



**NOBLE**  
**RESEARCH**  
INSTITUTE

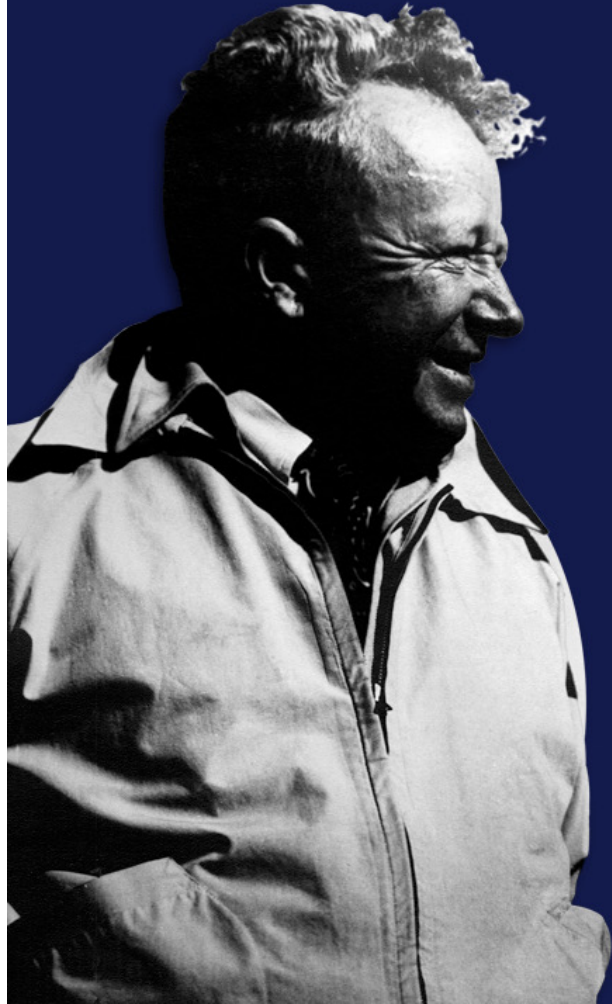
# Managed Grazing for Improved Soil Health

January 12, 2023

Steve Swaffar  
Noble Research Institute  
Ag Consultant







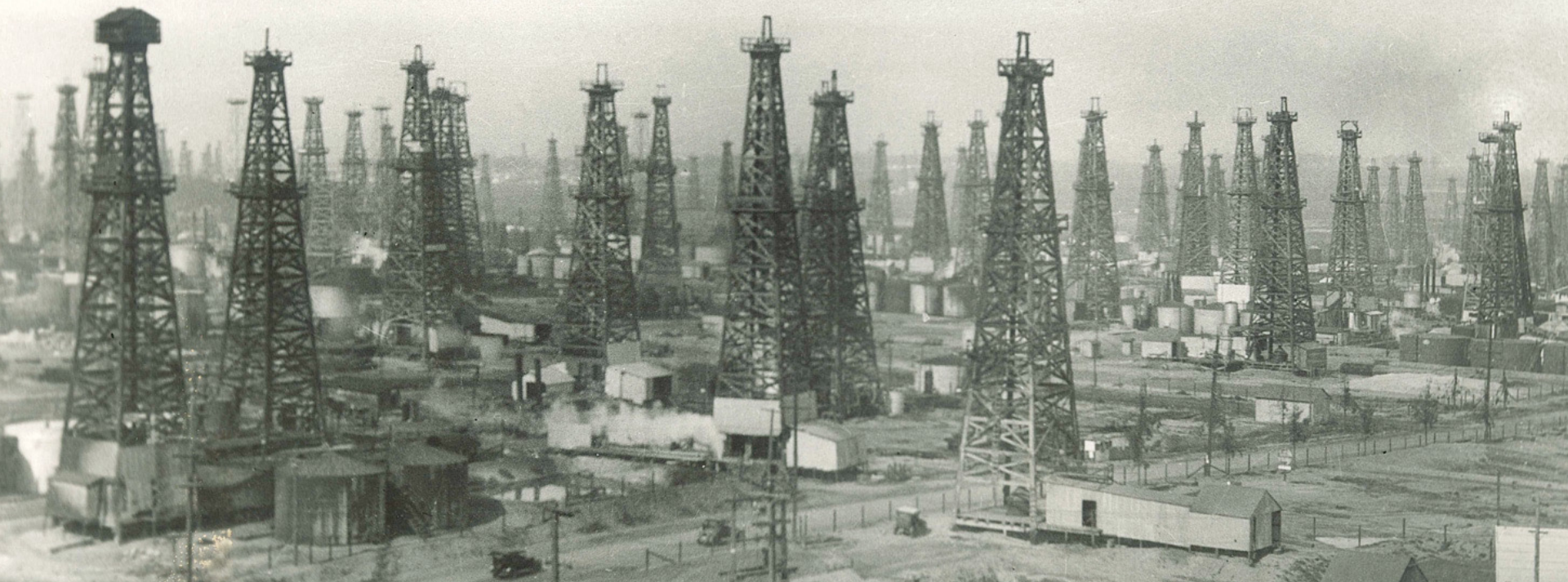
Lloyd Noble  
1896-1950

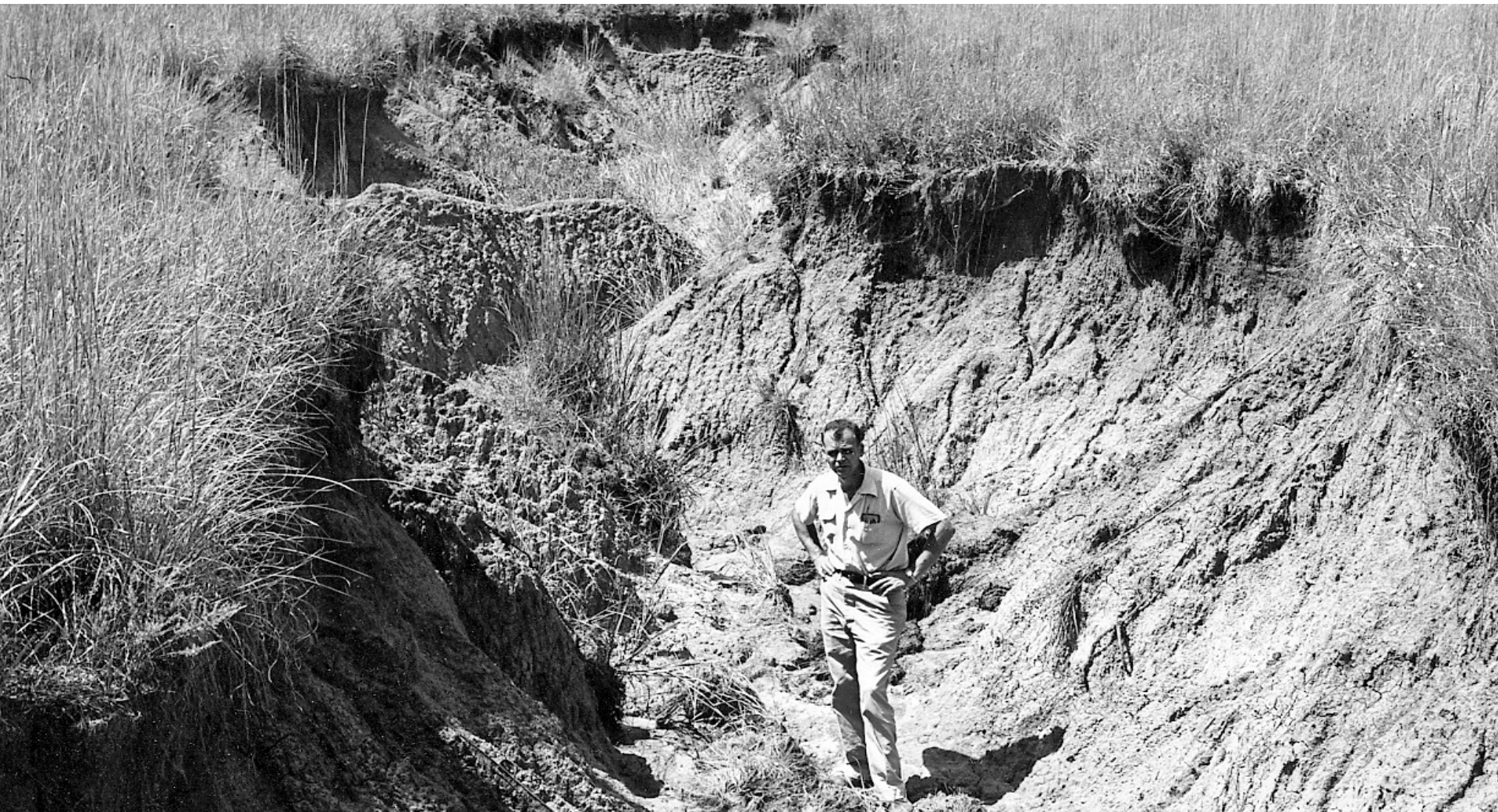
1896





1913

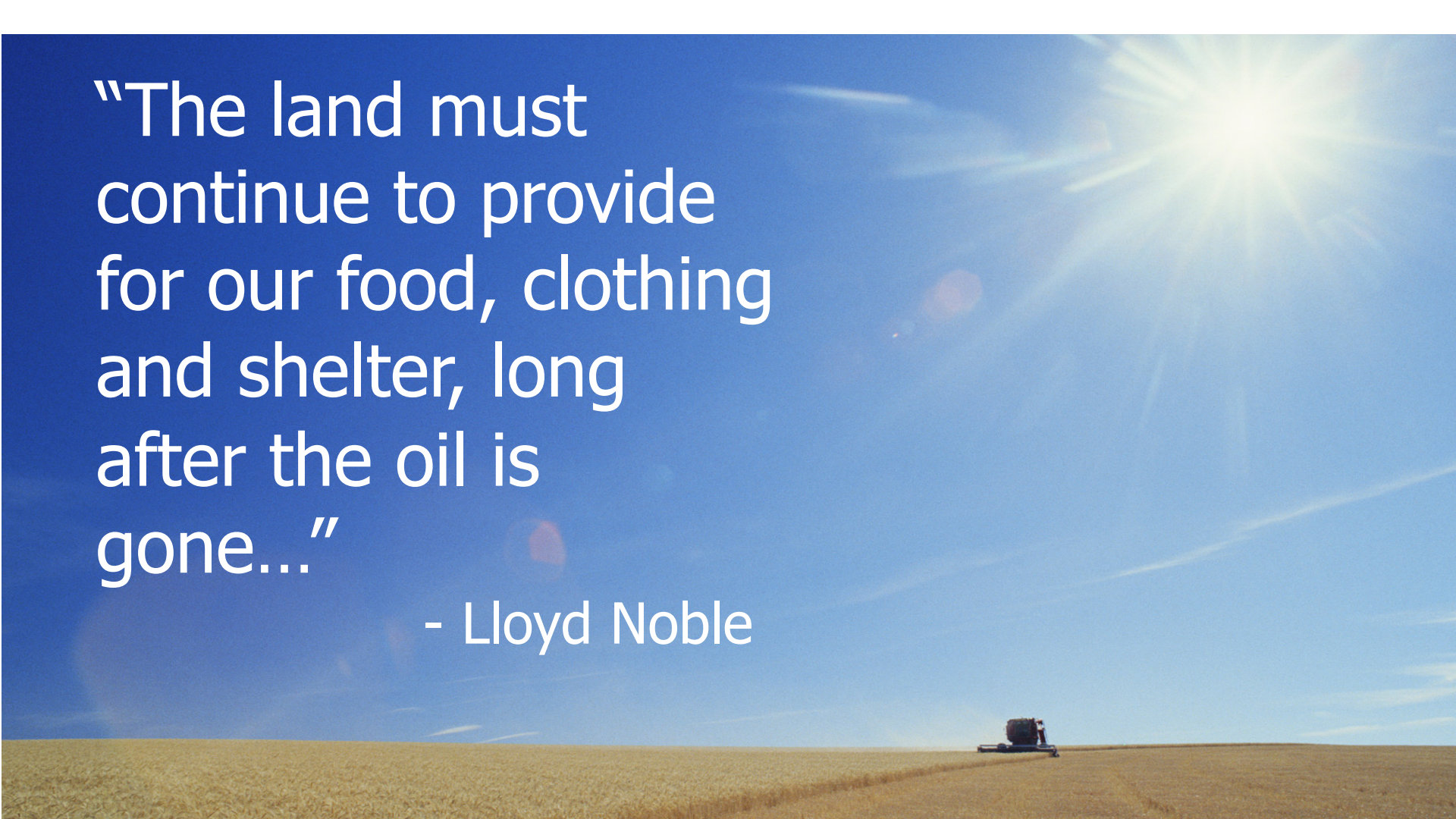






“The land must  
continue to provide  
for our food, clothing  
and shelter, long  
after the oil is  
gone...”

- Lloyd Noble





A black and white photograph of a building's exterior wall. The wall has a textured, brick-like appearance. The text "THE SAMUEL ROBERTS NOBLE FOUNDATION" is mounted on the wall in a bold, sans-serif font.

THE  
SAMUEL ROBERTS NOBLE  
FOUNDATION

Foundation  
Established 1945



Research



Contests/soil testing



Consultation

Died 1950

Left \$8.2M of his  
estate to the  
Noble Foundation





CENTRAL THEME

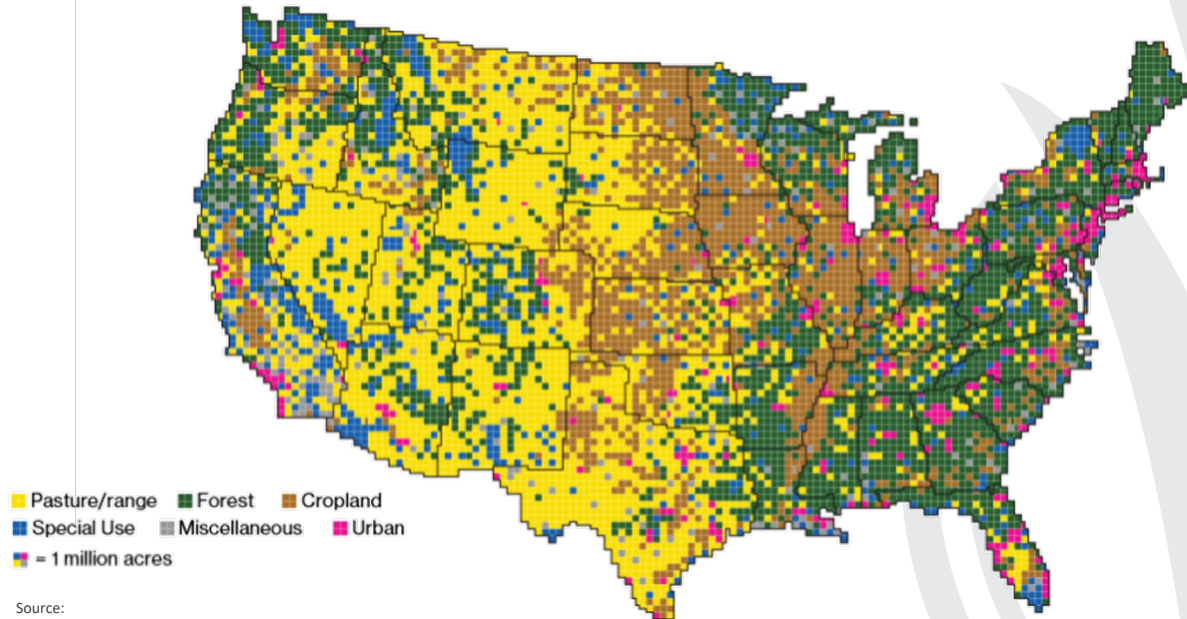
**Land stewardship for improved soil health in grazing animal production with lasting producer profitability**

Transition began in 2020



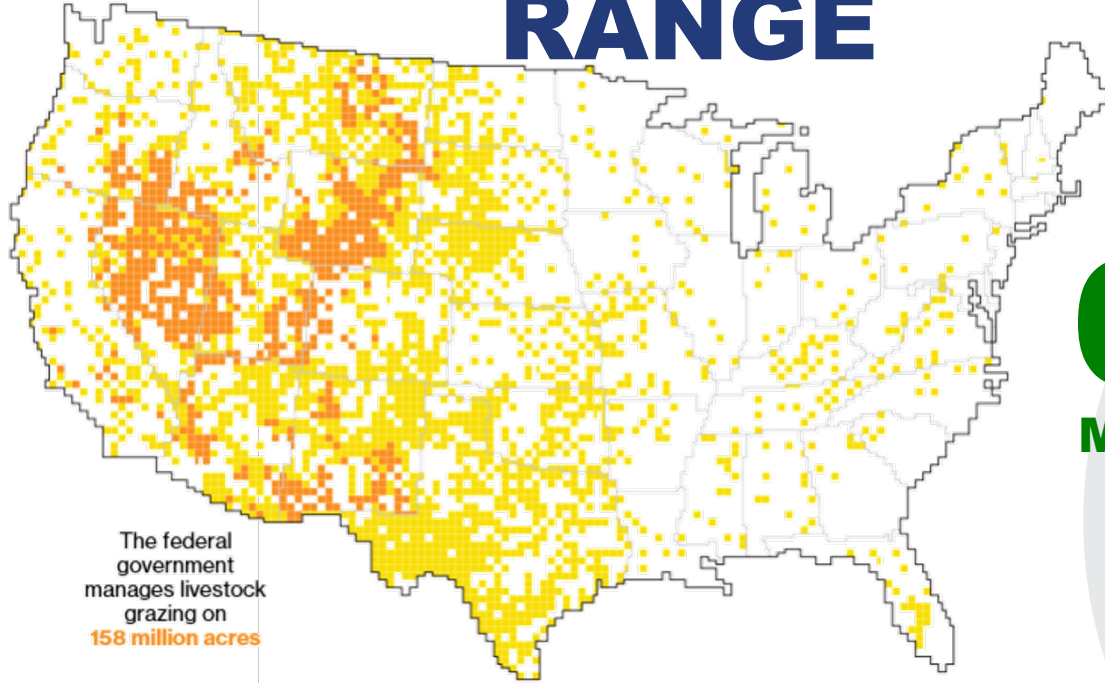


# U.S. PASTURE AND RANGE



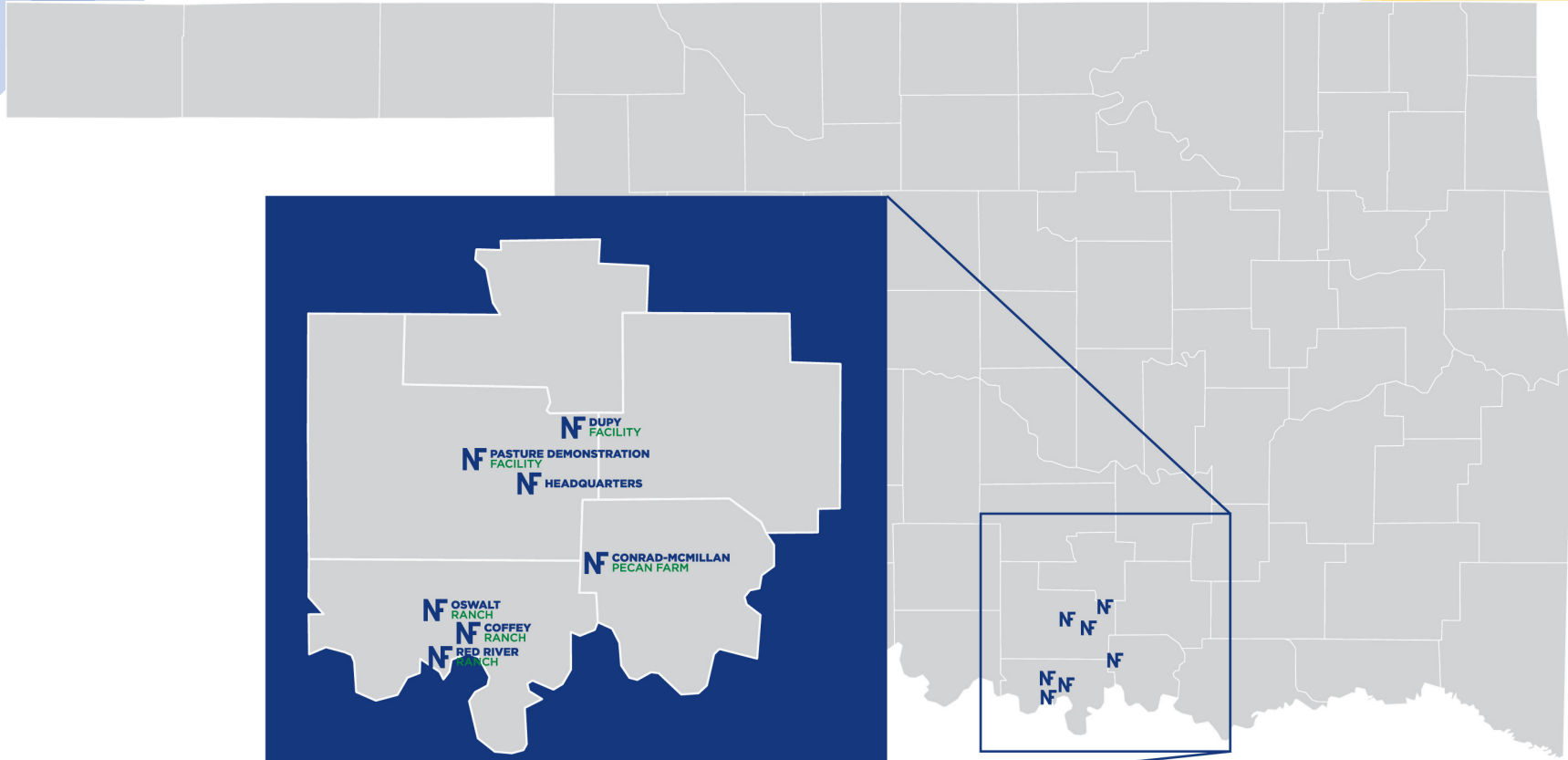
Source:  
[www.bloomberg.com/graphics/2018-us-land-use/](http://www.bloomberg.com/graphics/2018-us-land-use/)

# U.S. PASTURE AND RANGE



The federal government manages livestock grazing on **158 million acres**

**654**  
Million acres



NF DUPY FACILITY

NF PASTURE DEMONSTRATION FACILITY

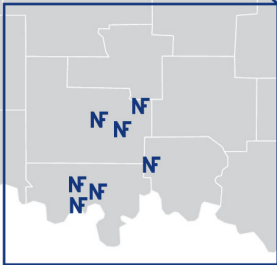
NF HEADQUARTERS

NF CONRAD-MCMILLAN PECAN FARM

NF OSWALT RANCH

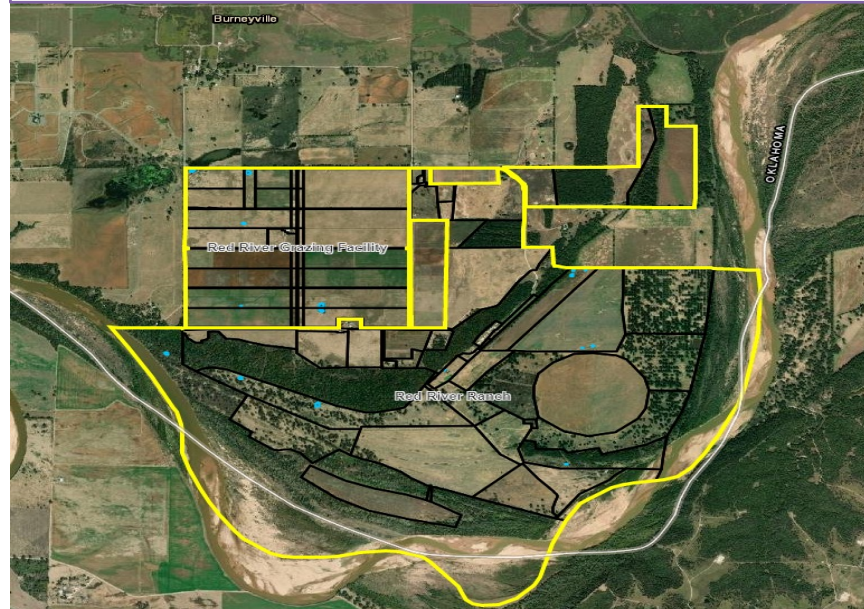
NF COFFEY RANCH

NF RED RIVER RANCH



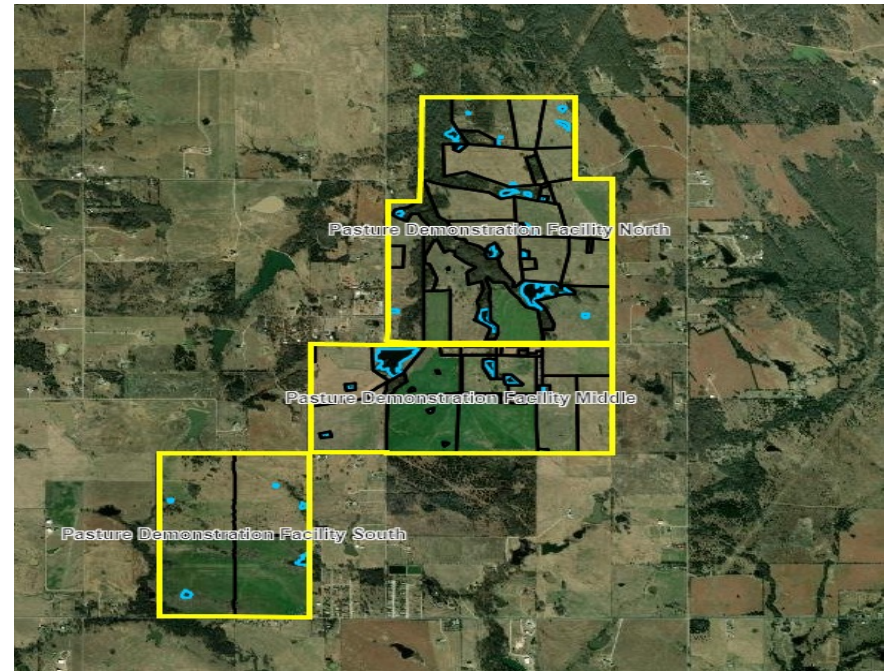
# RED RIVER RANCH

- 3423 acres
- 1805 grazable acres
- Native forages and introduced Bermuda grass
- Historically 200-300 acres were cropped
- 220 acres native and improved variety pecan orchards
- RR grazing facility used for grazing trials



# PASTURE DEMONSTRATION FACILITY

- 622 Acres
- 70 acres native forages
- 552 introduced Bermuda grass
- Historically 500 acres were cropped



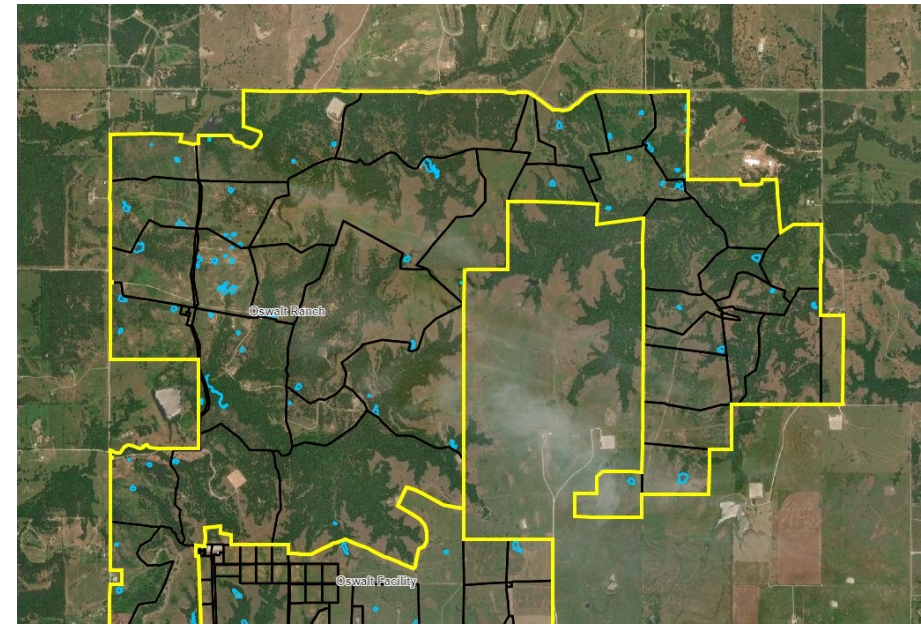
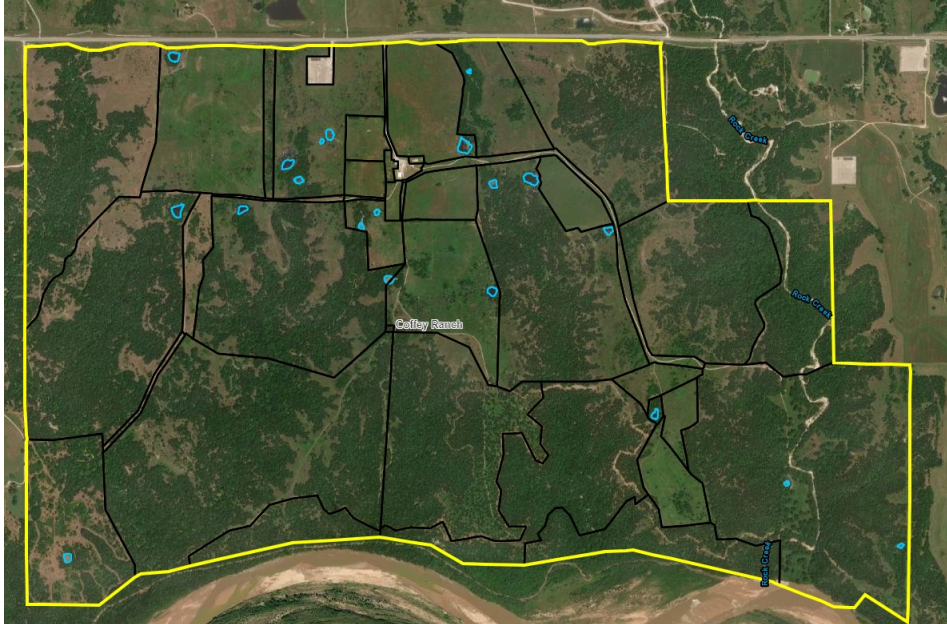


# COFFEY RANCH

- 2096 acres
- 943 grazable acres
- 843 acres native forages
- 100 acres Bermuda grass

# OSWALT RANCH

- 5121 acres
- 2540 grazable acres native forages
- Oswalt grazing facility used for grazing trials



# Pre-transition





# Our Oklahoma Soil



# Soil Health Principles

- **Keeping the soil covered**
- **Limited, but intentional, soil disturbance (breaking up soil capping)**
- **Adding diversity to the landscape (plant and animal)**
- **Maintaining a living root**
- **Integrating livestock**



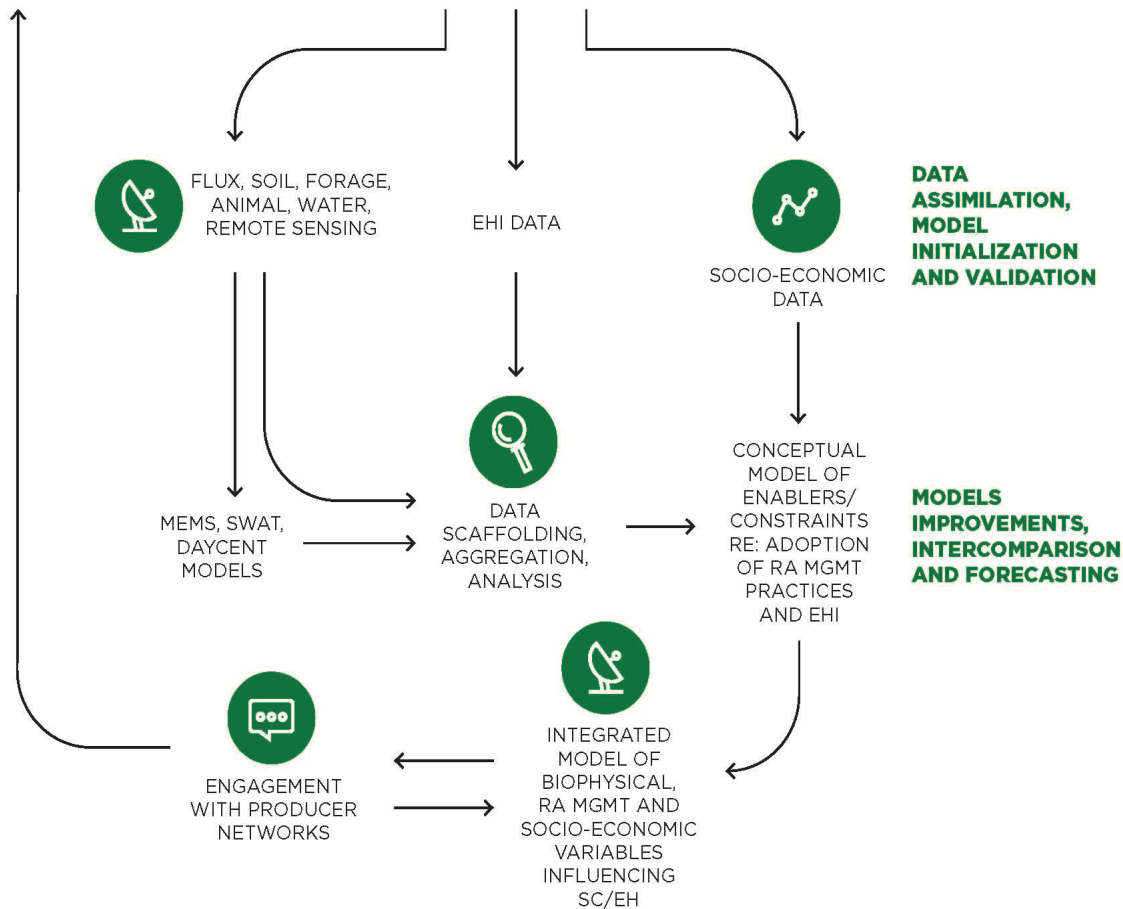
# What is Noble doing to Improve Soil and Profitability on Our Ranches?

- **Minimizing Disturbance**
- **Adaptive Grazing**
- **Adding Livestock**
- **Reducing inputs and hay**
- **Utilizing Cover Crops**
- **Match livestock to environment**

# Monitoring on Noble Ranches Through the Transition

- **Haney Test**
- **PLFA Test**
- **pH**
- **Al, Ca, Cu, Fe, Mg, Mn, K, Na, S, Zn**
- **Plant diversity, distribution and richness**
- **Bulk density**
- **Soil color**
- **Erosional features**
- **Aggregate stability**
- **Hydraulic Conductivity (infiltration)**
- **Worm Populations**

# SPECTRUM OF GRAZING MANAGEMENT



## FFAR GRANT





# Minimize Soil Disturbance-physical & chemical

- Supports soil structure
- Decreases erosion chances
- Maintains fungal networks
- Supports microbiological organisms



Use the right tool, at the right time, FOR THE RIGHT REASONS



# Adding Livestock

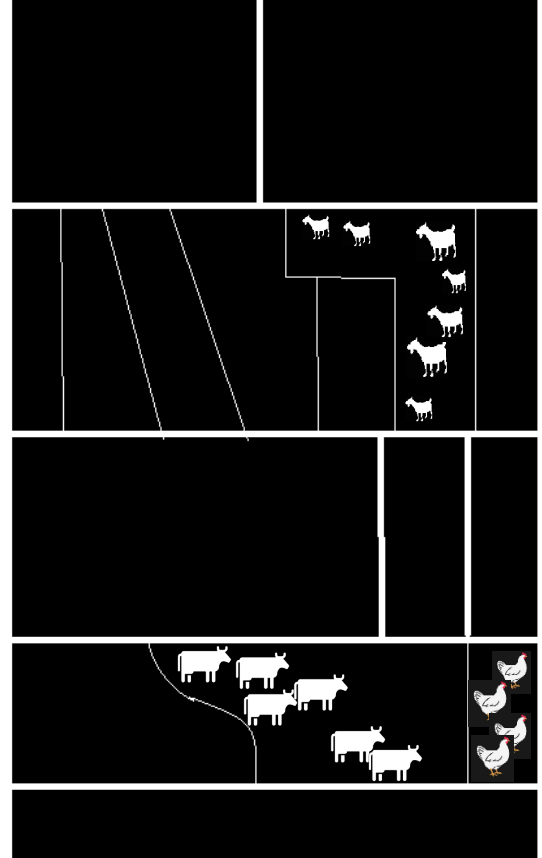
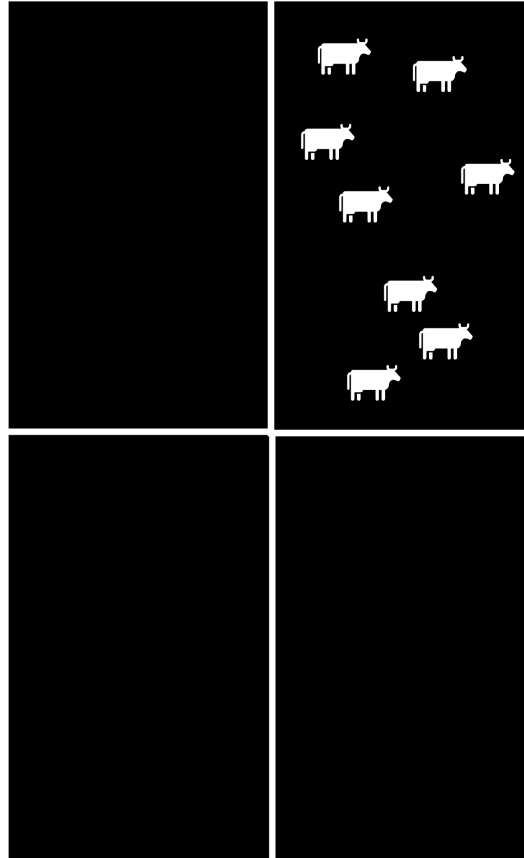
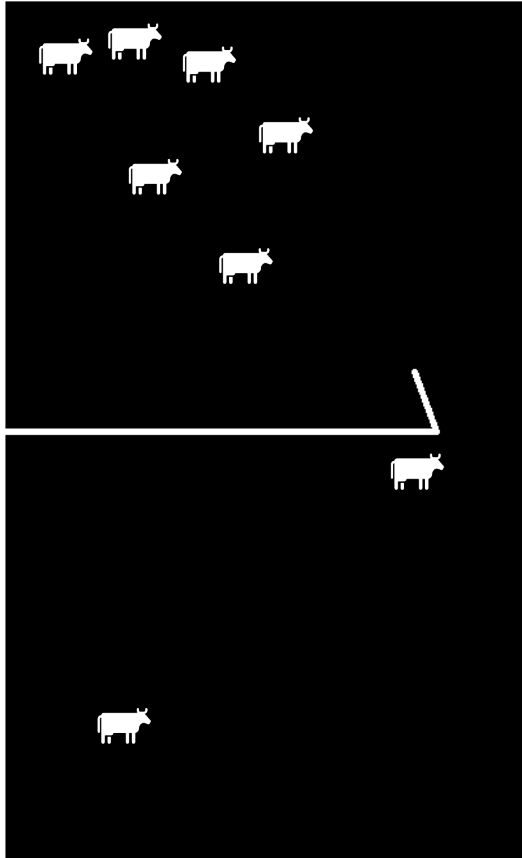


# Adaptive Grazing

## **TIMING, DURATION, FREQUENCY, DENSITY**

- **3 species of livestock, multi-species grazing**
- **Multiple paddock sizes**
- **Higher stock densities**
- **Increased forage rest**
- **Grazing at different times of the year**

# How do you graze?





# Adaptive Grazing





# Adaptive Grazing-High Stock Density





# Why Adaptive Grazing-High Stock Density





# Why Adaptive Grazing-High Stock Density



# Adaptive Grazing-High Stock Density





# Increase Forage Rest









# Increasing Diversity in Introduced Grass Pastures





# Cool Season Inter-seeding

Example:

- 11 species cool season cover crop
- 5 small grains and 6 legumes
- 50lb/acre seeding rate
- Inter-seeded into 100 ac Bermuda in the fall
- Bred heifers grazed in 10 ac paddocks moved every 2-3 days
- Approximately 30 days of grazing
- 1 lb/day

Wheat  
Oats  
Barley  
Triticale  
Cereal rye  
Austrian winter peas  
Vetch  
Crimson clover  
Arrowleaf clover  
White clover  
Persian clover





**3,000 Lbs.  
DM  
Production**



**2-3 Day moves  
Managed trampling  
Target 50% utilization**





# Increase Diversity in Native Pastures?





# Weed or Forage?

## Illinois bundleflower



OR





# Weed or Forage?

## Maximillian sunflower



OR





# Weed or Forage?

## Palmer amaranth (pigweed)



OR





# Weed or Forage?

## Common broomweed



OR





# Weed or Forage?

## Field bindweed



OR









October 31 2022



Crimson clover  
Ryegrass  
Wheat  
Purple top turnip  
Common vetch  
Chicory







# What About the Money?

NOBLE RESEARCH INSTITUTE, LLC  
Ranch Management Summary  
For the Ten Months Ending Monday, October 31, 2022

Account	ALL 2020	ALL 2021	Actual YTD 10 Months 2022	2020 to 2022	2020 to 2021	2021 to 2022
<b>Operating Expenses</b>						
Contract Labor	17,563	1,500	2,041	(15,522)	(16,063)	541
Ag Testing Services	900	22,411	1,836	936	21,511	(20,575)
Core Services	5,661			(5,661)	(5,469)	(192)
Feed	177,067	193,320	124,668	(52,399)	16,253	(68,652)
Seed	48,634	78,782	99,597	50,963	30,148	20,815
Fertilizer	92,403	19,422	11,307	(81,096)	(72,981)	(8,115)
Veterinary	72,019	66,105	36,185	(41,834)	(5,914)	(35,920)
Livestock	760,845	492,434	505,944	(254,901)	(268,411)	13,510
Farm Bldg Mtc & Repair	14,507	304	262	(14,245)	(14,203)	(42)
Road/Land Mtc & Repair	16,846	6,715	11,836	(6,180)	(11,301)	5,121
Repairs Mtc & Repair	26,167	10,801	70,856	(15,312)	(15,366)	54
Chemicals	77,921	0	0	(77,921)	(79,921)	0
General Supplies	11,909	16,525	6,224	(5,685)	4,616	(10,301)
Auto/Truck Operations	47,167	69,561	81,465	34,298	22,394	11,904
Ground Transp Allocation	14,545	4,239		(14,545)	(10,306)	(4,239)
Farm Equipment	40,669	2,804	4,091	(36,578)	(37,865)	1,287
Miscellaneous Equip	10,785	6,718	3,216	(7,569)	(4,067)	(3,502)
Orchard				0	0	0
				0	0	0
<b>Total Operating Expenses</b>	<b>1,459,389</b>	<b>1,046,377</b>	<b>930,142</b>	(529,247)	(413,012)	(116,235)
<b>Capital Expenditures &amp; Projects</b>						
Large Farm Projects	116,843	261,016	328,363	211,520	144,173	67,347
Cap Exp-Farm Equipment	50,943		63,075	12,132	(50,943)	63,075
Cap Exp-Miscellaneous	59,858	29,779		(59,858)	(30,079)	(29,779)
Cap Exp-Buildings & Improvements	55,555	67,802		(55,555)	12,247	(67,802)
<b>Total Capital Expenditures &amp; Projects</b>	<b>283,199</b>	<b>358,597</b>	<b>391,438</b>	108,239	75,398	32,841
<b>Revenues</b>						
Farm Products-Native Pecans	26,053			(26,053)	(26,053)	0
Farm Products-Improved Pecans	64,452	73		(64,452)	(64,379)	(73)
Farm Products-Other			13,160	13,160	0	13,160
Farm Products-Steers	285,919	469,964	318,293	32,374	184,045	(151,671)
Farm Products-Heifers	205,913	106,858	115,766	(90,147)	(99,055)	8,908
Farm Products-Cull Cows	100,723	135,199	232,755	132,032	34,476	97,556
Farm Products- Bulls	3,163		25,746	22,583	(3,163)	25,746
Farm Products-Purchased for Resale	612,809	487,135	337,041	(275,768)	(125,674)	(150,094)
Farm Products-Wether Lambs		5,213	0	5,213	5,213	(5,213)
<b>Total Revenues</b>	<b>1,299,032</b>	<b>1,204,442</b>	<b>1,042,761</b>	(256,271)	(94,590)	(161,681)
Net Less Operating Expenses	(160,358)	158,065	272,977	272,977	318,423	(45,446)
Net Less Op/CapEx Expenses	(443,557)	(200,532)	(278,819)	164,738	243,025	(78,287)
				0	0	0
<b>P/L Total</b>	<b>(443,557)</b>	<b>(200,532)</b>	<b>(278,819)</b>	164,738	243,025	(78,287)
An Acre	-31.68	-14.32	-19.92			



# Perennial Pasture Break

## Example: Osage Co. KS

Item /Description	lb/ac	% by wt
CSLG130; Red Clover: Medium Red	1.5	7.9 %
CSLG190; Alfalfa: Common	2.22222	17.8 %
CSLG150; Yellow Clover: Yellow Sweet Clover	1.5	7.9 %
FLRM040 Birdsfoot Trefoil; Norcen Birdsfoot	0.55556	4.4 %
FLRM030 Milkvetch; Cert. Lutana Cicer Milkvetch	0.55556	4.4 %
CSGR095; Prairie Brome Grass - Matua	2.22222	17.7 %
WSBL010; Buckwheat: Mancan	2.77778	22.2 %
CSBL040; Chicory - "Antler"	1	7.9 %
CSBL050; Plantain - "Boston"	1	8.0 %
+ Big Red - CRABGRASS	Inert	8.33 %
Quick + Slow - CRABGRASS	Weeds	0.09 %
	Other	0.04 %
	<b>Total</b>	<b>106.81 %</b>

Seeding rate 12.5#/acre



Anecdotally, a 10-15%  
yield increase for ten  
years following the break



# Matching Livestock to the Environment

If she can't be bred, feed herself, or is a behavior challenge she is sold.





# Integrate Livestock Into the Operation



- Increases carbon in the soil
- Reduces feed and fertilizer costs

**BENEFITS ARE DERIVED ONLY IF GRAZING IS MANAGED PROPERLY!** Community microbes



- Planted forages increase diversity





*Table 1*

% Root Growth Stoppage Three Days After Forage Removal					
% Forage Removal	Test 1	Test 2	Test 3	Test 4	
90	100	100	100	100	
80	100	100	91	81	
70	78	97	77	76	
60	50	80	54	36	
50	2	8	38	13	
40	0	0	0	0	
30	0	0	0	0	
20	0	0	0	0	
10	0	0	0	0	
0	0	0	0	0	

This represents four tests with three different grass species. From Crider, 1955.

Note that somewhere between 40% and 50% of the forage can be removed without stopping root growth.



“No civilization has  
**Questions** mess  
he  
soil is destroyed, the  
nation is gone.”

- Lloyd Noble