Perennial Warm-Season Forage Options for the Texas Plains: *Establishment and Utilization Strategies*

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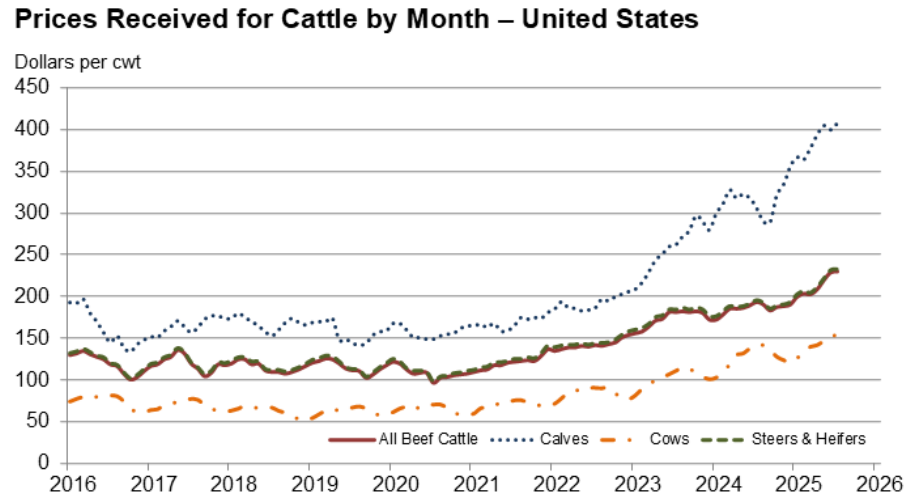
TEXAS TECH UNIVERSITY
RANGE CONSERVATION
NATURAL RESOURCES MANAGEMENT

Why convert to pasture?

- $$$$$
  - ↓ commodity prices, ↑ production costs and risks
  - Reduced irrigation capacities, marginal lands
  - Cattle prices at an all time high



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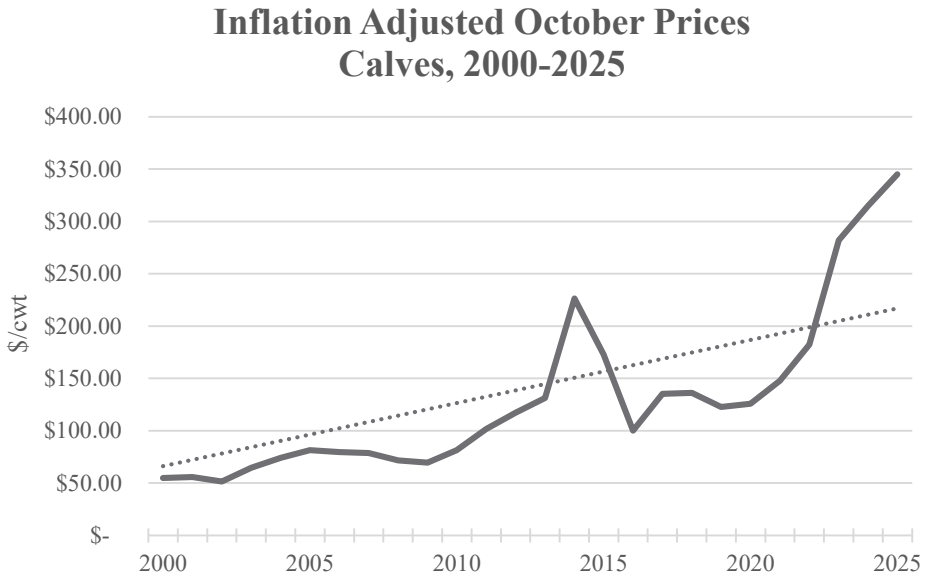

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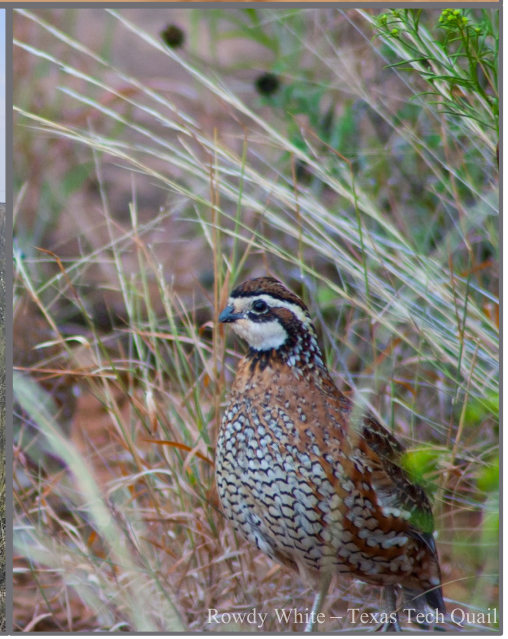
  - Water capture and filtration
  - Wildlife Habitat



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- Enterprise Diversification
  - Addition of livestock to crop enterprises
  - Hunting ($10-20/acre)
  - Recreation (e.g., photography)

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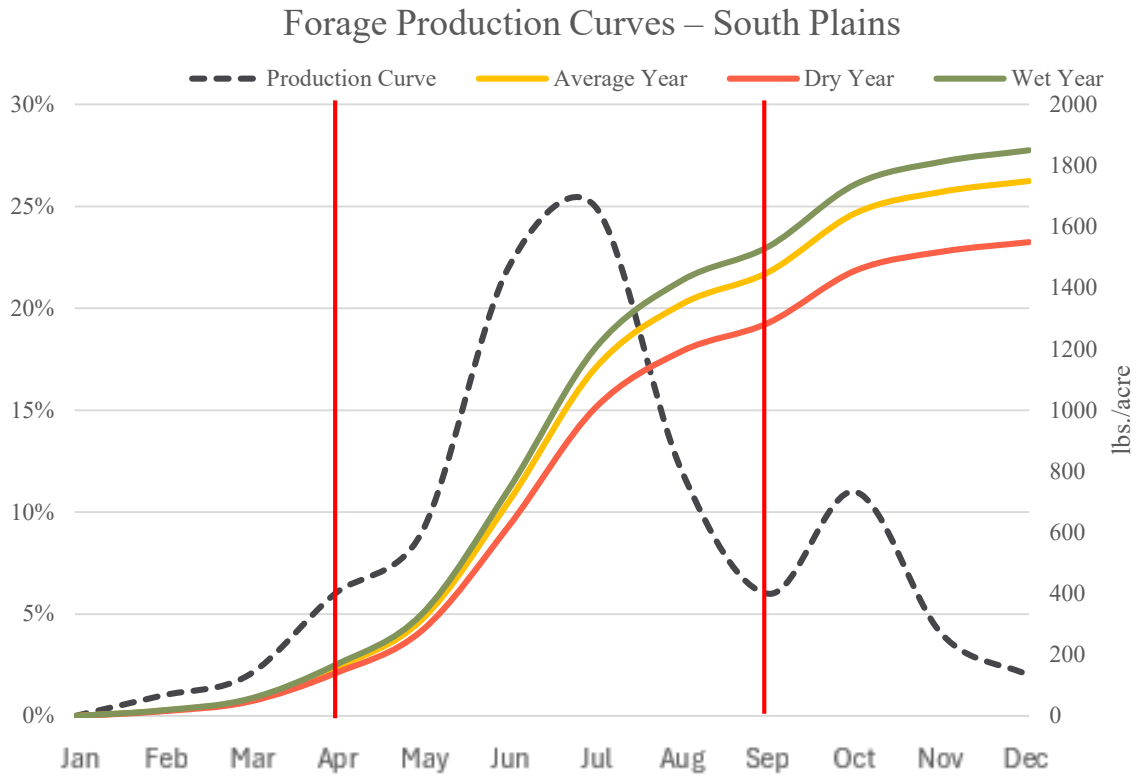

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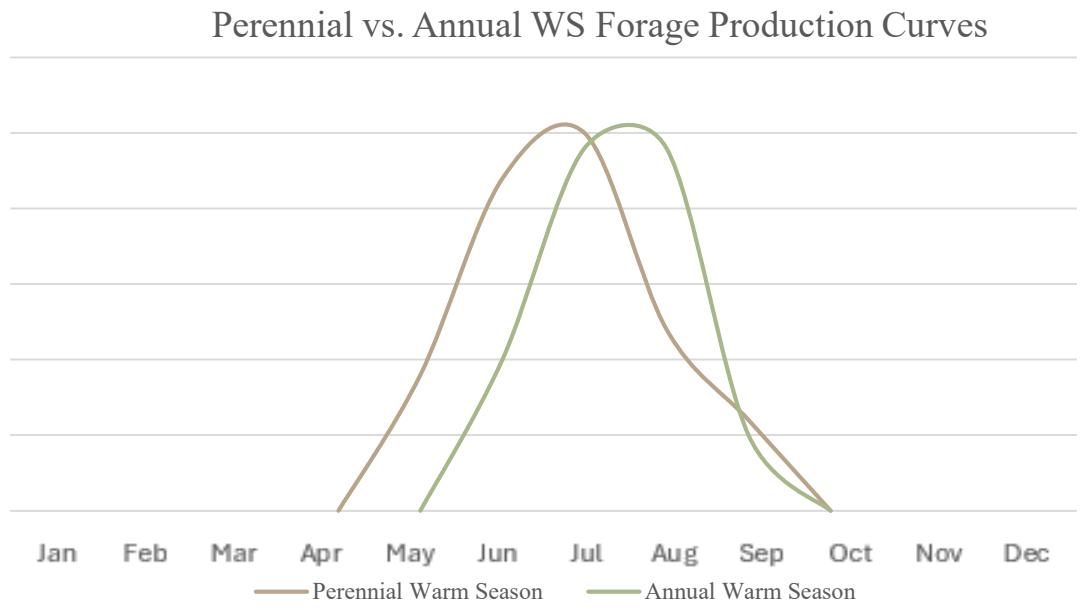

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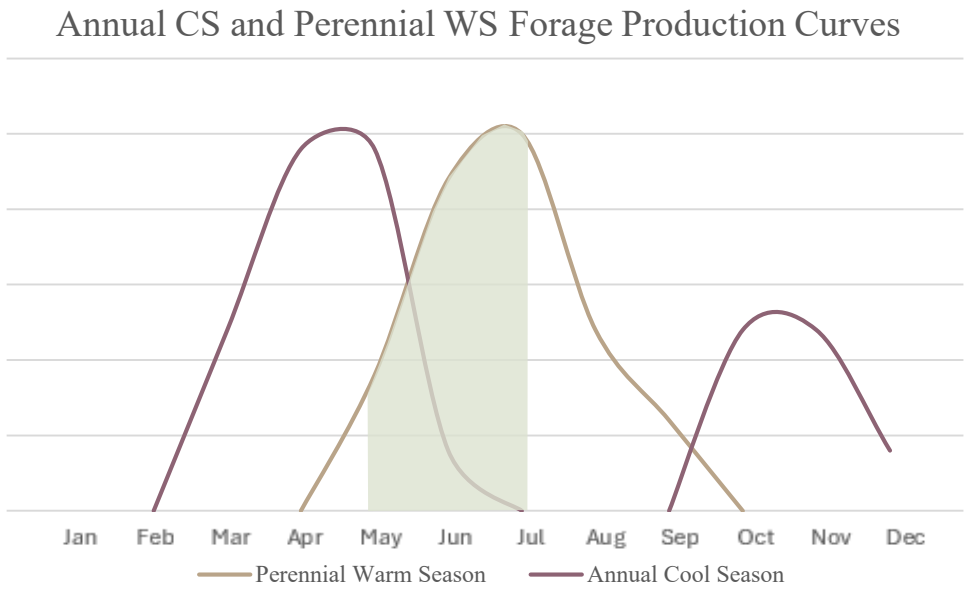

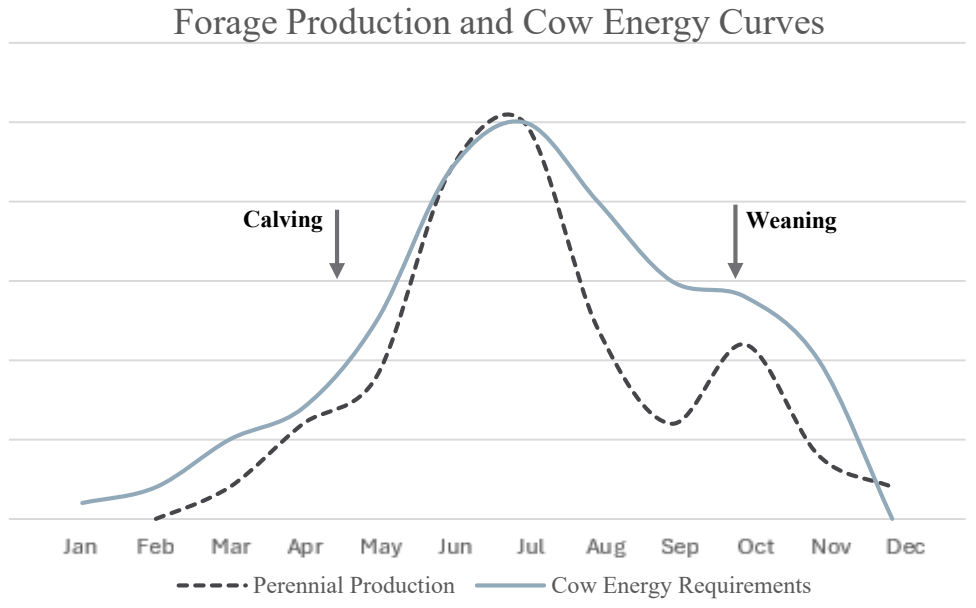

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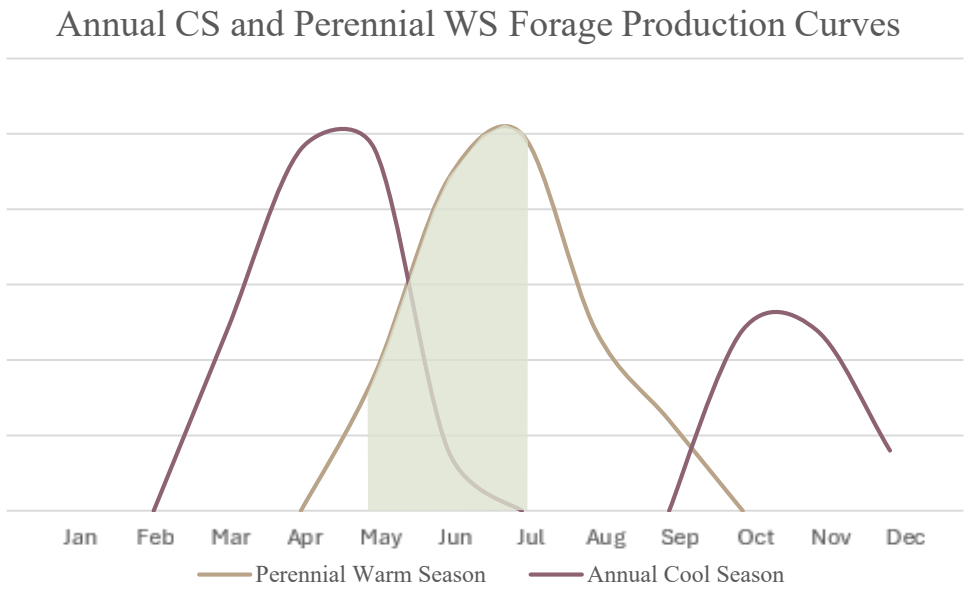

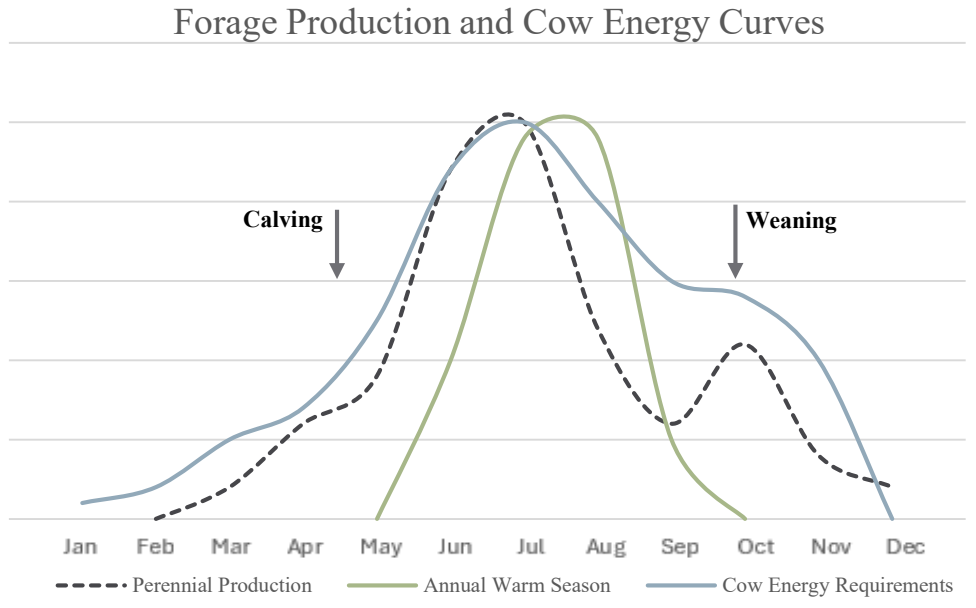

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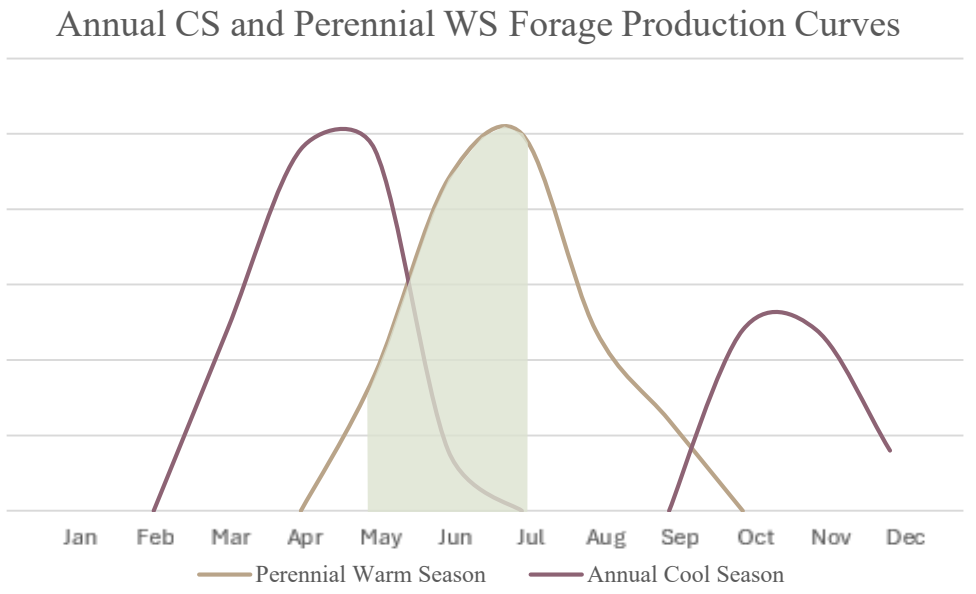

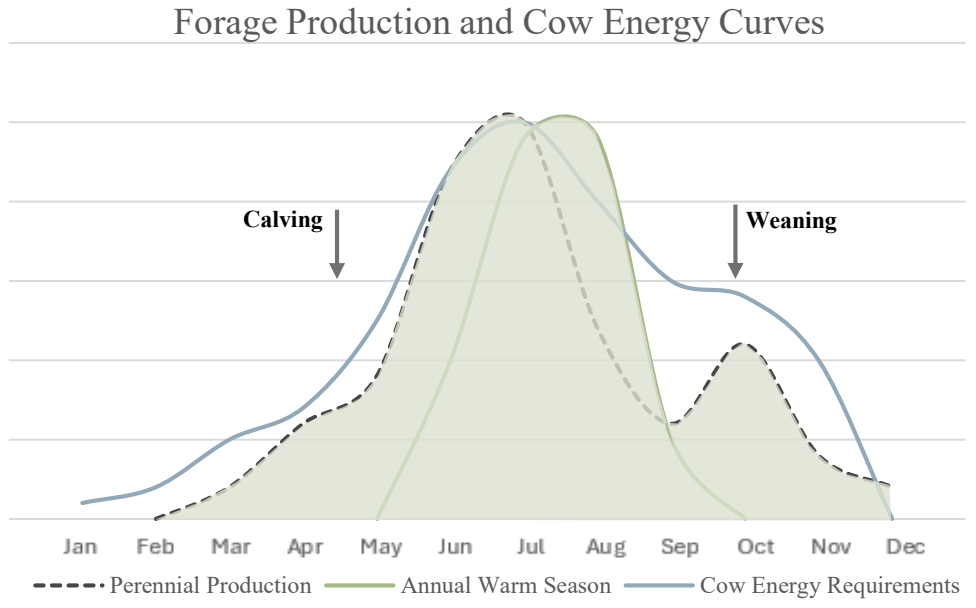

What are my options?

- Native Species
  - Adapted to the region and the climatic conditions
  - Require less fertility and are drought tolerant
  - Slow to establish (2 – 3 years)
  - Low resilience to overgrazing, proper grazing management is a must



- Introduced Species
  - Can be adapted to the region and similar climatic conditions
  - Require good fertility and can be less tolerant of environmental extremes (drought, cold)
  - Typically, quick to establish (1 – 2 years)
  - More resilient to overgrazing, can be mistreated and still produce
  - Can become invasive



Burning Questions

- How do I establish them?
- How do livestock perform?

Perennial Establishment Practices

Establishment

- Seedbed preparation and planting depth are key to success
  - Firm seedbed, preferably cultipacked or rolled
  - Seeding too deep is the 8th deadly sin
  - Error on the side of being shallow

Average Percent Emergence from Same Number of Viable Seed on Loam Soil							
Species	Depth of Planting (inches)						Optimum Depth
	1/2	1	1 1/2	2	2 1/2	3	
bromegrass	94	94	83	62	40	8	1/2 - 1
intermediate wheatgrass	92	98	90	77	38	6	1/2 - 1
tall wheatgrass	93	90	83	61	27	3	1/2 - 1
reed canarygrass	76	73	67	54	37	9	1/2 - 1
crested wheatgrass	87	79	44	6	0	0	1/2 - 1
western wheatgrass	71	72	54	0	0	0	1/2 -1
switchgrass	75	65	45	0	0	0	1/2 - 1
big bluestem	65	59	38	0	0	0	1/2 -1
sideoats grama	62	39	0	0	0	0	1/2
blue grama	61	33	0	0	0	0	1/2
alfalfa	74	40	no data	7	no data	0	1/2
sweet clover	62	30	no data	4	no data	1	1/2

Note: Data on introduced grasses from Canada, Scientific Ag., 26:9 September 1946. Data on native grasses from SCS Nursery, Mandan, ND, June 1949. Data on legumes from University of Minnesota reproduced in the Journal of American Society of Agronomy.

Planting in **Firm seedbed** with grass drill that has openers with **depth bands**.

Warner Brothers Seed Company
INVESTMENTS THAT GROW

Planting in **Firm seedbed** with grass seeder

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- Use of proper seeding equipment
  - Fluffy box is often the best option
  - Drop seeders and drills can work, but difficult

picker wheel

agitators

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- Seeding rate varies based on species
  - ~1-2 million PLS/acre (3 – 5 lbs)
  - ~20-50 PLS/ft^2, 2–4 plants/ft^2 when established

Eastern gamagrass seed

Spike dropseed seed

PLANT DENSITY GUIDE

Mean Annual Precipitation	Ecological Site	Target Density plants/sq. feet
22"+	Loamy	3.0 - 4.0+
	Shallow, Gravelly, Stony, Eroded, etc.	2.0 - 3.5
16"-22"	Loamy	2.0 - 3.0
	Shallow, Gravelly, Stony, Eroded, etc.	1.0 - 2.5
12"-16"	Loamy	1.0 - 2.0
	Shallow, Gravelly, Stony, Eroded, etc.	0.8 - 1.5
10"-12"	Loamy	0.7 - 1.5
	Shallow, Gravelly, Stony, Eroded, etc.	0.5 - 1.0
<10"	Loamy	0.5 - 1.0
	Shallow, Gravelly, Saline, Calcareous, etc.	0.3 - 0.7

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- Competition
  - Want to minimize competition (nutrient and light)
  - Clean fields are not necessary, can act as nurse plants
  - Possible to establish while utilizing annuals?

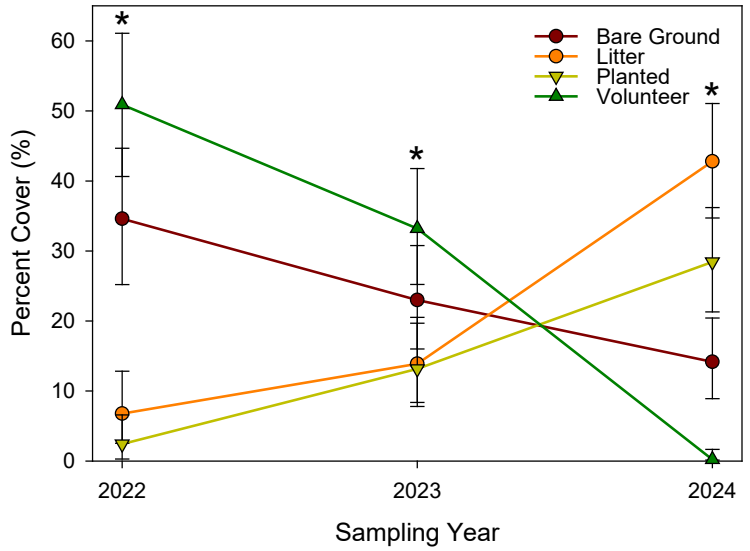
Establishment Research

- Assessment of seeding rate and herbicide
  - Two seeding rates: 3.5 or 7 lbs. PLS/acre
  - Herbicide application or none
  - Cover and biomass assessments in October

Table 3.1. Deep Hardland Mix utilized in study for planting at Panhandle site

Deep Hardland				
Common Name	Type	Species	lbs./Acre	% Mix
Blue Grama	"Hachita"	*Bouteloua gracilis*	0.75	50
Buffalograss	"Texoka"	*Bouteloua dactyloides*	1.60	20
Sideoats Grama	"El Reno"	*Bouteloua curtipendula*	0.45	10
Sand Dropseed		*Sporobolus cryptandrus*	0.05	5
Galleta	"Viva"	*Hilaria jamesii*	0.26	5
Western Wheatgrass		*Pascopyrum smithii*	0.35	5
Purple Prairie Clover	"Kaneb"	*Dalea purpurea*	0.05	1.7
Mexican Hat	"VNS"	*Ratibida columnifera*	0.05	1.7
Engelmann Daisy	"Eldorado"	*Engelmannia peristenia*	0.24	1.6

Establishment - Ground Cover



October 2022

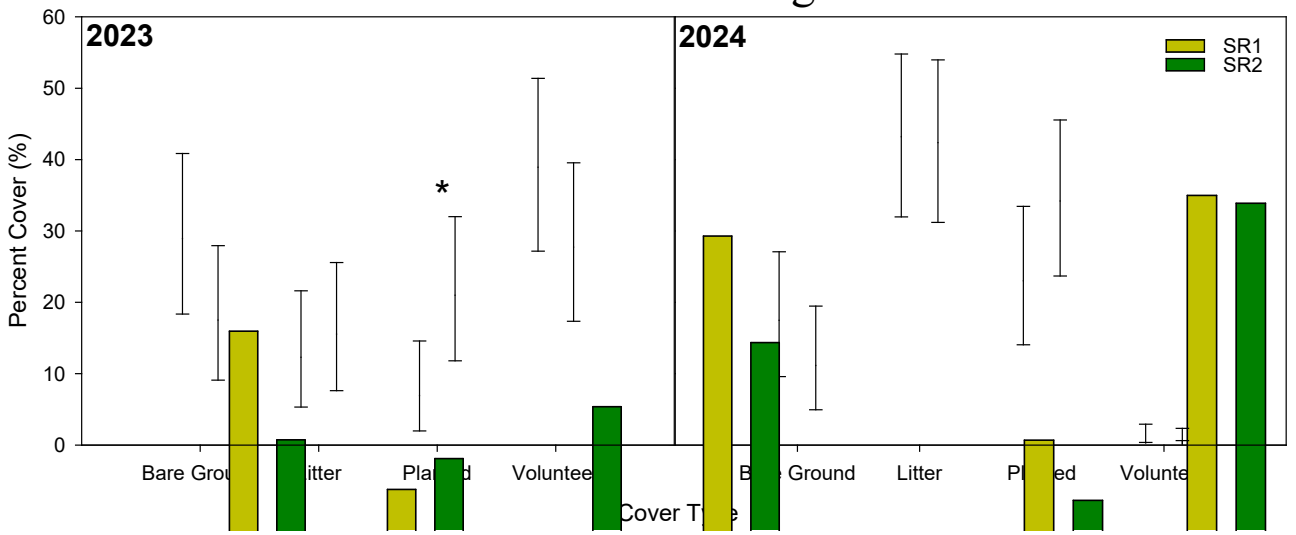
October 2023

October 2024

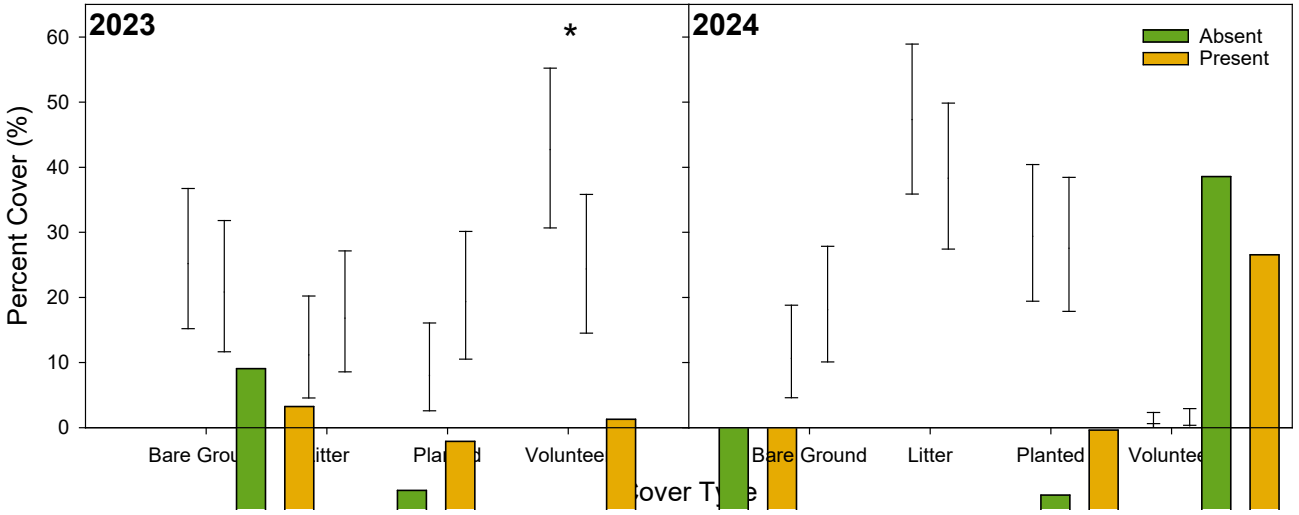
Establishment - Ground Cover

- 2023
  - SR2 had greater cover of planted species
  - Herbicide application increased volunteer grassy species
- 2024
  - No effect of seeding rate or herbicide

Effect of Seeding Rate

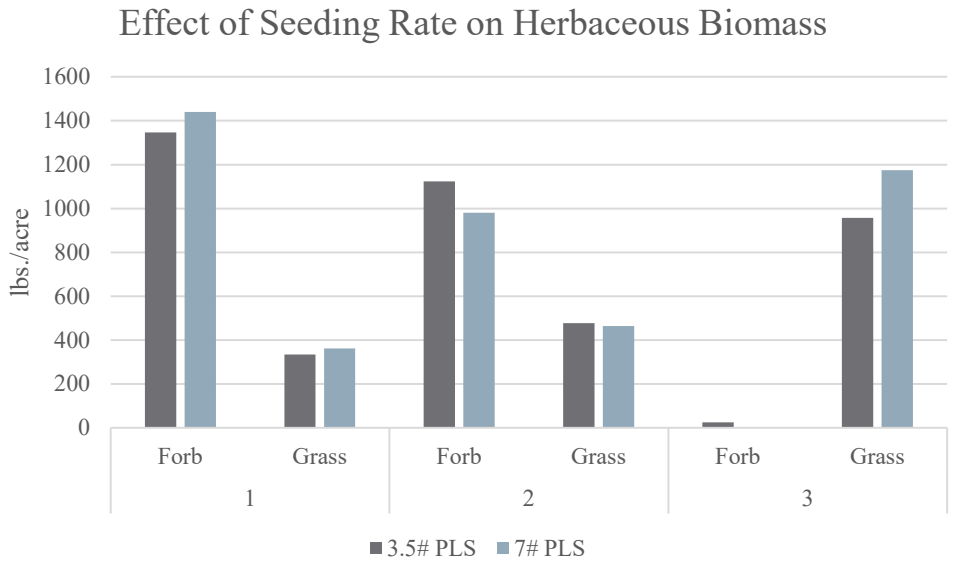


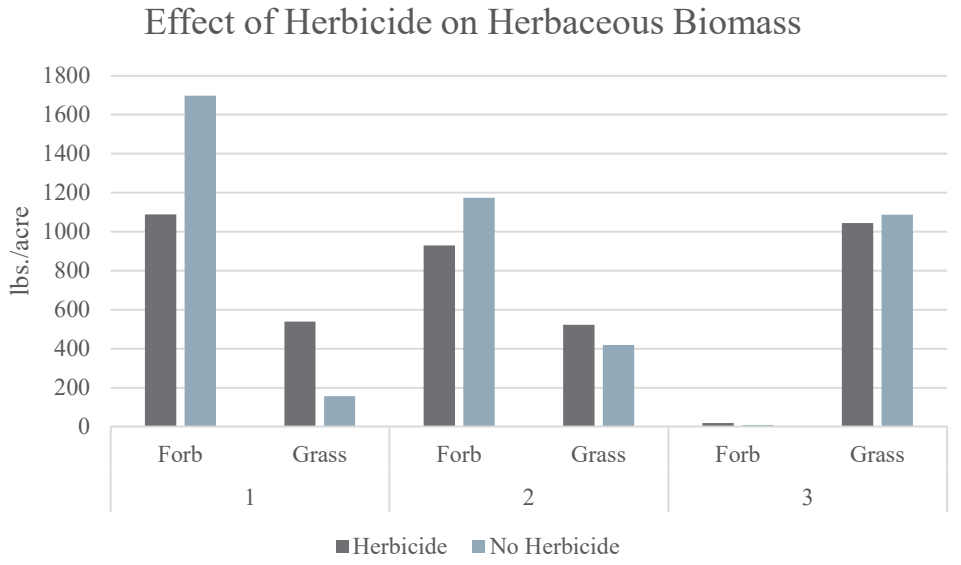
Effect of Herbicide



Establishment - Biomass

- Seeding rate
  - No influence in any year.
- Herbicide
  - Reduced forbs in years 1&2 post-planting
  - Grass amounts were increased in herbicide plots
  - Year 1, grasses were largely volunteer.





Establishment – Takeaways

- Seeding rate and herbicide had no influence on establishment success

- Additional expense on seeds and herbicide do not appear to be worthwhile at the rates used
  - Does not mean this fits all situations

- Although forbs were noxious, could still serve as livestock feed (8-20% CP | 55-80% DMD)
  - Amaranth
  - Kochia
  - Russian thistle
  - Must watch for toxicities

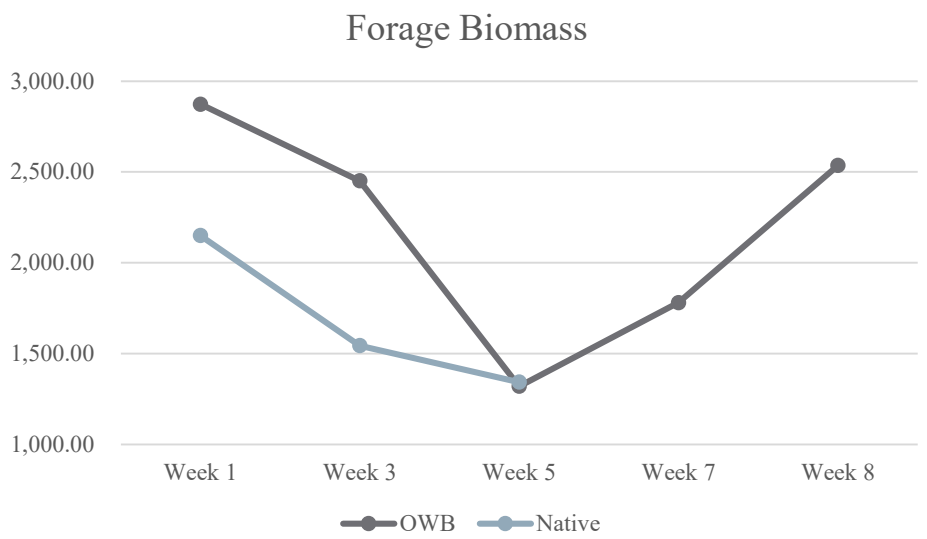
Animal Performance

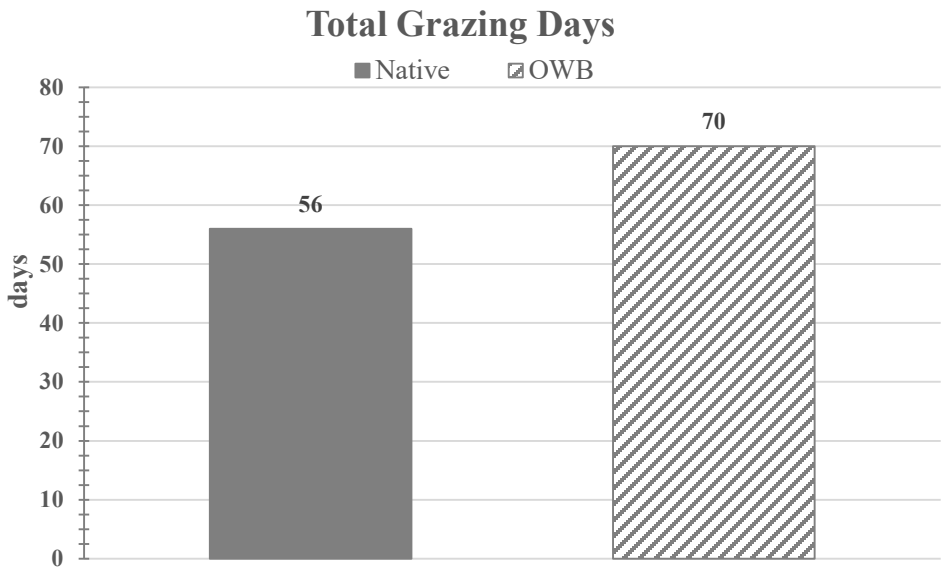
Animal Performance

- Native vs. OWB (B-dahl)
  - Initiated July 2, 2024
  - Angus cross heifers (590 ± 54 lbs)
  - Stocked at ~0.37 AU/acre | 1.65 acres/hd
  - Supplemented CSM 0.2% BW – 3×/week

Animal Performance

- Biomass production
  - OWB had greater biomass
  - Greater rate of decline (consumption/trampling)
  - OWB was highly responsive to rainfall event
- Grazing days
  - More grazing days with OWB
  - Increased utilization in OWB (55 vs. 40%)
  - Removed animals from natives for plant health





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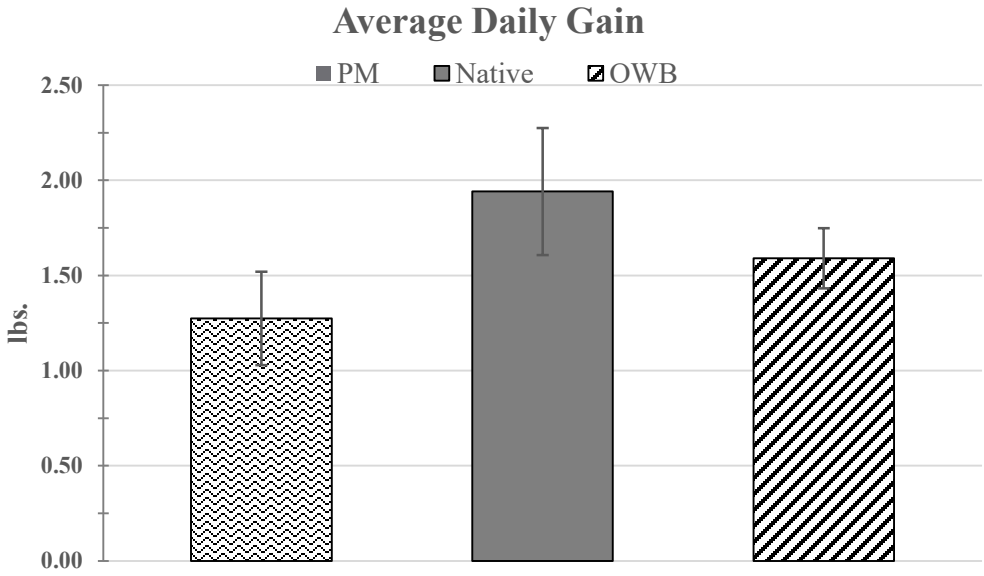
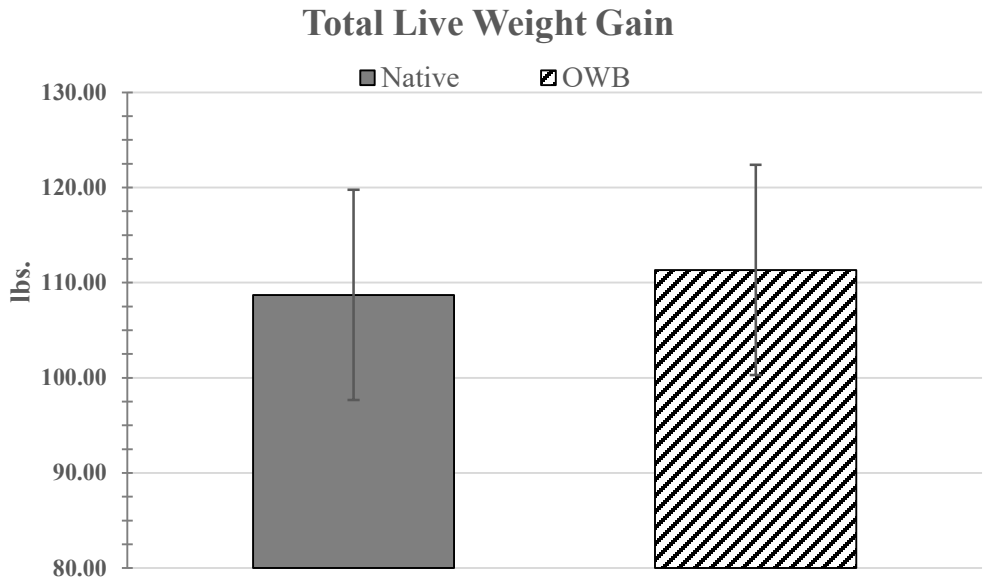
- Average daily gain
  - Elevated gain in natives (1.94 vs. 1.59 lbs)
  - Both exceeded pearl millet ADG (1.27 lbs.)
- Total live weight gain
  - Similar across forage types
  - Increased ADG supported similar gain in fewer days





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- OWB (B-dahl) supplementation
  - Summer 2022 and 2023
  - Angus cross heifers (580 ± 40 lbs)
  - No CSM, 1 lbs CSM daily, 2 lbs CSM every two days

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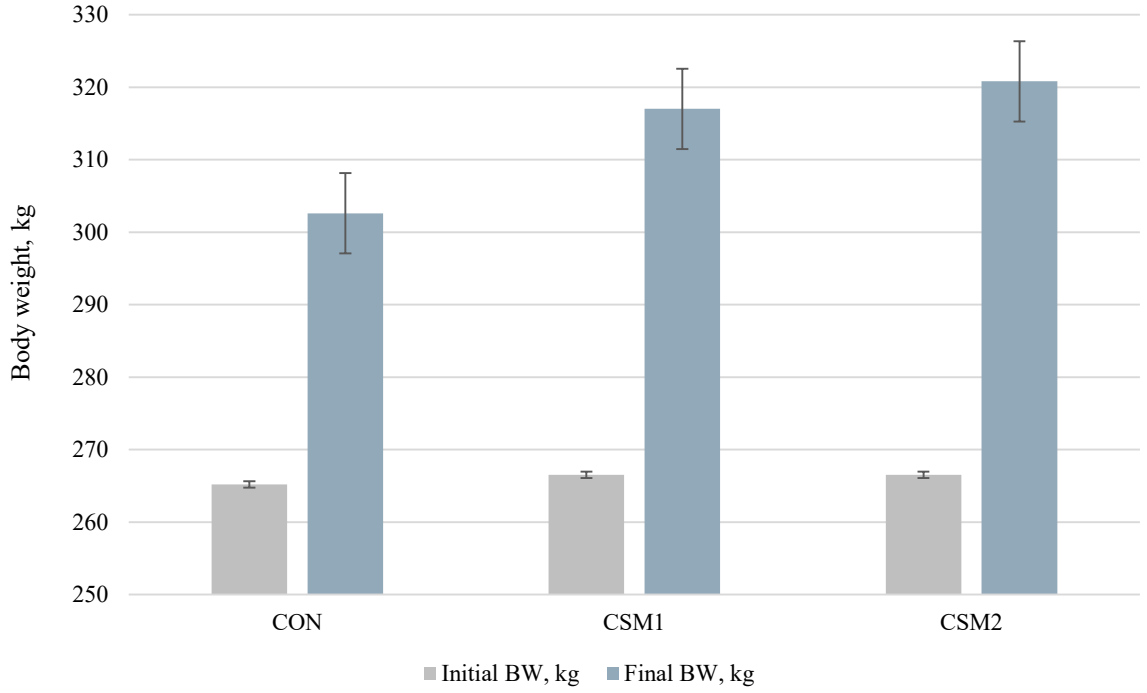
- Gain was improved with CSM supplementation
  - 30 – 40 lbs. more gain with supplementation
  - 29% greater gains with supplementation
  - Cost of gain must be assessed*

- Even without supplement, animals still exhibited gains.
  - Adequate for cows in late summer
  - Suitable for developing replacement heifers



	Treatment			SEM	*P*-value
	CON	**CSM1**	**CSM2**		
Total gain, lbs.	82.3^{b}	111.1^{ab}	119.4^{a}	5.03	0.012
ADG, lbs./d	1.19^{b}	1.63^{ab}	1.72^{a}	0.08	0.013
% of initial BW gained	14.6^{b}	19.4^{ab}	20.2^{a}	0.35	0.015

Animal Performance - Takeaways

- Perennial forages can support good gains with CP supplementation
  - Native species – 1.94 lbs.
  - OWB B-dahl – 1.59 – 1.72 lbs.
- Without supplement, gains were still observed.
  - Suitable for cows and developing heifers
  - Mineral status needs to be better assessed
- Native vs. Introduced
  - Introduced ↑ biomass, utilization, and grazing days
  - Natives supported ↑ ADG
  - Total gain was similar although differences in grazing days
  - Forage management differs, but performance is similar.

Summary

- Reestablishment of perennial forages will continue to increase
  - Plan and prepare to improve establishment odds
  - Loss of production in year 1&2 can be managed
  - Talk with experts, there are many in your backyard
  - Have patience
- Provide a means of diversifying or shifting enterprises.
  - Numerous benefits apart from livestock production
- Native vs. Introduced
  - Both have their place
  - Know your long-term goals
  - Combination of the two can work well

Thanks to:

Shaelyn Rainey, MS
Diego Aviles, MS
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Questions/Comments?

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