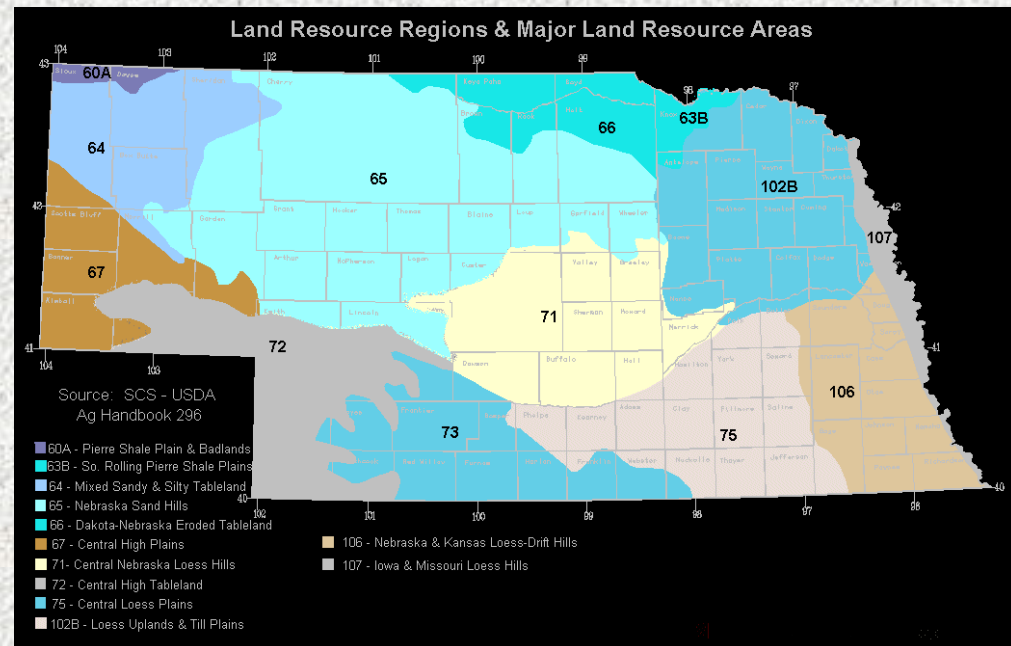# Ecological Site Description (ESD)

- **Standardized method for defining, delineating, and describing grasslands.**

- **Distinctive kinds of land with specific physical characteristics.**

- **Recognized and described based on its unique characteristics and ability to produce and support a characteristic plant community.**

- **ESD contains more information – soil, physical, climate, and hydrologic features, plant communities and dynamics, production estimates, growth curves, animal communities, and interpretation for management.**
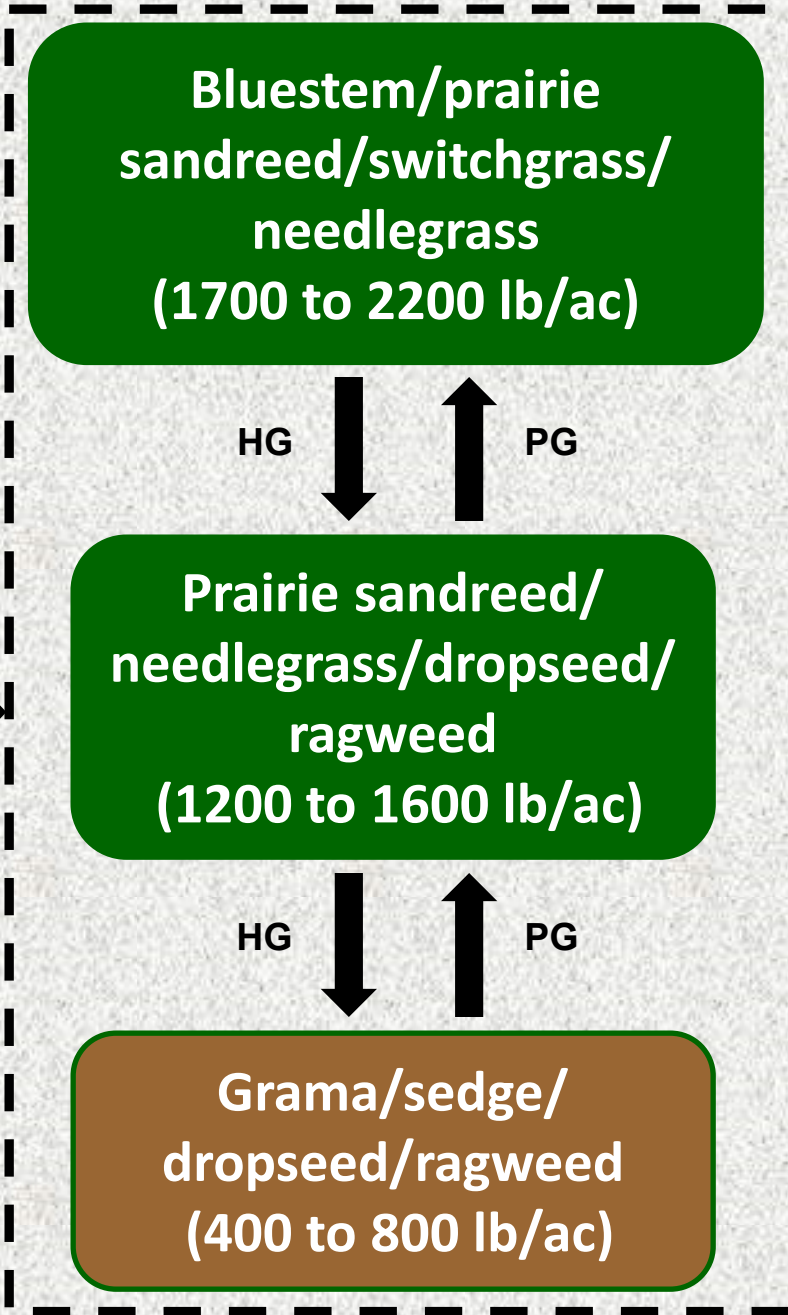

Land Resource Regions & Major Land Resource Areas

Source: SCS - USDA
Ag Handbook 296

60A - Pierre Shale Plain & Badlands
63B - So. Rolling Pierre Shale Plains
64 - Mixed Sandy & Silty Tableland
65 - Nebraska Sand Hills
66 - Dakota-Nebraska Eroded Tableland
67 - Central High Plains
71 - Central Nebraska Loess Hills
72 - Central High Tableland
73 - Central Loess Plains
75 - Central Loess Plains
102B - Loess Uplands & Till Plains
106 - Nebraska & Kansas Loess-Drift Hills
107 - Iowa & Missouri Loess Hills

Sands Ecological Site

Eastern redcedar

Encroachment →

Bluestem/prairie sandreed/switchgrass/needlegrass
(1700 to 2200 lb/ac)

HG ↓   ↑ PG

Prairie sandreed/needlegrass/dropseed/ragweed
(1200 to 1600 lb/ac)

HG ↓   ↑ PG

Grama/sedge/dropseed/ragweed
(400 to 800 lb/ac)

Disturbance (animal, man, fire)

Active blowout

PG ↓   ↑ HG

Annual/perennial pioneer

Long-term PG

MLRA 65 Nebraska Sandhills (17-22" precipitation)
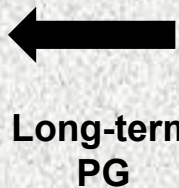
(PG = proper grazing)
(HG = heavy grazing)

Ranch Practicum 2023 – Meadow Hay Summary

Yield (tons/acre)

	June 28	October regrowth	Total
Fertilized	2.03		
Control – no fertilizer	1.41		
	July		
Fertilized			
Control – no fertilizer			

Meadow Hay Harvest: June 20

Control: 0.78 tons/ac
CP: 13.1%, TDN: 60.2%

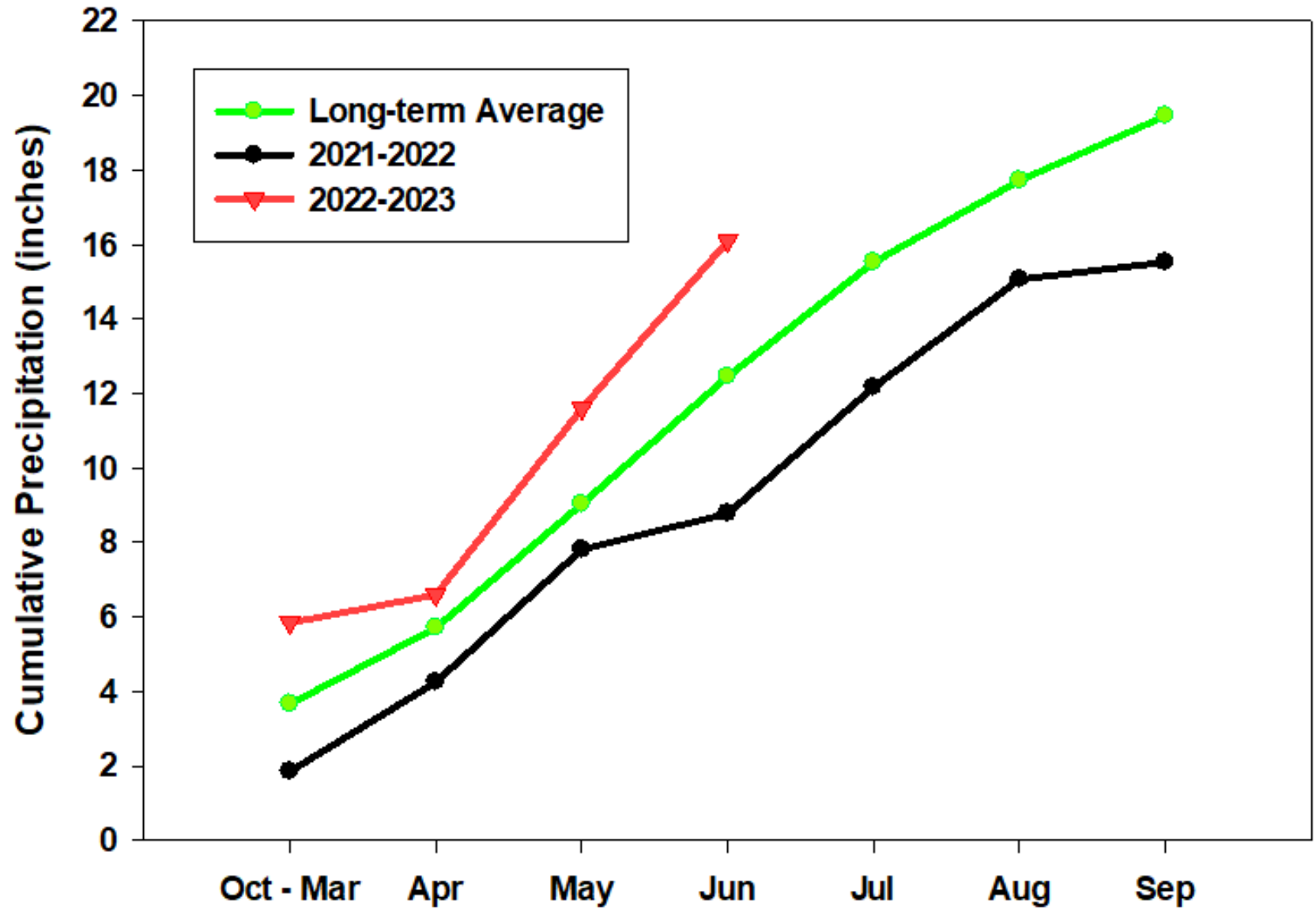Fertilized: 1.52 tons/ac
CP: 12.4%, TDN: 57.1%

GSL Precipitation (inches)

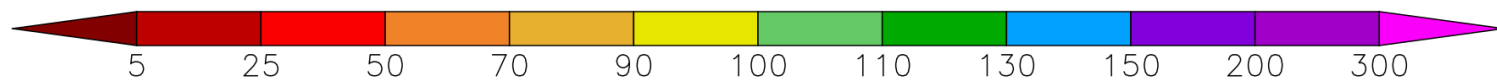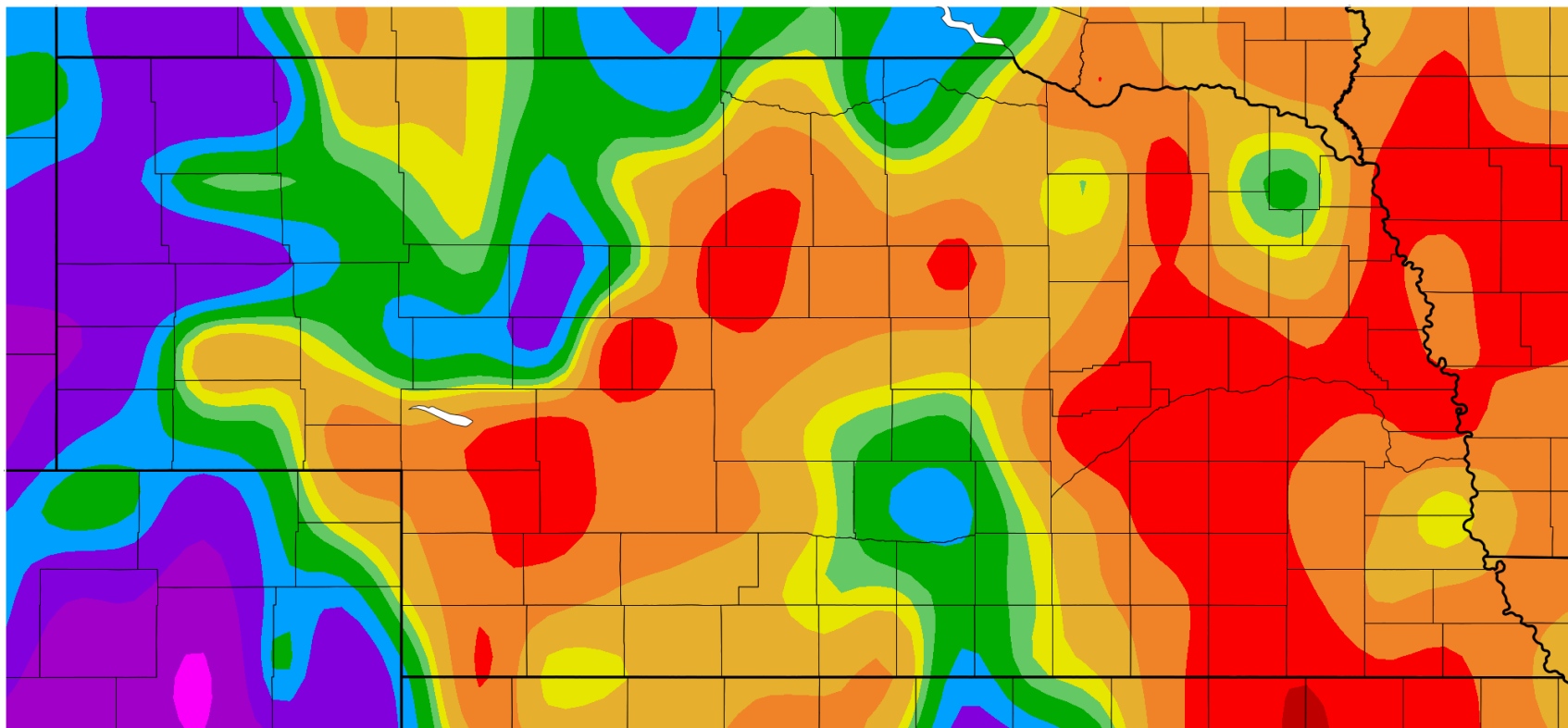| Month	Average	2021-2022	2022-2023	2022-2023 Cumulative
Oct. – Mar.	3.66	1.85	5.84	5.84
April	2.05	2.4	0.76	6.60
May	3.32	3.56	5.00	11.60
June	3.43	0.97	4.50	16.10
July	3.07	3.39		
August	2.19	2.9		
September	1.74	0.46		
Total	19.46	15.53		

June 2023 rainfall

- **Mostly after June 21**

GSL 2023 Cumulative Precipitation

Percent of Normal Precipitation (%)
6/1/2023 − 6/30/2023

5   25   50   70   90   100   110   130   150   200   300

Balancing Forage Supply and Demand

Jerry D. Volesky

Range / Forage Specialist

West Central Res. & Ext. Center

402 West State Farm Rd

North Platte, NE 69101

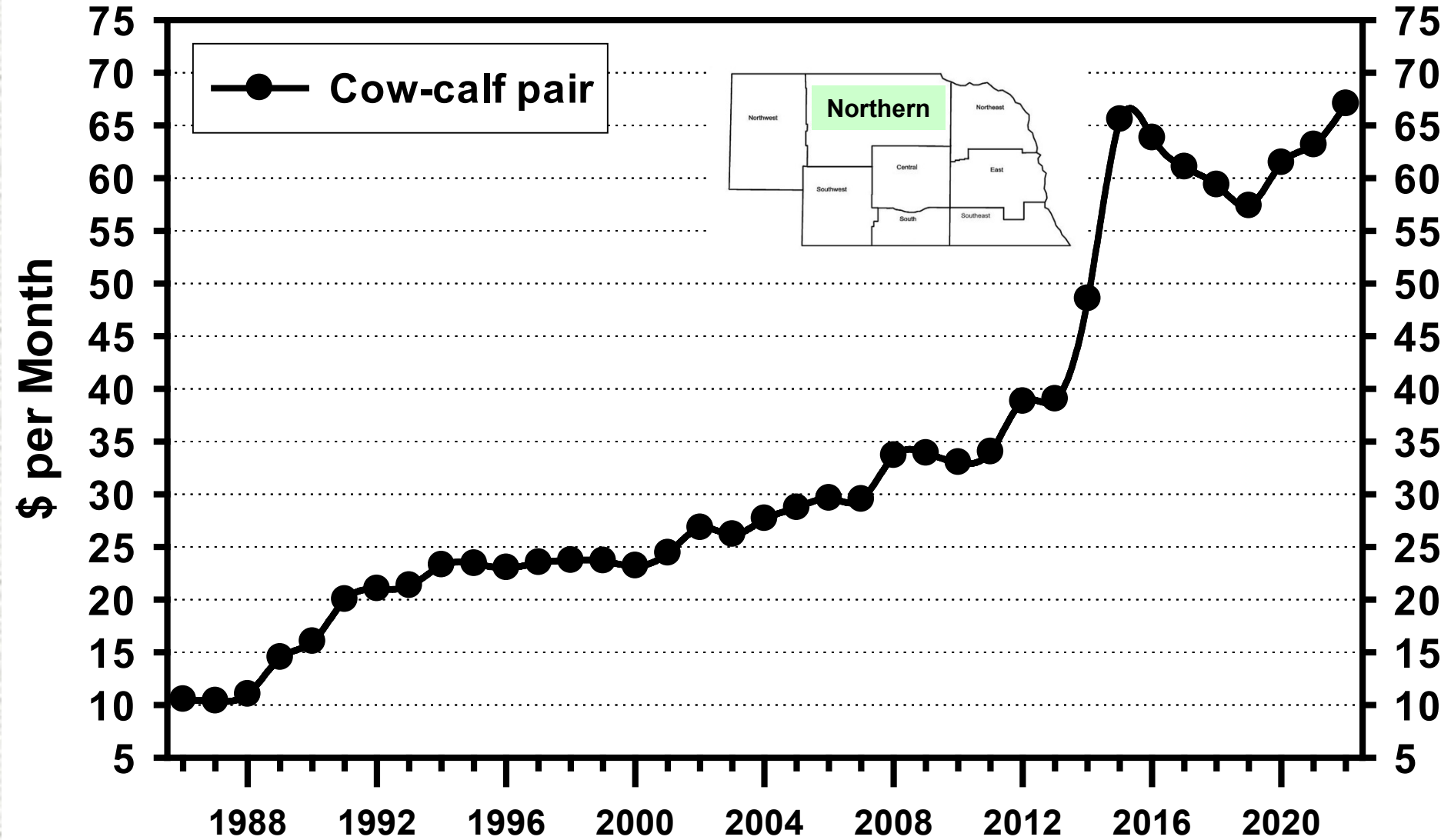**(308) 696-6710**

Jerry.volesky@unl.edu

Ranch Practicum - 2023

Grazing Resources

- **Native rangeland**
- **Mixed native and introduced pastureland**
- **Seeded introduced/improved pasture**
- **Irrigated perennial or annual pasture**
- **Dryland annual pasture**

Northern Nebraska Cash Rental Rates for Pasture (1986 - 2022)

T. Jansen, et al. UNL Ag Economics

Value of 1 lb of pasture forage:
$0.10 to $0.12

Consumption & trampling

Plant vigor

Wildlife
(consumption & habitat)

Residue - litter

Hail - wind

Wildfire

Insects
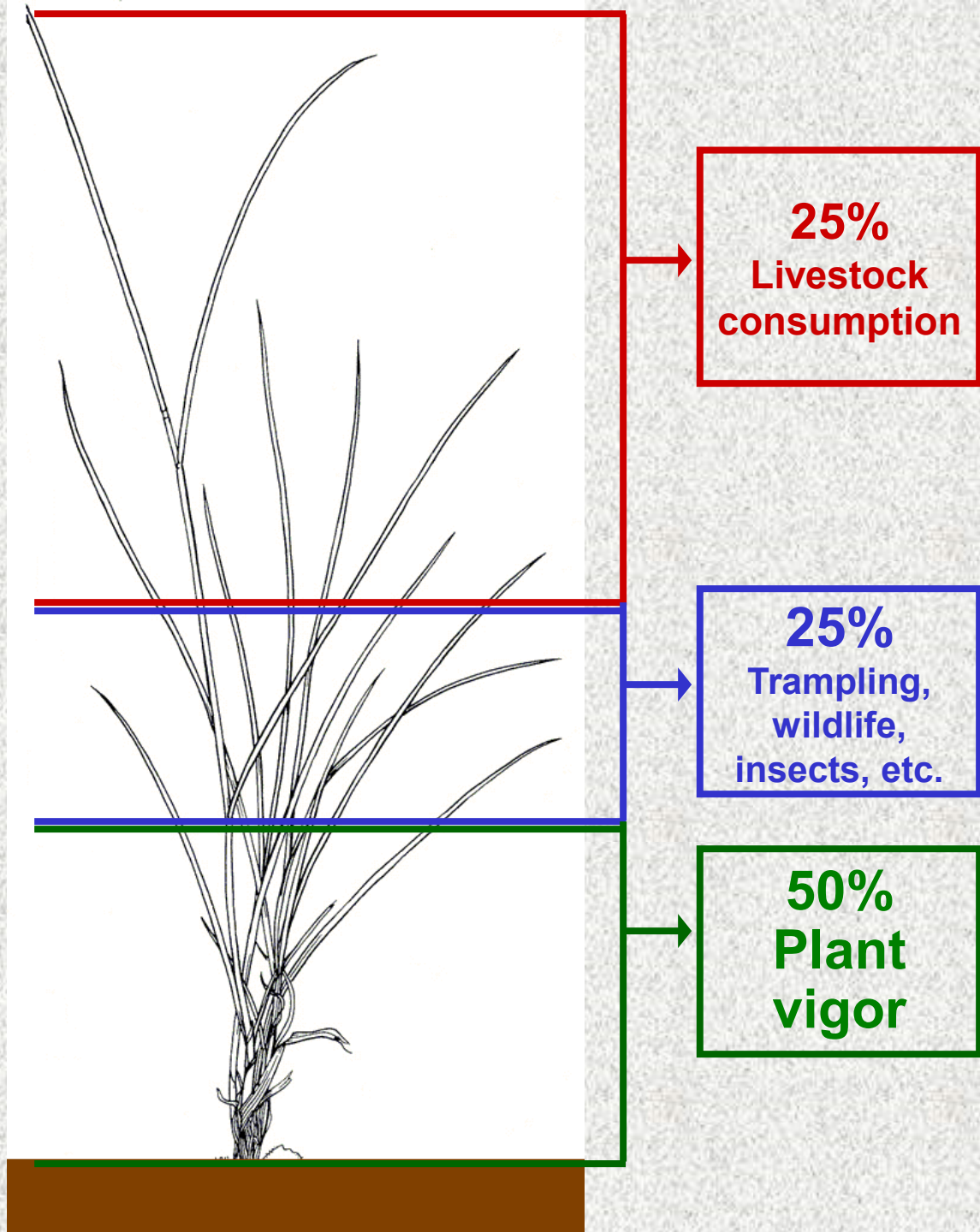
Balancing Forage Supply and Demand

- Spatially – optimum use across management units
- Temporally – optimum use over time

Animal-Land Relationship

- **<u>Grazing capacity</u> – total number of animals which may be sustained on a given area based on total forage available.**

- **<u>Stocking rate</u> – animal unit demand per unit area over a period of time (e.g., AUM/acre). It is a management decision.**

Stocking rate could be expressed by which of the following?

1. **AUM/acre**
2. **Cows/section/month**
3. **Acres/pair/5 months**
4. **All the above**
5. **None of the above**

Stocking Rate Decisions

- **Enable ranch to survive financially.**
- **Give satisfactory animal performance.**
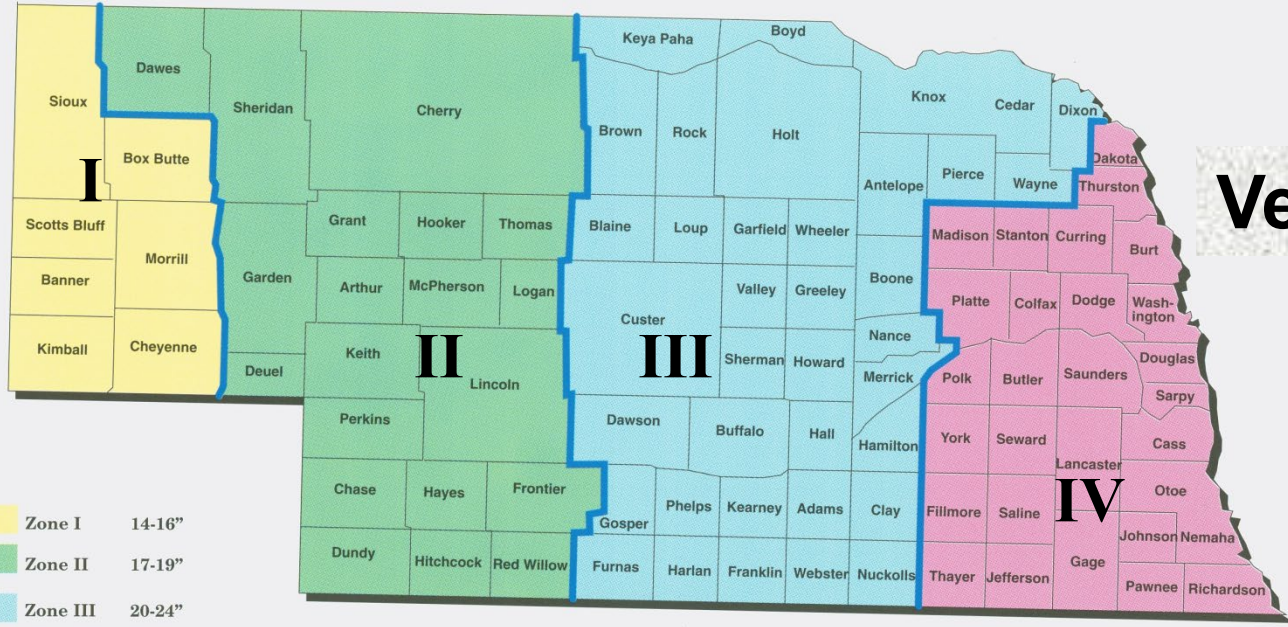- **Allow for future growth of the forage plants.**

Methods of Determining Forage Supply

- **Table values – based on ecological or range site and species composition**
- **Pasture yields**
- **Visual estimates**
- **Clip samples**
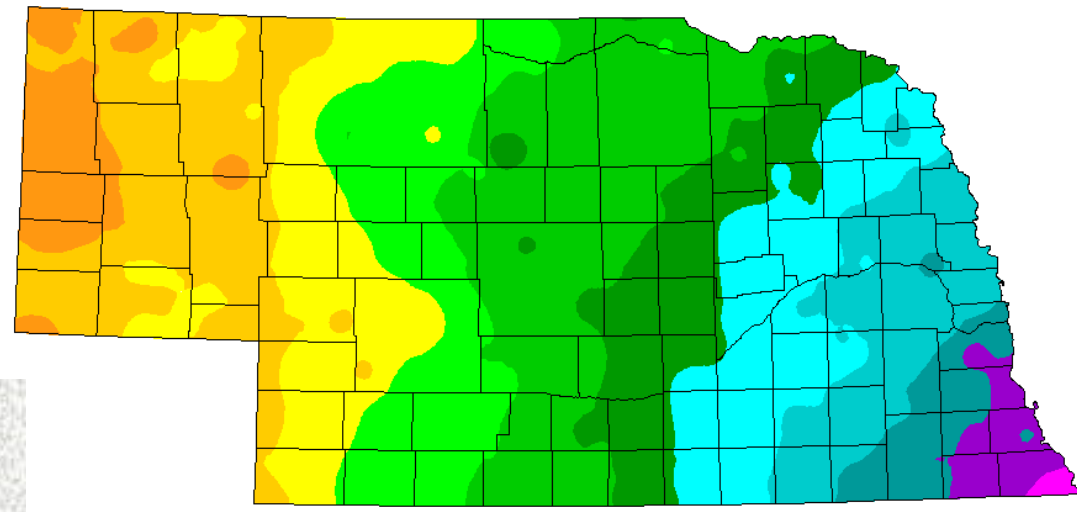- **Records – observations - experience**

Vegetative Zones

Zone I	14-16"
Zone II	17-19"
Zone III	20-24"
Zone IV	25-34"

Average Annual Precipitation

Legend (in inches)

Under 16	26 to 28
16 to 18	28 to 30
18 to 20	30 to 32
20 to 22	32 to 34
22 to 24	Above 34
24 to 26	

This is a map of annual precipitation averaged over the period 1961-1990. Station observations were collected from the NOAA Cooperative and USDA-NRCS SnoTel networks, plus other state and local networks. The PRISM modeling system was used to create the gridded estimates from which this map was made. The size of each grid pixel is approximately 4x4 km. Support was provided by the NRCS Water and Climate Center.

For information on the PRISM modeling system, visit the SCAS web site at http://www.ocs.orst.edu/prism

The latest PRISM digital data sets created by the SCAS can be obtained from the Climate Source at http://www.climatesource.com

Copyright 2000 by Spatial Climate Analysis Service, Oregon State University

Recommended Stocking Rate by Range Site and Condition Class

Vegetative Zone II	Range condition – Stocking rate	
	Fair to Excellent	
	AUM/acre	Acres/AU/5 month
Silty overflow, sandy lowland, silty lowland	0.45 to 0.90	6 to 12
Sandy, sands, silty	0.35 to 0.70	7 to 14
Clayey, choppy sands, limy upland	0.30 to 0.60	8 to 17
Shallow clay, shallow limy	0.25 to 0.50	10 to 20
Shallow to gravel, thin loess	0.20 to 0.40	12 to 25

Mid-August herbage yield on upland Sandhills range, Gudmundsen Sandhills Lab., 2004-2020
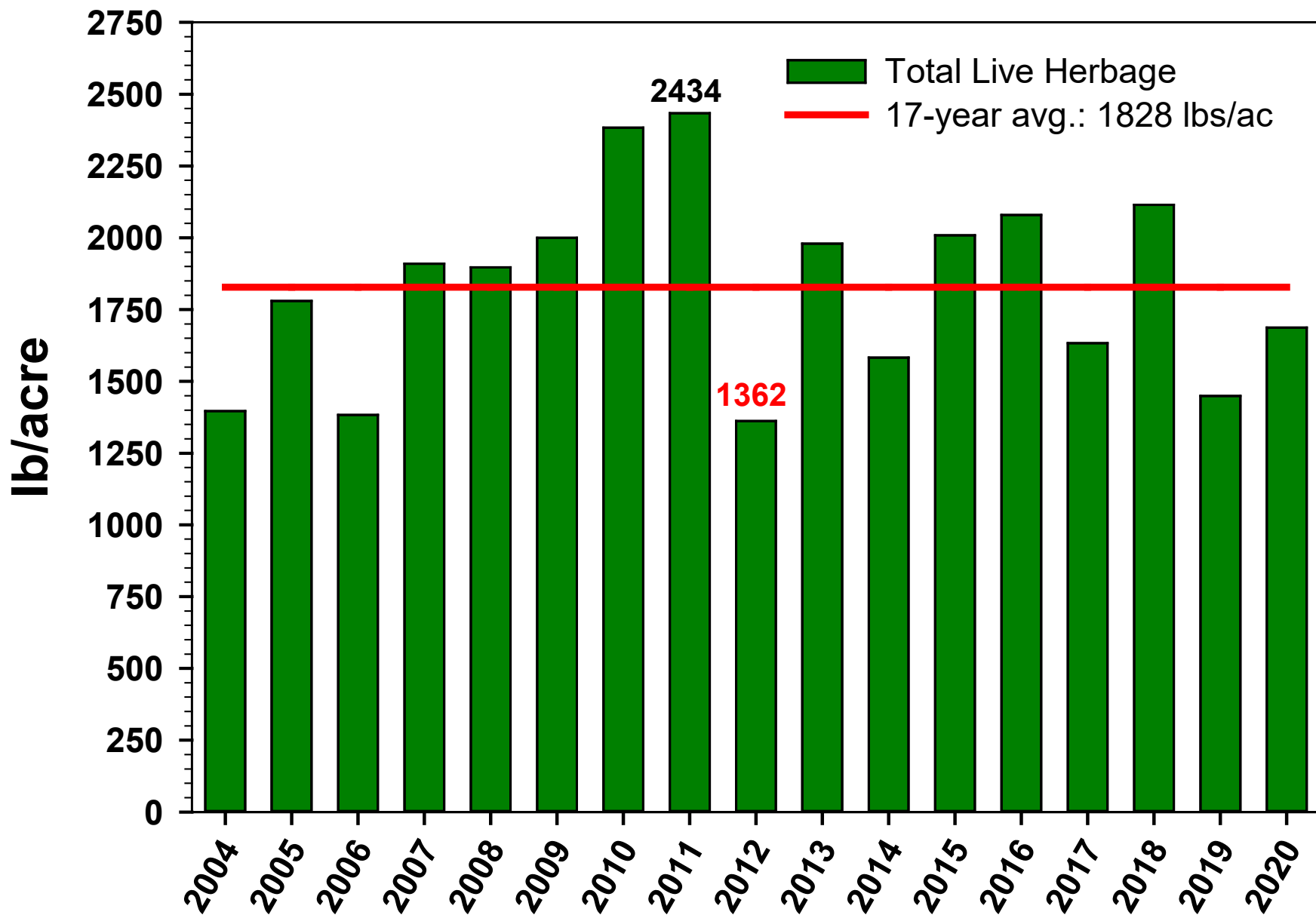
Mid-August herbage yield (lbs/acre) on upland Sandhills range, Gudmundsen Sandhills Lab., 2004 – 2020.

Year	Warm-season grass	Cool-season grass	Sedge	Forbs	Shrubs	Annual grass	Cacti	Total
2004	787	437	87	78	2	6	10	1396
2005	1197	396	61	115	9	2	8	1780
2006	951	290	47	68	24	3	6	1383
2007	1205	334	57	287	26	1	3	1910
2008	1235	233	55	315	58	0	4	1897
2009	1222	454	93	220	11	0	0	2000
2010	1208	799	168	130	79	0	1	2383
2011	1211	887	165	133	28	10	0	2434
2012	620	500	110	60	73	0	5	1362
2013	536	229	21	1154	40	0	0	1980
2014	715	591	15	214	48	0	1	1583
2015	792	850	44	306	16	0	0	2009
2016	1043	651	45	303	37	0	2	2079
2017	693	632	55	187	65	0	8	1633
2018	819	642	232	355	63	4	0	2115
2019	605	599	52	107	74	13	0	1450
2020	627	774	93	99	93	2	0	1687

Animal Unit (AU)

- **Standard animal (1,000 lb. animal) that consumes a standard amount of forage (26 lbs of air-dry forage).**

- **The animal unit concept allows for expressing forage supply and demand using a common unit of measure.**

Animal Unit Month (AUM)

- Amount of forage (780 lbs of air-dry forage) required to sustain the standard animal for one month.

- 1.5 AUM/acre = 1,170 lbs of air-dry forage.

- 0.6 AUM/acre = 470 lbs of air-dry forage.

- Can be expressed as amount of forage available or amount of animal demand.

- Animal unit day (AUD) or year (AUY).

Animal Unit Equivalent (AUE)

- **A numerical figure expressing the quantitative forage demand of a particular kind and class of animal relative to an animal unit.**

- **AUE - 0.1 AU for every 100 lbs of live weight.**

Animal Unit Equivalent

- **A weaned calf weighing 500 lbs will consume about 390 lbs of air-dry forage/month; therefore, it is equivalent to 0.5 AU.**

- **AUE of a cow-calf pair is the sum of the average cow weight and the average calf weight and divided by 1,000 lbs.**
  (Option: calf not included until > 3 months age)

Animal Unit Equivalent

Class of Cattle	Approximate AUE	
Cows (1000 lb)	1	* For all classes, the preferred method of calculating AUE is: **Avg. weight $\div$ 1000**
Cow-calf pairs	1.3 to 1.6	
Replacement heifer (> 24 mo.)	0.9	
Calves (weaned) (< 12 mo.)	0.5	
Yearling (12 - 17 months)	0.7	
Yearling (18 - 24 months)	0.8	
Bulls	1.5 to 2.0	

Grazing Stocking Rates and Carrying Capacity

1 AU (animal unit) = 1000 lb of animal
1 AUD (animal unit day) = 26 lb forage (daily intake)
1 AUM = 780 lb of forage intake (26 lb per day X 30 days)
AUE (animal unit equivalent)

Class of Cattle	Approximate AUE	
Cows (1000 lb)	1	* For all classes, the preferred method of calculating AUE is: Avg. weight ÷ 1000
Cow-calf pairs	1.3 to 1.6	
Replacement heifer (> 24 months)	0.9	
Calves (weaned) (< 12 months)	0.5	
Yearling (12 - 17 months)	0.7	
Yearling (18 - 24 months)	0.8	
Bulls	1.5 to 2.0	

Forage production	Nebraska example	AUM/acre	AUD/acre	Cow-calf (1.5 AUE) pairs/acre for 1 month	Cow-calf (1.5 AUE) pairs/acre for 5 months	Acres/AU for 1 month	Acres/AU for 5 months	Acres/cow-calf (1.5 AUE) pair for 5 months
Low	Panhandle native	0.30	9	0.20	0.04	3.3	16.7	25.0
	Southwest native	0.40	12	0.27	0.05	2.5	12.5	18.8
	Western Sandhills	0.50	15	0.33	0.07	2.0	10.0	15.0
	Central Sandhills	0.60	18	0.40	0.08	1.7	8.3	12.5
	Eastern Sandhills	0.70	21	0.47	0.09	1.4	7.1	10.7
Increasing rainfall or irrigation	Seeded cool-season pasture	0.80	24	0.53	0.11	1.3	6.3	9.4
		0.90	27	0.60	0.12	1.1	5.6	8.3
		1.00	30	0.67	0.13	1.0	5.0	7.5
		1.50	45	1.00	0.20	0.7	3.3	5.0
		2.00	60	1.33	0.27	0.5	2.5	3.8
	Graze-out oats, rye, triticale, or sorghum-sudan.	2.50	75	1.67	0.33	0.4	2.0	3.0
		3.00	90	2.00	0.40	0.3	1.7	2.5
		4.00	120	2.67	0.53	0.3	1.25	1.88
	Low input irrigated pasture	5.00	150	- -	0.67	- -	1.00	1.50
		6.00	180	- -	0.80	- -	0.83	1.25
		7.00	210	- -	0.93	- -	0.71	1.07
		8.00	240	- -	1.07	- -	0.63	0.94
		9.00	270	- -	1.20	- -	0.56	0.83
		10.00	300	- -	1.33	- -	0.50	0.75
		11.00	330	- -	1.47	- -	0.45	0.68
High	High input irrigated pasture	12.00	360	- -	1.60	- -	0.42	0.63

Pasture size: 640 acres
Recommended SR: 0.7 AUM/acre

- **Forage supply:**
  640 acres x 0.7 AUM/acre = 448 AUMs
- **Forage demand:**
  1.2 AU/cow + 0.3 AU/calf = 1.5 AU/pair
  1.5 AU x 6 months = 9 AUMs/pair
- **Number of pairs:**
  448 AUMs/9 AUMs = <u>50 pairs</u>

- -

- **How long for 70 pairs?** (70 pairs x 1.5 AU = 105 AU)
  448 AUM / 105 AU) = 4.3 months

Importance of Animal Unit Concept

- **To present forage supply and demand in a common unit of measure.**

- **As a means of estimating forage removal.**

- **To allow a switch from one kind or class of animal to another.**

Grazing Records: an essential component of any range or pastureland management program

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- **Planning next year's grazing (stocking rates, timing, rotation sequence, etc.)**
- **Grazing lease arrangements**
- **Participation in NRCS programs**
- **Drought / insurance disaster relief**

Homework

Forage Supply

Pasture	Site	Acres	Stocking Rate AUM/ac	AUM's
1	Silty	250	0.50	
	Limy Upland	50	0.40	
2	Silty	150	0.40	
	Sand	150	0.30	
3	Sandy	300	0.50	
4	Silty	100	0.50	
	Sandy	200	0.40	
5	Silty	400	0.60	
Total available AUM				

One Animal Unit Month (AUM) of forage = 780 lb air dried

One Animal Unit Day (AUD) of forage = 26 lb air dried

One Animal Unit (AU) of beef = 1,000 lb of beef animal

Bonus: How long could 80 cow-calf pairs (1.5 AUE each) graze <u>Pasture 5</u> to reach the point where they removed 0.60 AUM/acre from that pasture?

80 cow-calf pairs × 1.5 AUE = _____ AU

AUM in Pasture 5: _____ = _____ AUM

Length of time: _____ = _____ months

Homework

100 pairs
4 bulls (Jun 1 – Aug 15) 2000 lb
1200 lb cows (@ BCS 5.0-5.5)
Calves 3 months on July 1, 2008
Grazing season May 1 – Oct 31

	Animal Weights and AUE Values					
	May	Jun	Jul	Aug	Sep	Oct
Cow	1200	1200	1200	1200	1200	1200
Calf			300	370	440	510
Total	1200	1200	1500	1570	1640	1710
AUE						

Average Animal Unit Equivalent (AUE) per pair = _____ AUE
Animal Unit Equivalent per bull = _____ AUE

How much **forage** do you need?

(100 pairs) × (_____ AU/pair) × (6 mo) = _____ AUM

(4 bulls) × (_____ AU/bull) × (2.5 mo) = _____ AUM

Total = _____ AUM

Bonus: How many acres of pasture (carrying capacity = 0.60 AUM/acre) would be needed to support this herd?

_____

Sandhills Defoliation Response Index System

- **Decision support tool designed to optimize grassland production and use.**

- **Assist grassland manager with decisions about grazing land use in a variable environment.**

- **Ranks the suitability of pastures for future grazing based on the season of defoliation, recent precipitation regime, and residual herbage (hydrologic condition).**

Homework #2
(for September)

Review SanDRIS

Sandhills Defoliation Response Index System (SanDRIS)

Patrick E. Reece[1], Walter H. Schacht[2], and Jerry D. Volesky[3]
University of Nebraska-Lincoln
2007 Edition

Season of Defoliation (Grazing, Hail, Fire, & Grasshoppers)	Index
March-April: sedges green-up and grow	+2
May: cool-season grasses green-up	+1
June: early growth of warm-season tall grasses.	-1
July: rapid growth of warm-season tall grasses.	-2
Multiple events during **June-August**.	-3
August: warm-season tall grasses have flowered.	0
September: nearly full growing-season deferment.	+2
October-February: dormant season	+4

Precipitation Regime (October through September)	Index
Well above average: 5-6 feet of moist soil by April 30 **and** abundant precipitation during May-July.	+2
Near average: 3-4 feet of moist soil by April 30 **and** abundant precipitation during June-July.	0
Drought: little or no dormant-season precipitation during October-April **and/or** well below average precipitation during June-July.	-2

End-of-Season Residual Herbage (Hydrologic Condition)	Index
Excellent: residual herbage of palatable species is common, standing herbage (>1500 lb/ac) and litter are abundant throughout.	+2
Adequate: standing herbage (700-900 lb/ac) and litter uniformly distributed.	0
Poor: standing herbage absent, litter uncommon, characteristic of fire or severe overgrazing.	-2

Questions