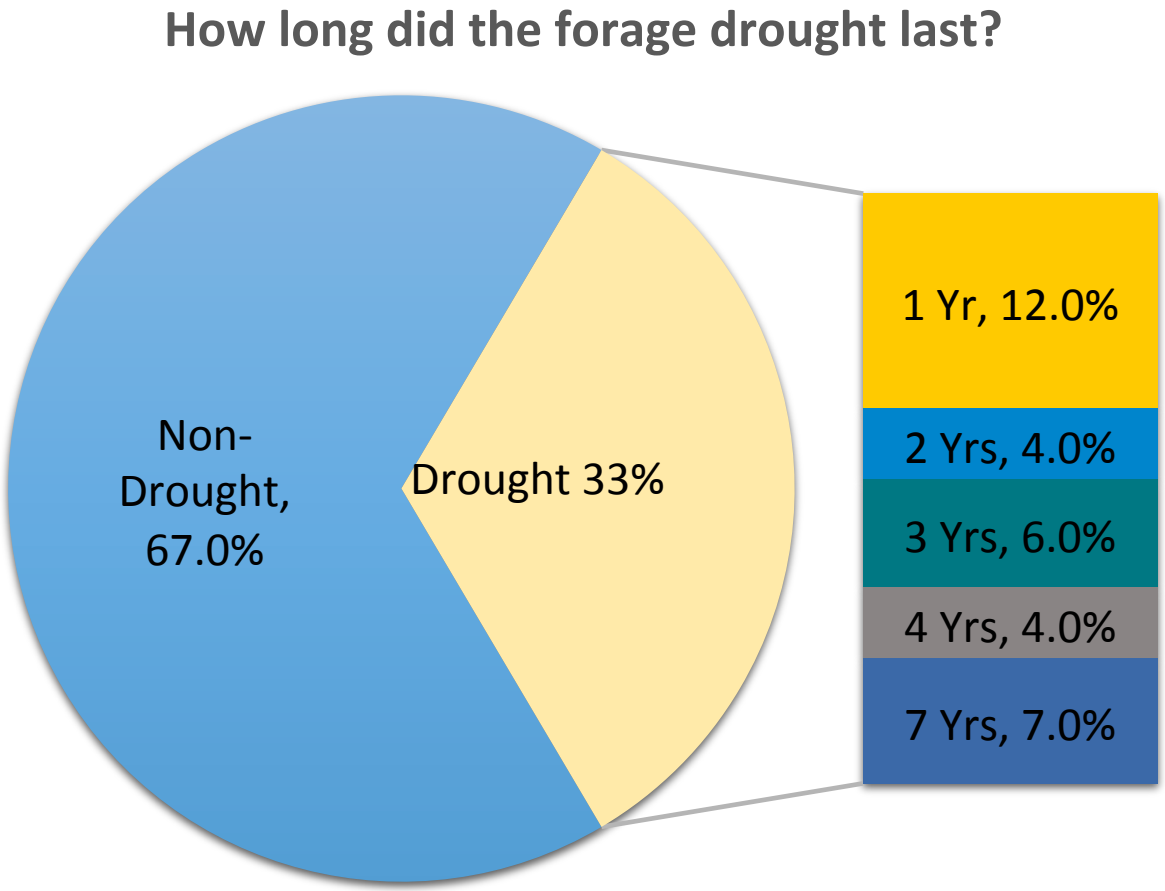


Carrying Capacity (AUY/Section)



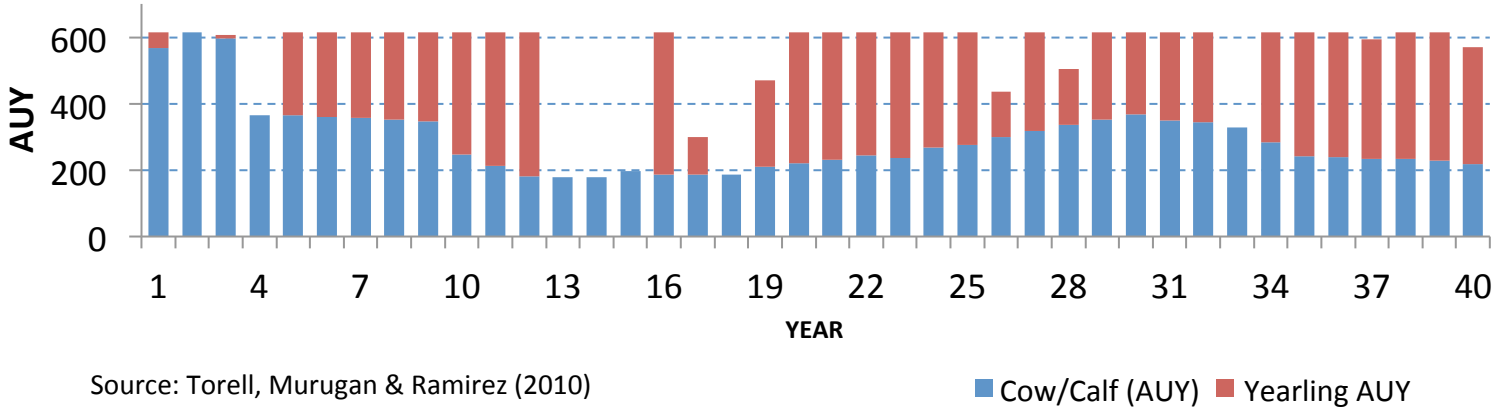
Drought Frequency
(< 90 lbs/acre harvestable forage)





Optimal Strategies for Dealing with Variable Forage Conditions

- Maintain a Conservative Stocking Rate
- Leave a significant end-of-season forage residual
  - Rangeland health
  - Forage to start the next year
- Maintain grazing flexibility with yearlings
  - 50:50 split between cow-calf and yearlings optimal

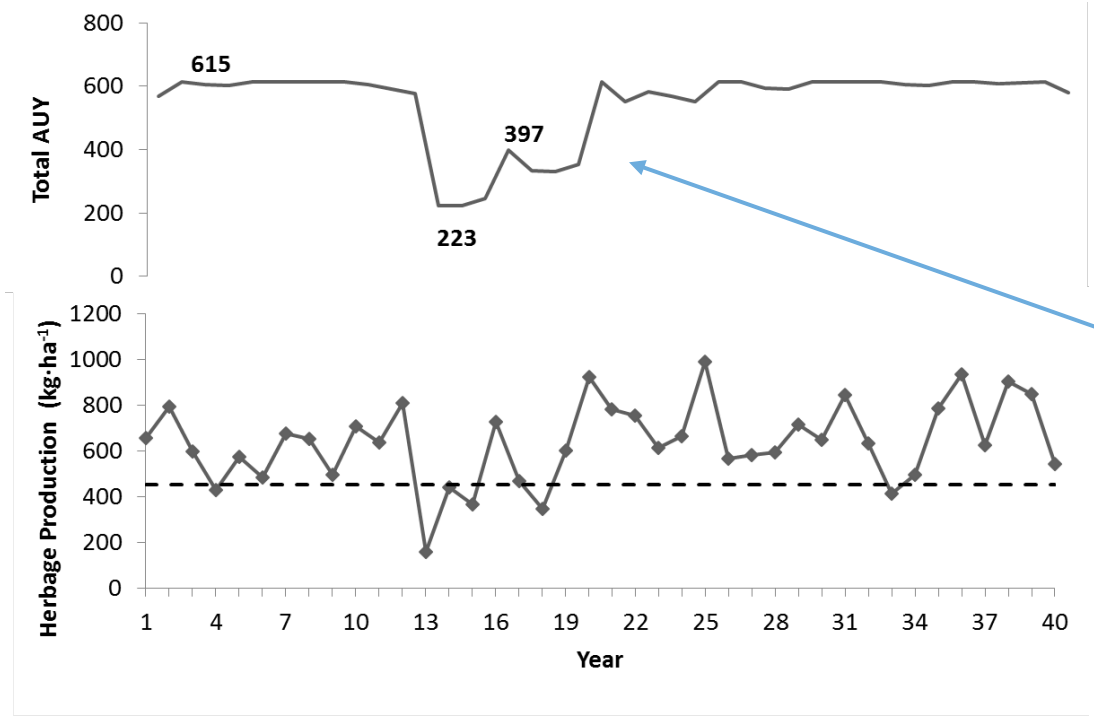


Source: Torell, Murugan & Ramirez (2010)

Adding grazing flexibility with yearlings increased net returns by 14%

Optimal Strategies for Dealing with Variable Forage Conditions

Consecutive Years of Drought

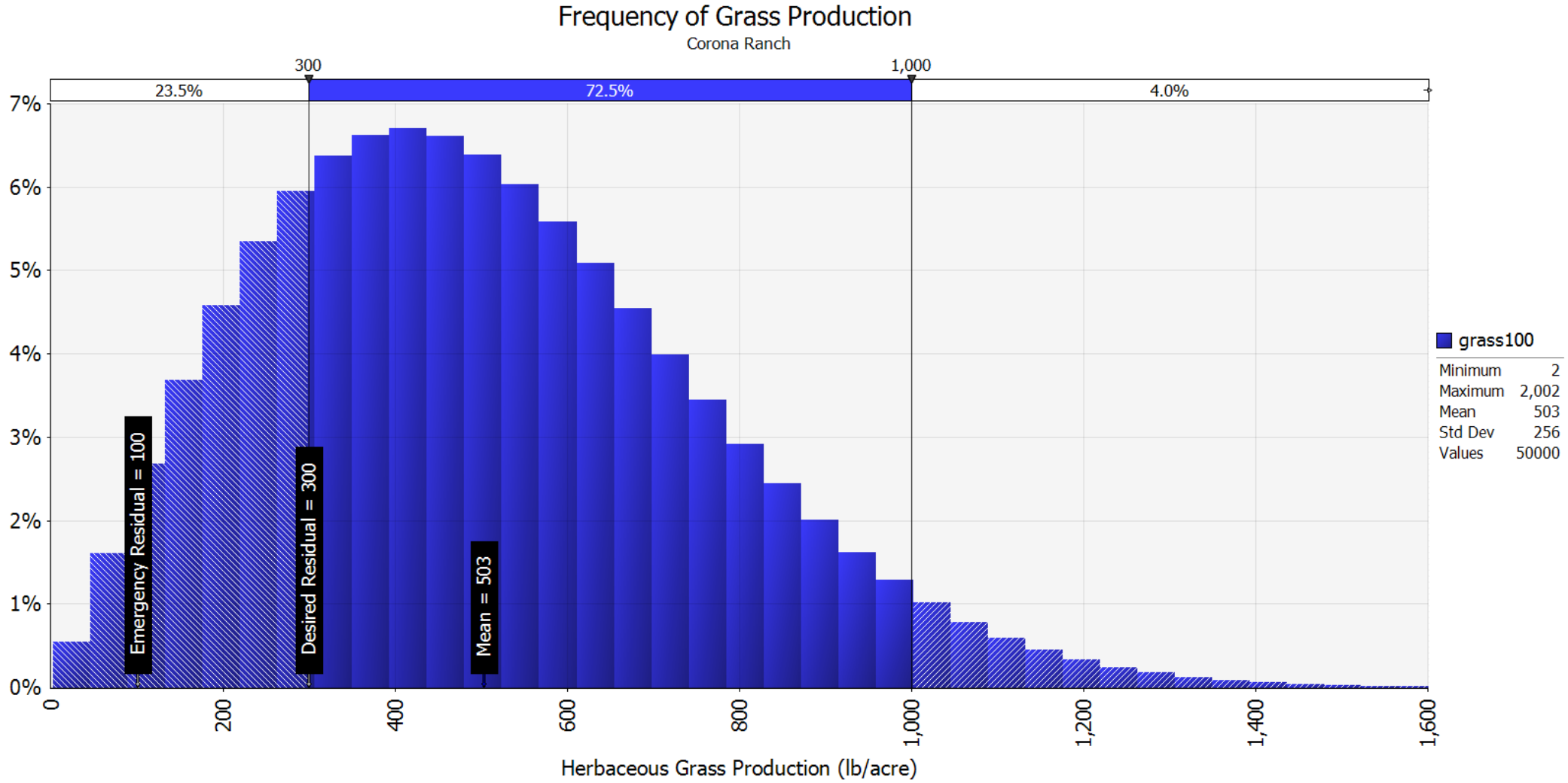


Optimal Strategies

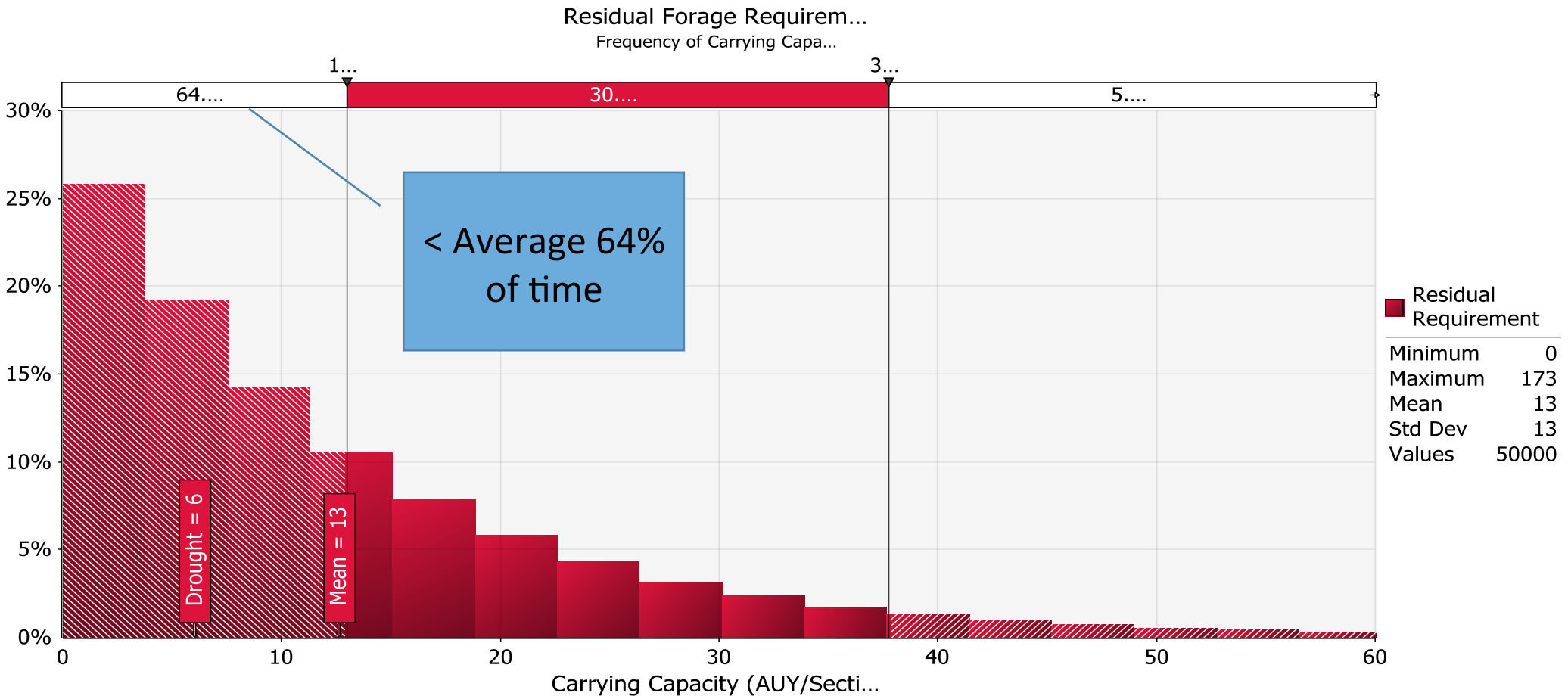
- 1 yr of drought
  - Dry-lot and feed through it
- 2 or more years of drought - herd reduction is optimal
  - > 8 years to re-build herd with production and cash flow limits
- How long will the drought last?

Source: Torell, Murugan & Ramirez 2010

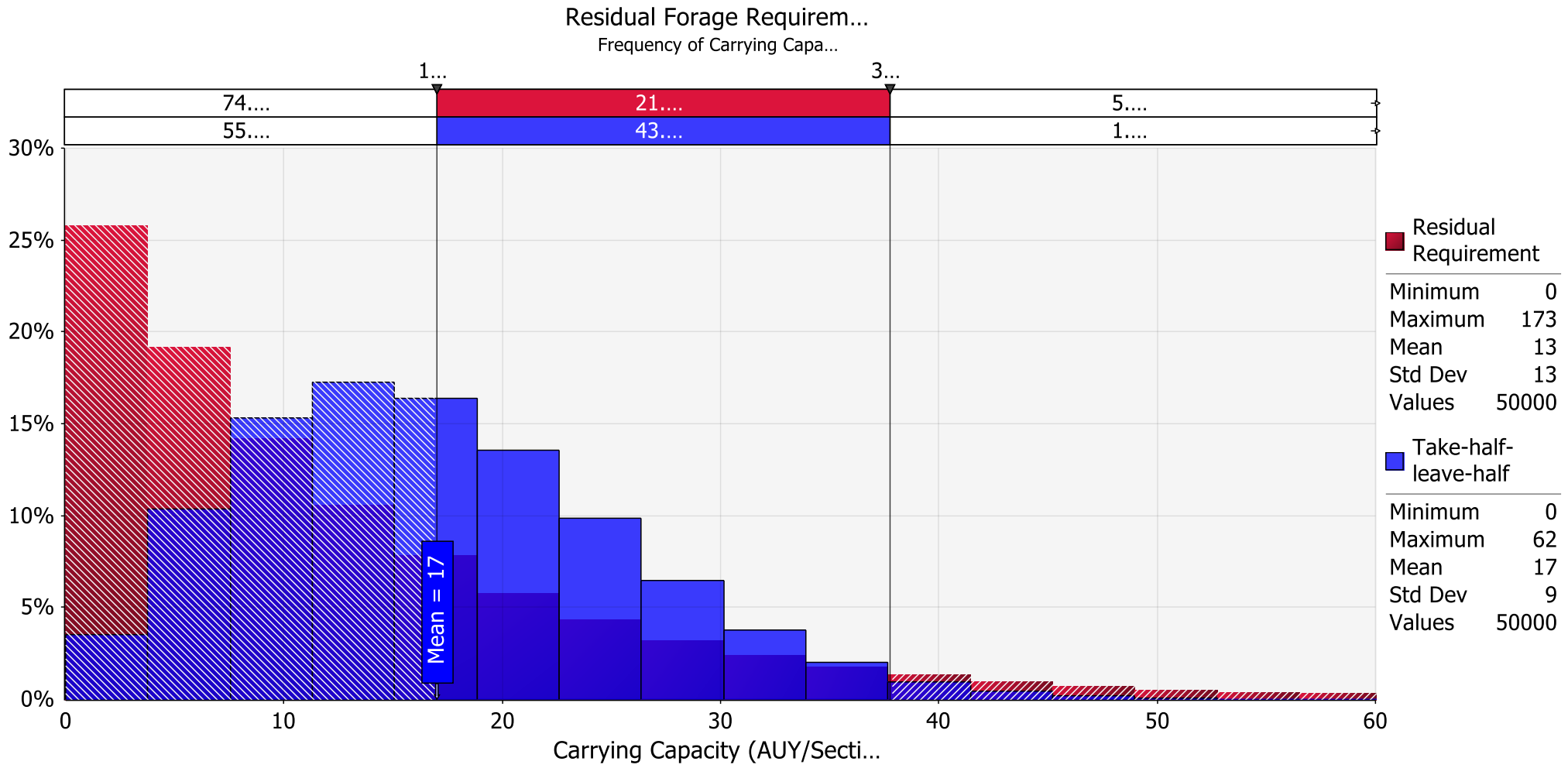
Relative Frequency of Annual Grass Production

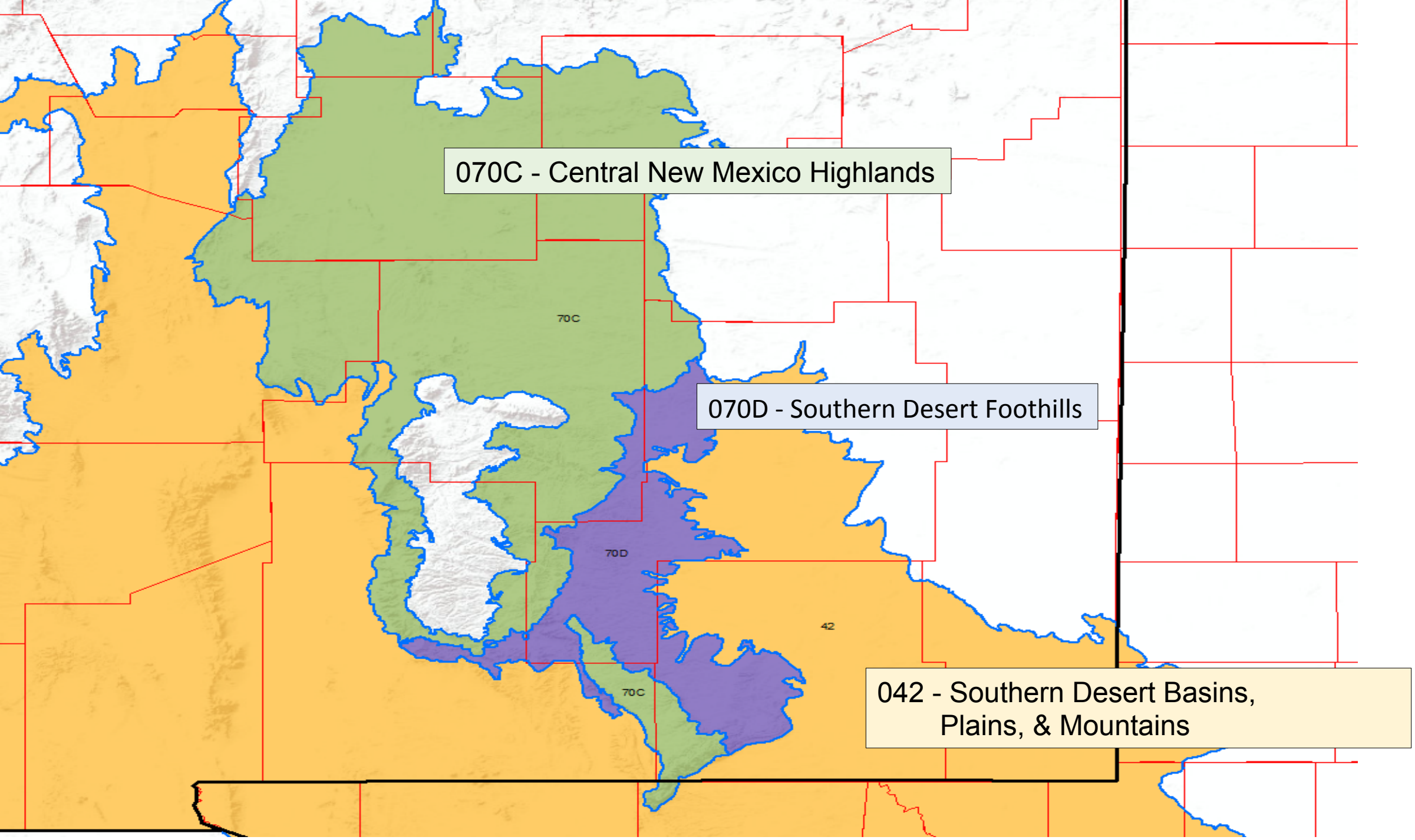


Stocking Based on Residual Forage Requirement



Compared to Take-Half Rule




070C - Central New Mexico Highlands
070D - Southern Desert Foothills
042 - Southern Desert Basins, Plains, & Mountains
70C
70D
42
70C