Making Grazing Management Decisions

KSU/NDMC Drought Workshop
Garden City
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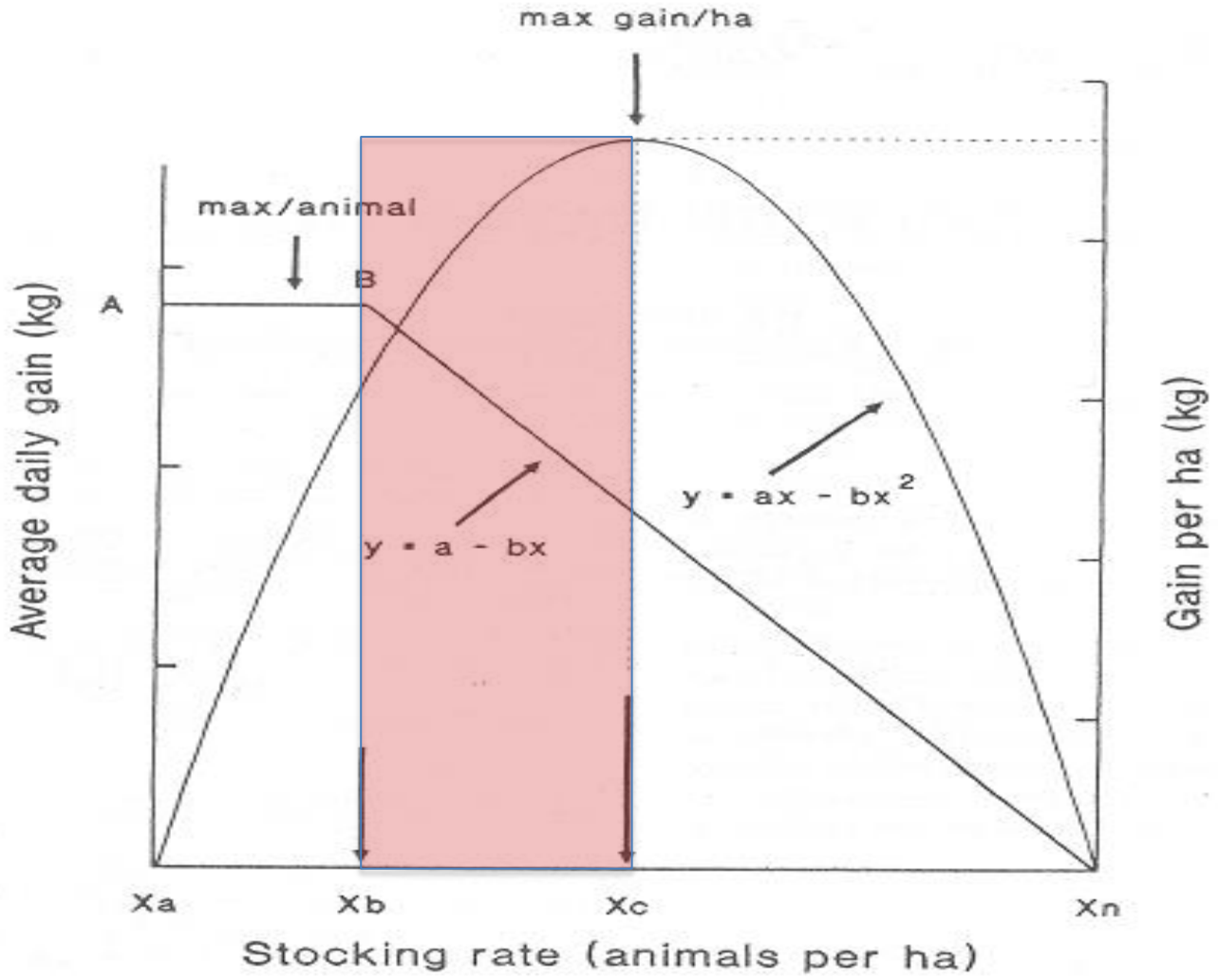
Making Grazing Management Decisions some basic assumptions

Livestock eat grass

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

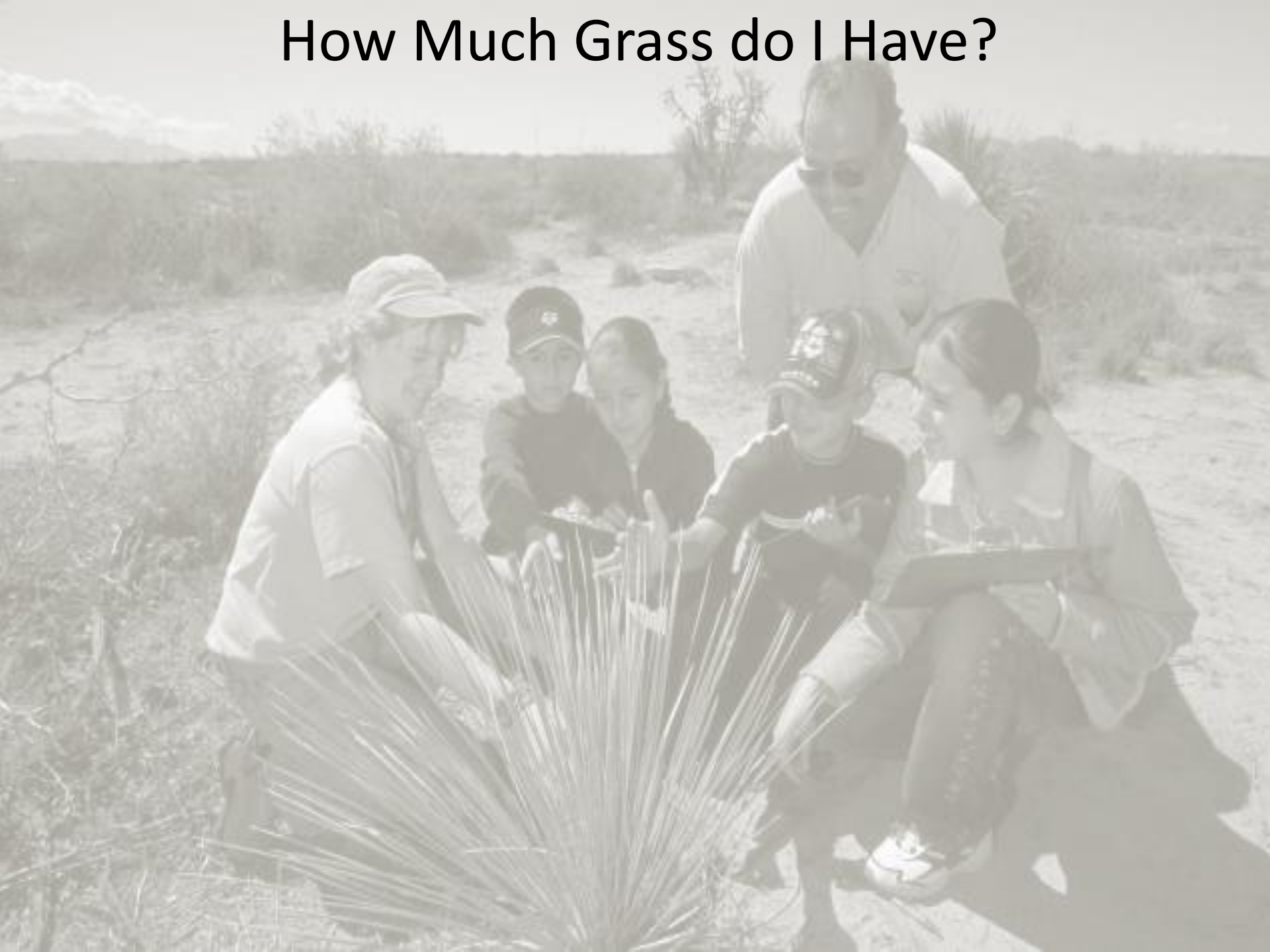
The objective is to maximize intake (gain/hd/d)

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



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

How Much Grass do I Have?



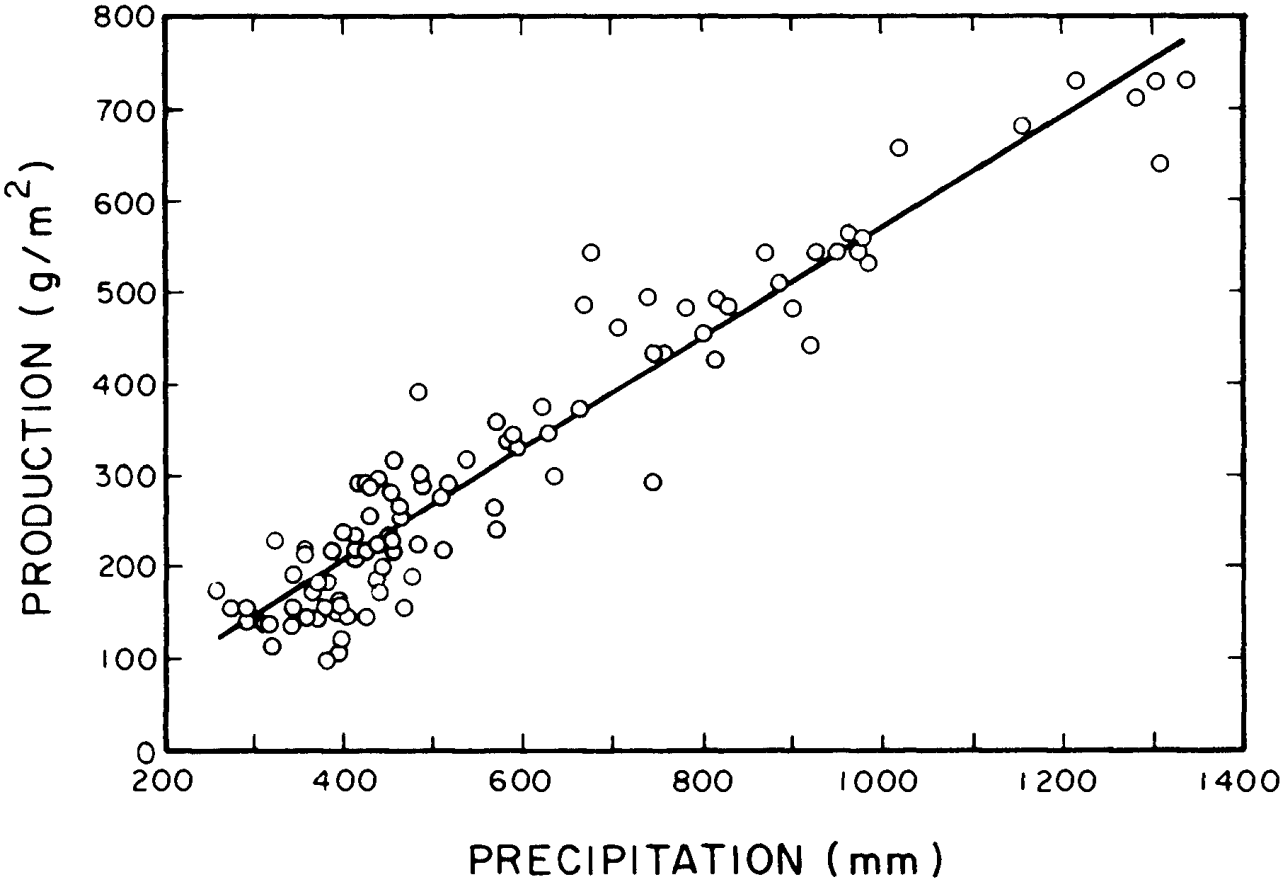
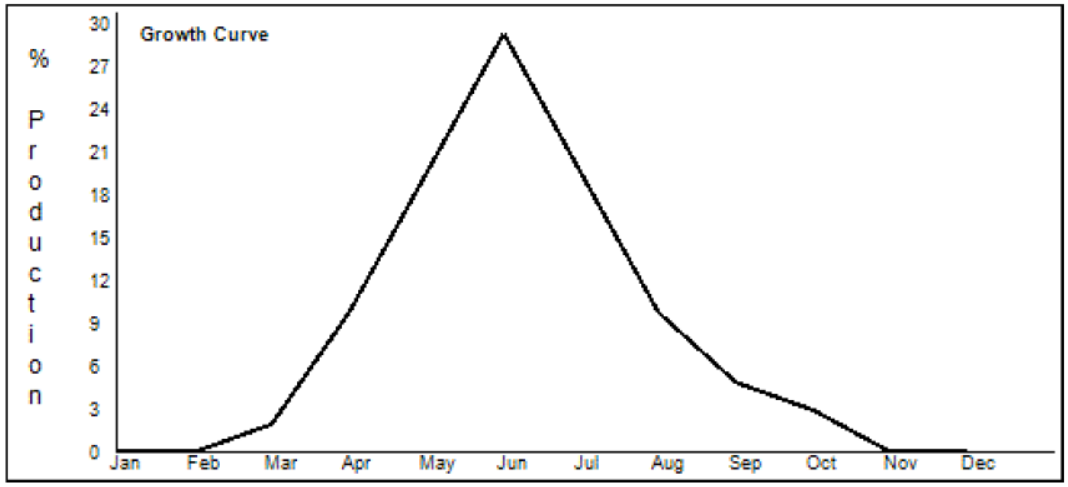


FIG. 2. Relationship between mean annual precipitation and mean aboveground net primary production (ANPP) for 100 major land resource areas across the Central Grassland region. ANPP = $-34 + 0.6 \cdot$APPT; $r^2 = 0.90$.

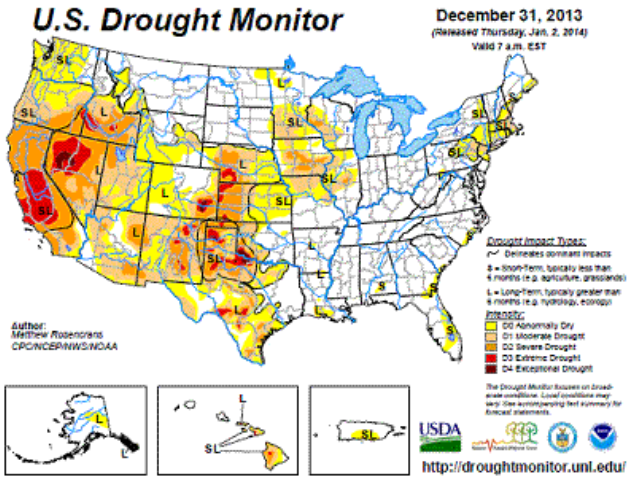
Site name: **Clay Upland (North) Draft (PE 16-20)**
Site type: Rangeland
Site ID: R072XA007KS
Major land resource area (MLRA): 072-Central High Tableland

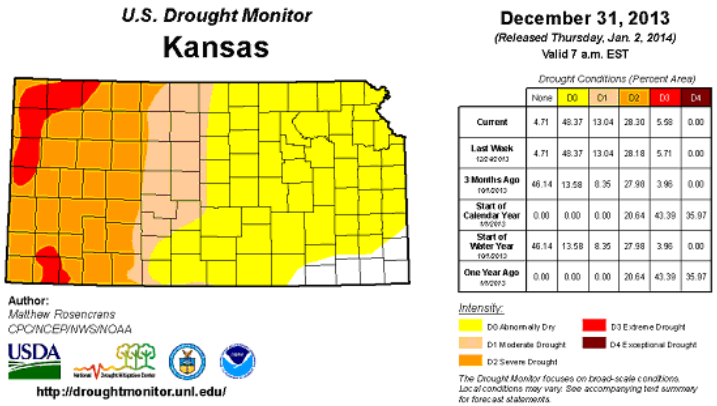
Annual Production by Plant Type

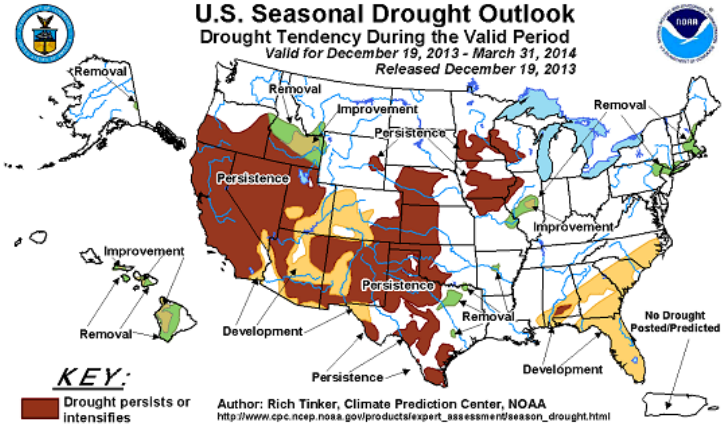
	Annual Production (lbs/ac)		
Plant type	Low	Representative value	High
Grass/Grasslike	570	1120	1570
Forb	65	140	215
Shrub/Vine	65	140	215
Total	700	1400	2000

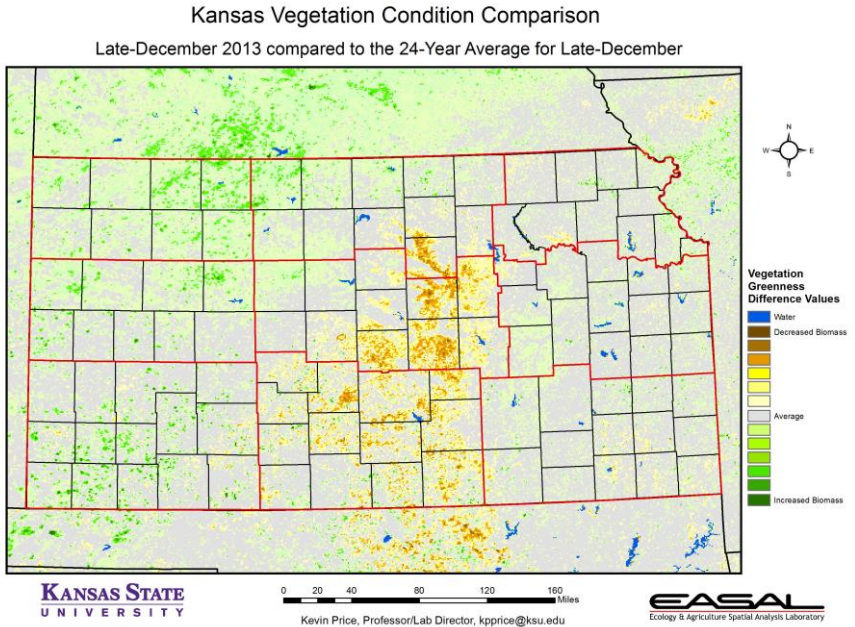


How Much Grass am I Going to Have?

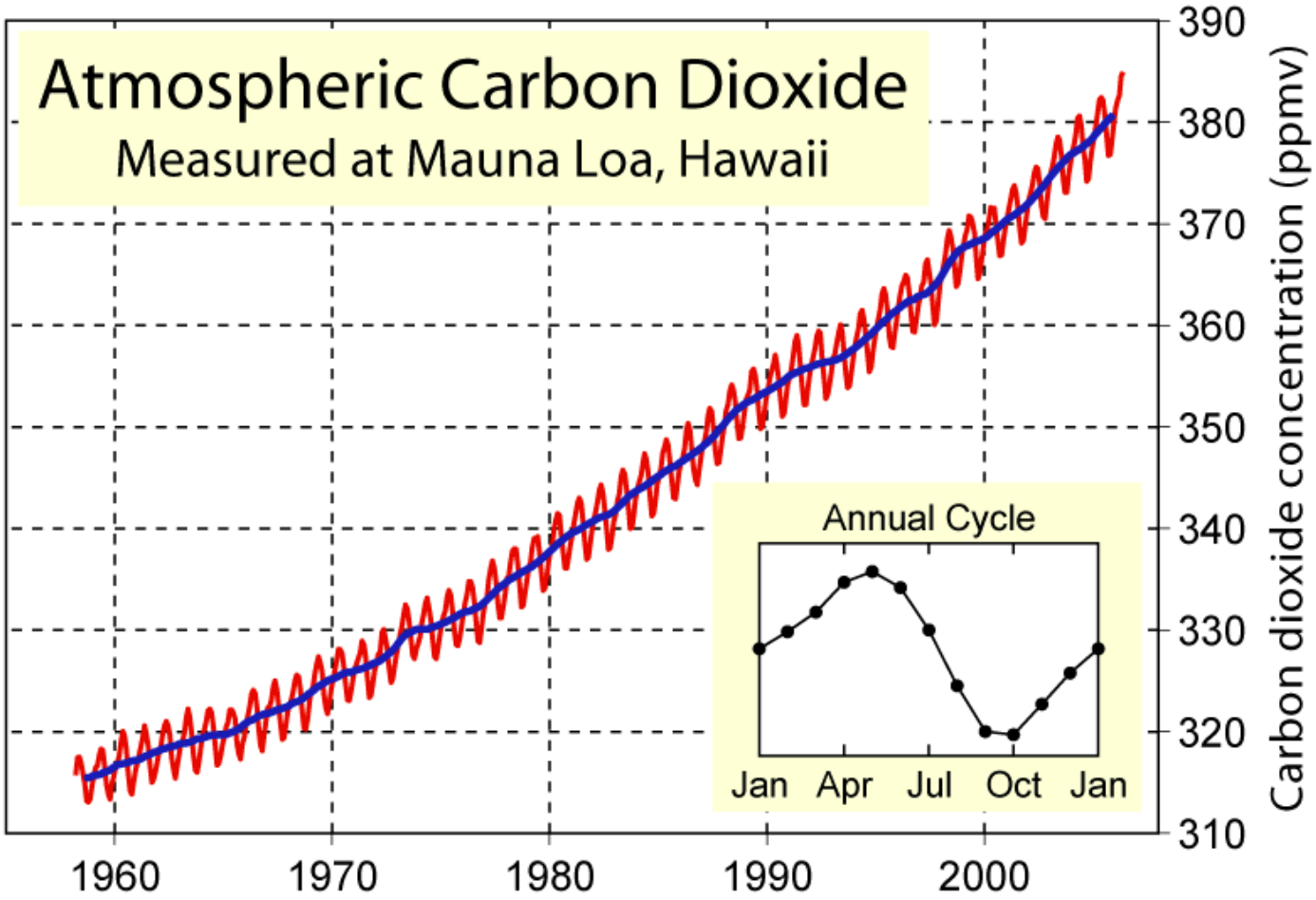






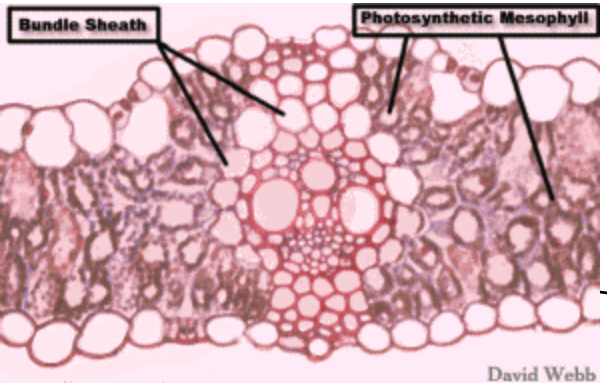


Changes in CO_2 concentration

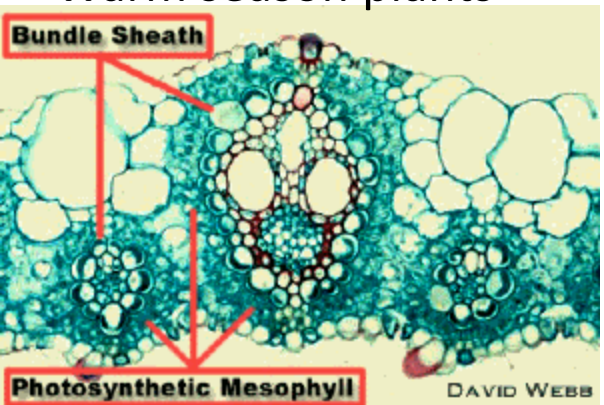


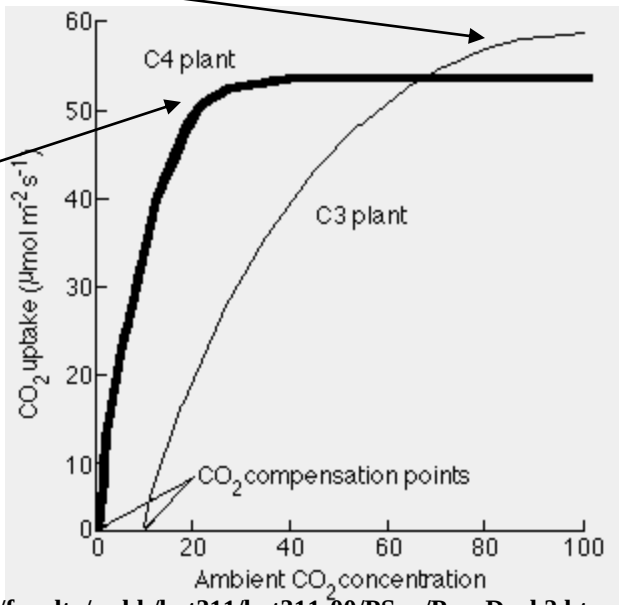
Elevated CO_2 effects on plants

Cool season plants



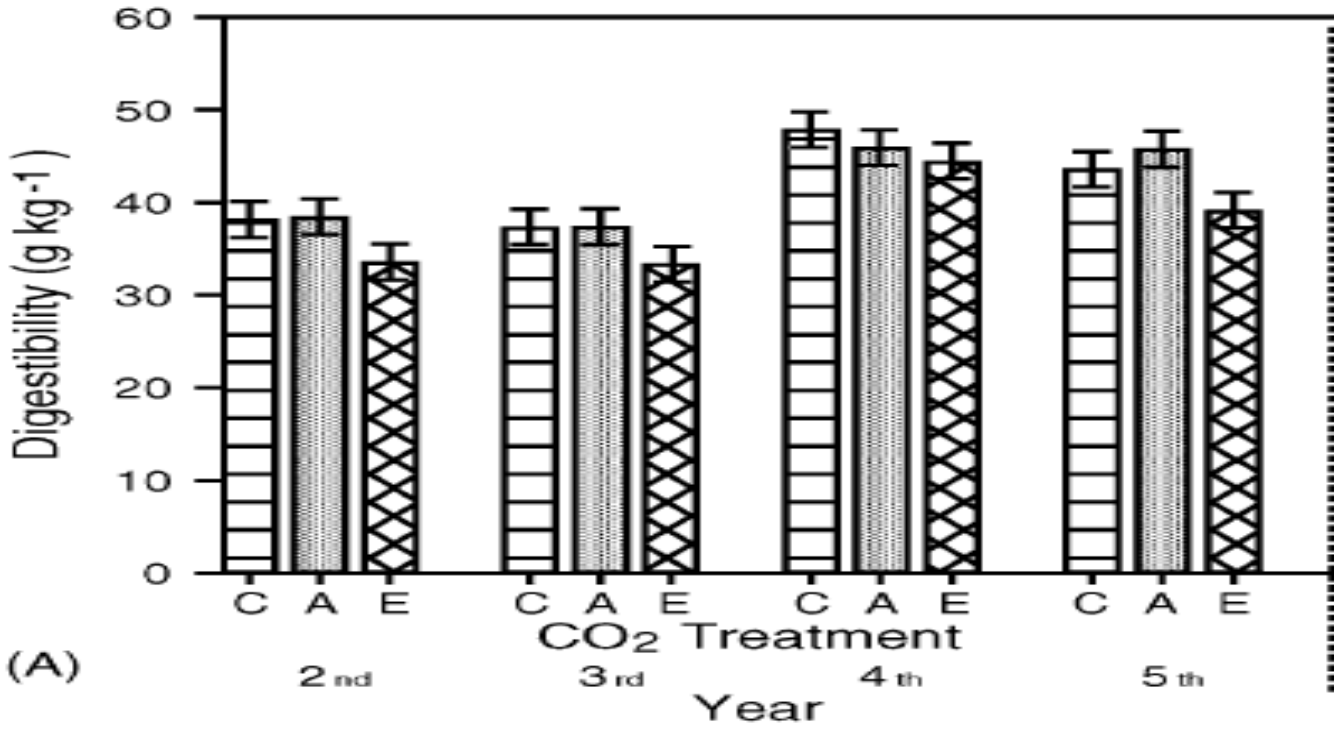
Warm season plants





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

ELEVATED CO_2 EFFECTS ON FORAGE QUALITY



The negative effects of elevated CO2 on forage quality are likely to be greater than the positive effects on quantity, because quality drops to critically low levels that can inhibit utilization of the quantity that is available. Milchunas et al 2005

ELEVATED CO_2 EFFECTS ON LIVESTOCK PERFORMANCE

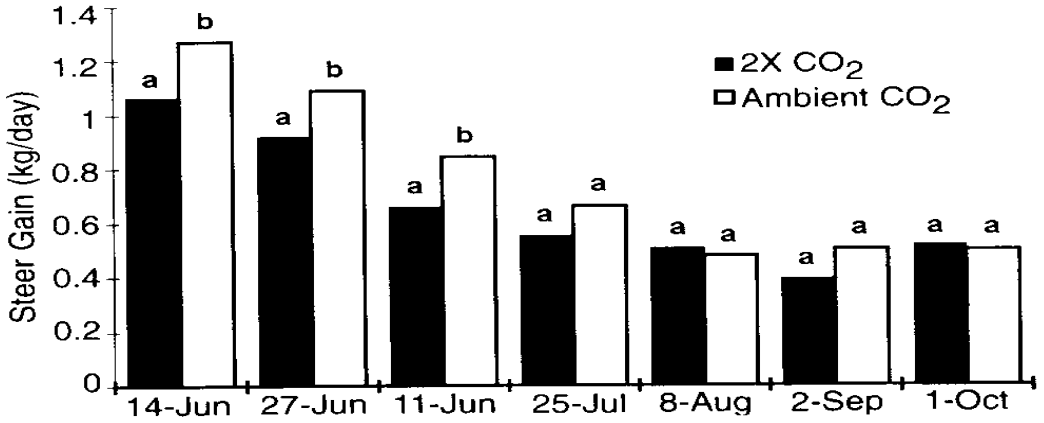
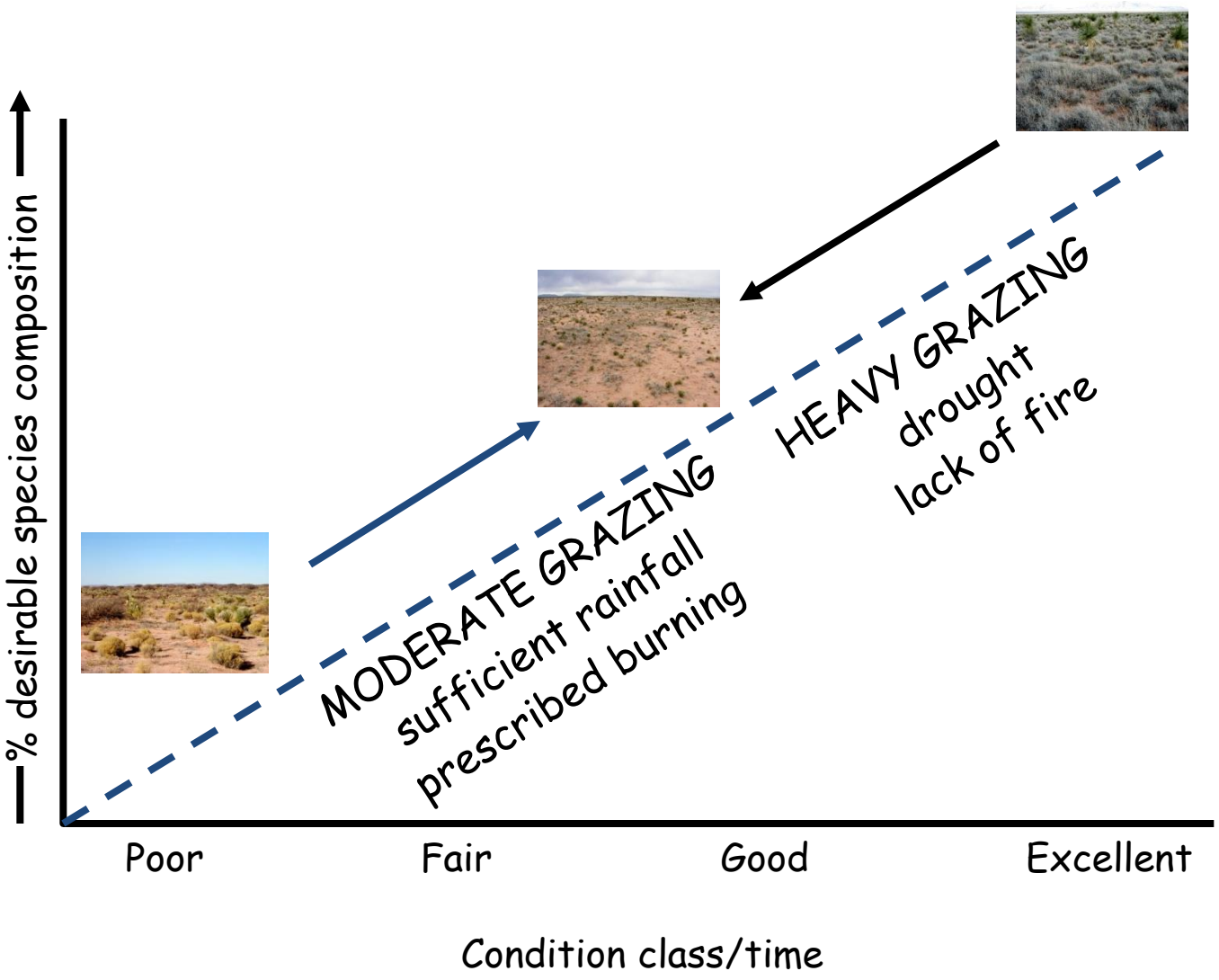


Figure 2 Estimated steer gain (kg/day) derived from acid detergent fiber and crude protein of diet samples collected on the indicated dates in 1989 by esophageally fistulated sheep from tallgrass prairie exposed to 2× ambient and ambient atmospheric CO_2. Means within a date with a common letter do not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



Making Drought Decisions

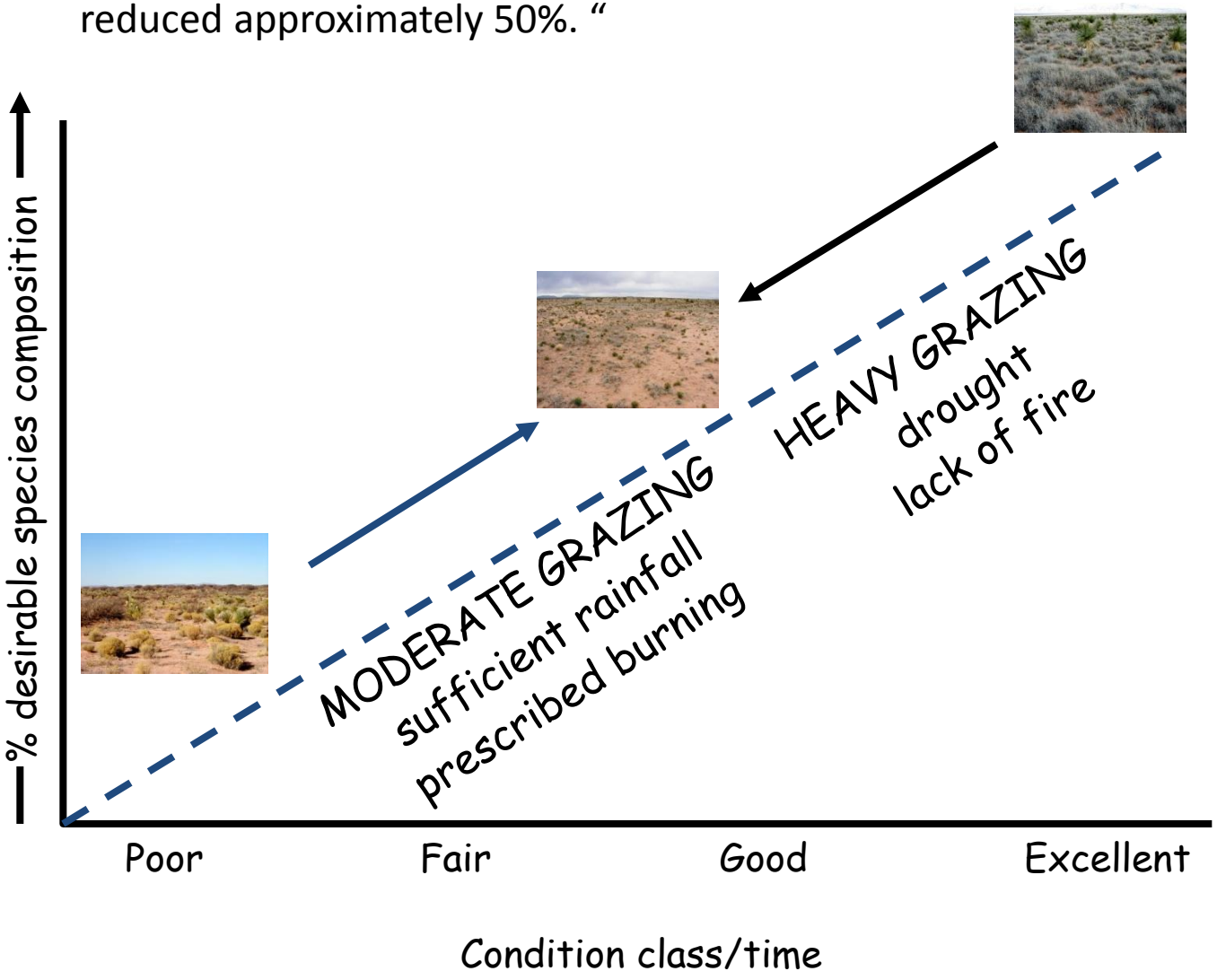
“It is obvious that grasslands, weakened by over- grazing during wet cycles are extremely sensitive to deficient soil moisture when drought strikes. Loss on heavily grazed ranges often was nearly double' that on those moderately grazed and frequently more than double the amount on the nongrazed grasslands “. Albertson, Tomanek and Riegel 1957

Percent drought loss, on heavily grazed (HG), moderately (MG), and nongrazed (NG) ranges 1933-1952.

St. Francis			Sharon Springs			Rozel /Coldwater		
HG	MG	NG	HG	MG	NG	HG	MG	NG
97	88	63	84	47	15	90	56	50

How much grass can I harvest sustainably?

"By 1951, cover had increased to 95% and yield was nearly 3,000 lb/A. However, by 1955-after 4 years of drought-both cover and yield had been reduced approximately 50%. "



Making Drought Decisions

Short grass prairie is exceptionally resilient to livestock grazing

We have a very good working knowledge of the relationship between soil/vegetation and rainfall-both in the short term and the long term

We have a very good working knowledge of the relationship between forage quality/quantity and livestock performance

The challenge is adjusting livestock numbers in the short term to optimize livestock and financial performance