
 DEPARTMENT OF
AGRICULTURAL ECONOMICS

ECONOMICS OF PATCH BURNING & GRAZING

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THE
PRAIRIE PROJECT



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GRASS & RANGELAND EXPERTS

SAM FUHLENDORF & LAURA GOODMAN

Natural Resource Ecology & Management



Home, Home on the Range

Oklahoma

We have rangelands.

Rangelands make up 30% of US land (Great Plains)
Supports production of roughly 50% beef cattle
Woody Plant Encroachment (WPE)

We have cattle production.

Grazing is the #1 use of rangelands in OK
(25 million acres)
Forages are important to cow-calf and backgrounders

We can't control the weather (darn it...).



Production & Profits

Proper range and grassland management is key to maintaining a sustainable and profitable cow herd.

We can't control the weather, but we can mitigate its impacts...

When drought strikes, it impacts stocking rates (may have to liquidate herd), supplemental feed costs, and producers' bottom line.

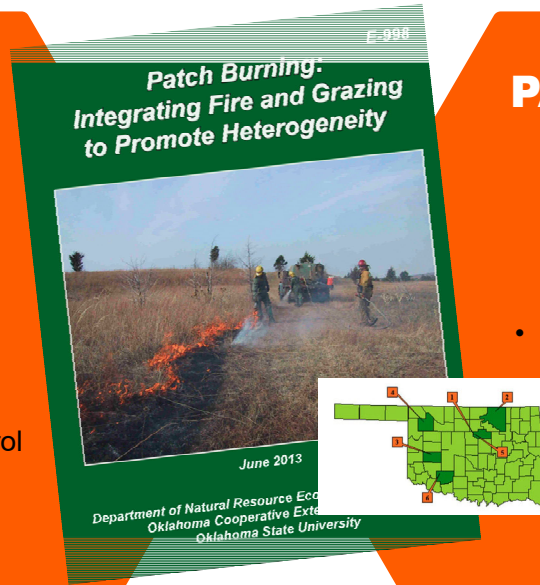
Patch Burning & Grazing

it is not new....

PYRIC- HERBIVORY

Interaction of burning and grazing.

- **Benefits:**
 - High Quality Forages
 - Drought Mitigation
 - WPE & Wildfire Control
- **Why Fire is not Utilized:**
 - Fear & liability



PATCH BURNING & GRAZING

- **Why PBG isn't used:**
 - Unawareness & rejection from seasoned producers

Home, Home on the Range

Oklahoma



Economic Impact of PB&G in Oklahoma



Estimate the cost of utilizing pyric-herbivory through PBG management practices



Quantify the qualitative benefits of PBG for Oklahoma cow-calf producers



Compare annual cost budgets for PBG and TB management on cow-calf operations

Step 1: Estimate **Burn** Costs

2021 survey about costs of prescribed burning

Firebreak construction costs for PB are expected to decrease in years 2 & 3 by 28.5%.

Annual Averages	Patch-Burning	Traditional Burning
Number of Acres Burned	133.41	862.45
Cost of Burn	\$610.47	\$1,558.83
Cost per Acre	\$4.58	\$1.81

Survey created by OSU NREM; Amkar Joshi, John Weir, & Aaron Russell

Step 1: Estimate **Burn** Costs

Fuel reduces by 28.5% in years 2 & 3 (\$11/year)

Labor assumed to reduce by 28.5% in years 2 & 3 (\$19/year)

	Patch-Burning	Traditional Burning
3-Year Investment Cost	\$677.67	\$317.14
Difference	\$360.53	
Per Acre Difference	\$2.40	

Step 2: Estimate **Feed** Costs

Used two studies:

Limb et al. 2011 -> reduction in supplemental feed requirements

OSU Range Research Station, Tall-Grass Prairie

Lalman 2021 -> supplemental feed costs

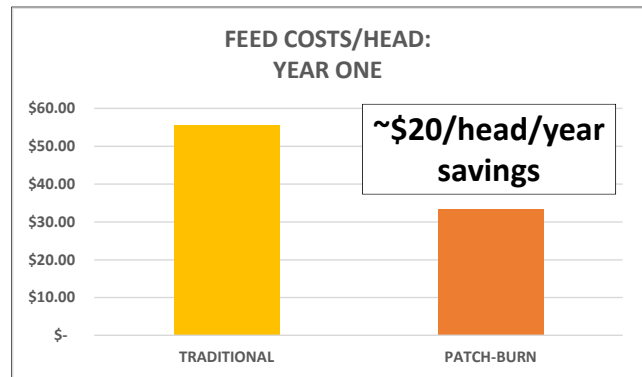
Feed Reduction

Cows on **Patch Burn** pastures -> 90 days

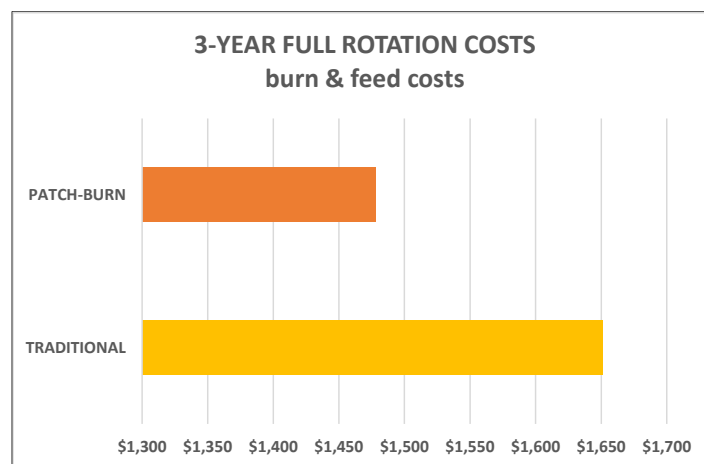
Cows on **Traditional Burn** pastures -> 150 days

Step 2: Estimate **Feed Costs**

	Number of Head	Days on Feed	\$/head /day	Total
PBG	8	90	\$0.37	\$266.76
TB	8	150	\$0.37	\$444.60



Step 2.5 : Combine **Burn & Feed Costs**



Step 3: Estimate **Drought** Impacts

U.S. Drought Monitor
 Mesonet – Payne Co.
 Web Soil Survey
 OSU Range Research Station
 Vegetation productivity based on rainfall

Five scenarios created to represent burning scenarios
during a drought

Scenarios for Comparison

Scenarios	Traditional Burning	Patch-Burning
1	Burn	2 Patches
2	Burn	1 Patch
3	No burn	2 Patches
4	No burn	1 Patch
5	No burn	No Burn

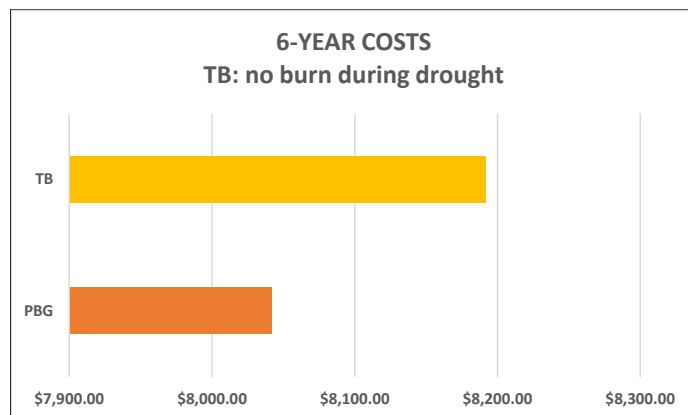
Step 3: Estimate **Drought** Impacts

Scenarios	Number of Days 8 Cow-Calf Pairs can rely on Stockpiled Forage
1 & 3: Burning Two Patches	3.65
2 & 4: Burning One Patch	4.56
1 & 2: Burning Entire Pasture	0
3 – 5: Not Burning at All	5.47

Hay & supplement costs estimated based on:
 210-day period (April-October) – # of days relied on stockpiled forage
 DMI & TDN need for 1,100 lb cow in lactation phase (Lalman and Richards 2017)
 150 acres, 8 cow-calf pairs

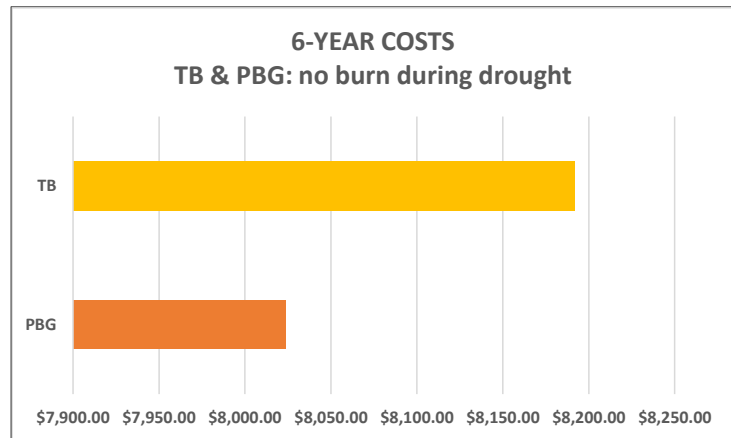
Step 4: Six Year Impacts

- Drought in Year 4
- **Scenario 4:**
 - TB -> no burn
 - PB -> 1 patch
- 1.83% difference
- Avg. savings:
 - \$25/year
 - \$3/head/year



Step 4: Six Year Impacts

- Drought in Year 4
- **Scenario 5:**
 - TB -> no burn
 - PB -> no burn
- 2.05% difference
- Avg. savings:
 - \$28/year
 - \$3.50/head/year



Step 4: Six Year Impacts (NPV)

	6-Year NPV: No Drought	6-Year NPV: Drought TB: No Burn PB: 1 Patch	6-Year NPV: Drought No Burn for Either
PBG	\$135.46	\$93.72	\$113.48
TB	\$0.00	\$19.76	\$0.00

- 2023 interest rate: 4.83% (Macrotrends 2023)
- Calculated based on savings amount each year rather than investment payment

Patch-burning and grazing provides potential flexibility while maintaining cattle production and reducing costs during a drought.

Conclusion

Burning two patches a year results in:

- ❖ a decrease in winter feed costs by approximately \$20 per head per year,
 - ❖ a 10% decrease in burn & feed costs when using PBG after 3 years
 - ❖ a future value savings of \$130 after 6 years
-
- ❖ Utilizing patch-burning before and after the drought while deciding to skip burning during a drought year potentially shows to be the most economical option by providing:
 - ❖ 5 additional days of grazing, reducing costs by \$17
 - ❖ a future value savings of \$113 after 6 years
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- ❖ Results providing cost-minimizing options aids in the decision-making process on how to best manage grazing rangelands in Oklahoma.

THANK YOU.

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