What it takes to make a profitable hay crop

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Haying is an Export Business:

What Are We Exporting?

- Water
- Land
- Labor
- Nutrients
- Mechanic Abilities

The Three Levers to Profitability in the Hay Business:

Lever 1: Minimize Equipment
Lever 2: Manage Forage Quality
Lever 3: Manage Yield

Skyrocketing Equipment Costs

50 years ago

- 500 lb calf top of market: $71 cwt
- New round baler: $5,000
- Calves / baler: 14

Photo Credit: https://www.auctiontime.com/listings/auction-results/vermeer/605c/hay-and-forage-equipment/1105

Now

- 500 lb calf top of market: $400 cwt
- New round baler: $58,000
- Calves / baler: 29

Photo Credit: https://www.auctiontime.com/listings/search?Category=1105&EventCategoryID=7&ListingType=Auction%20Results&Manufacturer=VERMEER

Lever 1: Minimize Equipment

MFWD Power Unit	
list price	$ 34,500
purchase cost	$ 30,000
expected useful life	10
Salvage Value	$ 15,000
acres covered	80
interest rate %	7.50%
Ownership costs	**Per Acre**
annual use	$ 18.75
interest	$ 1.41
taxes, interest, and housing	$ 0.28
annual ownership costs	**20.4375**

Hydroswing Mower/Conditioner	
list price	$ 16,900
purchase cost	$ 15,000
expected useful life	10
Salvage Value	$ 8,000
acres covered	80
interest rate %	7.50%
Ownership costs	Per Acre
annual use	$ 8.75
interest	$ 0.66
taxes, interest, and housing	$ 0.13

Rake	
list price	$ 5,250
purchase cost	$ 4,500
expected useful life	10
Salvage Value	$ 1,500
acres covered	80
interest rate %	7.50%
Ownership costs	Per Acre
annual use	$ 3.75
interest	$ 0.28
taxes, interest, and housing	$ 0.06

Baler	
list price	$ 8,500
purchase cost	$ 8,000
expected useful life	10
Salvage Value	$ 2,000
acres covered	80
interest rate %	7.50%
Ownership costs	Per Acre
annual use	$ 7.50
interest	$ 0.56
taxes, interest, and housing	$ 0.11
p costs	8.175

Assets tied up in equipment **$ 57,500**

Machinery Ownership per acre **$ 42.24**

John Deere 5603 MFWD C/A Tractor with L...
☆ 8/5 St. Joseph, MO

New holland h7550 disc mower
☆ 8/3 Clarksdale

2020 Frontier WR0010 Wheel Rake
☆ 7/15 Gallatin MO

Vermeer 605xl
☆ 7/27

Lever 1: Minimize Equipment

Case Study:

Acres in Hay Production:	72
Average Yield (Tons)	3
Interest Rate	7.50%
Bale Weight	1200

Total Costs	Per Acre
Equipment	$ 53.32
Operating	$ 242.52
Total	$ 295.84
Cost/Ton	**$ 98.61**
Cost/Bale	$ 59.17

Assuming a 1 cut system-

Tractor 1	
Current Value	$ 30,000
Expected useful life	10
Expected salvage value	$ 15,000
% of hours used for making	80%
Tractor 2	
Current Value	$ 5,000
Expected useful life	5
Expected salvage value	$ 1,000
% of hours used for making	50%
Mower/Swather	
Current Value	$ 15,000
Expected useful life	10
Expected salvage value	$ 8,000
Rake	
Current Value	$ 4,500
Expected useful life	10
Expected salvage value	$ 1,500
Baler	
Current Value	$ 10,000
Expected useful life	10
Expected salvage value	$ 2,000
Truck	
Miles for making & hauling	100
Trailer	
Current Value	$ 2,000
Expected useful life	30
Expected salvage value	$ 100
% of time used for hauling	100%

Operating Costs		
Fuel	$	5.03
Net wrap:	$	1.17
Fertilizer:	$	102.87
Crop supplies	$	15.00
Custom hire	$	31.63
Operator and	$	13.44
Interest	$	12.69
Farm busines	$	21.66
Land Rent	$	39.04

Total Equipment Costs:	
annual use	$ 48.99
interest	$ 3.61
taxes and housing	$ 0.72
annual ownership costs	$ 53.32

Lever 1: Minimize Equipment

Keys To Managing Equipment Costs

- Manage Depreciation (Sell Excess Equipment)
- Match equipment with acreage size
- Minimize number of cuttings
- Maximize Yield (We'll Cover this one More Later)

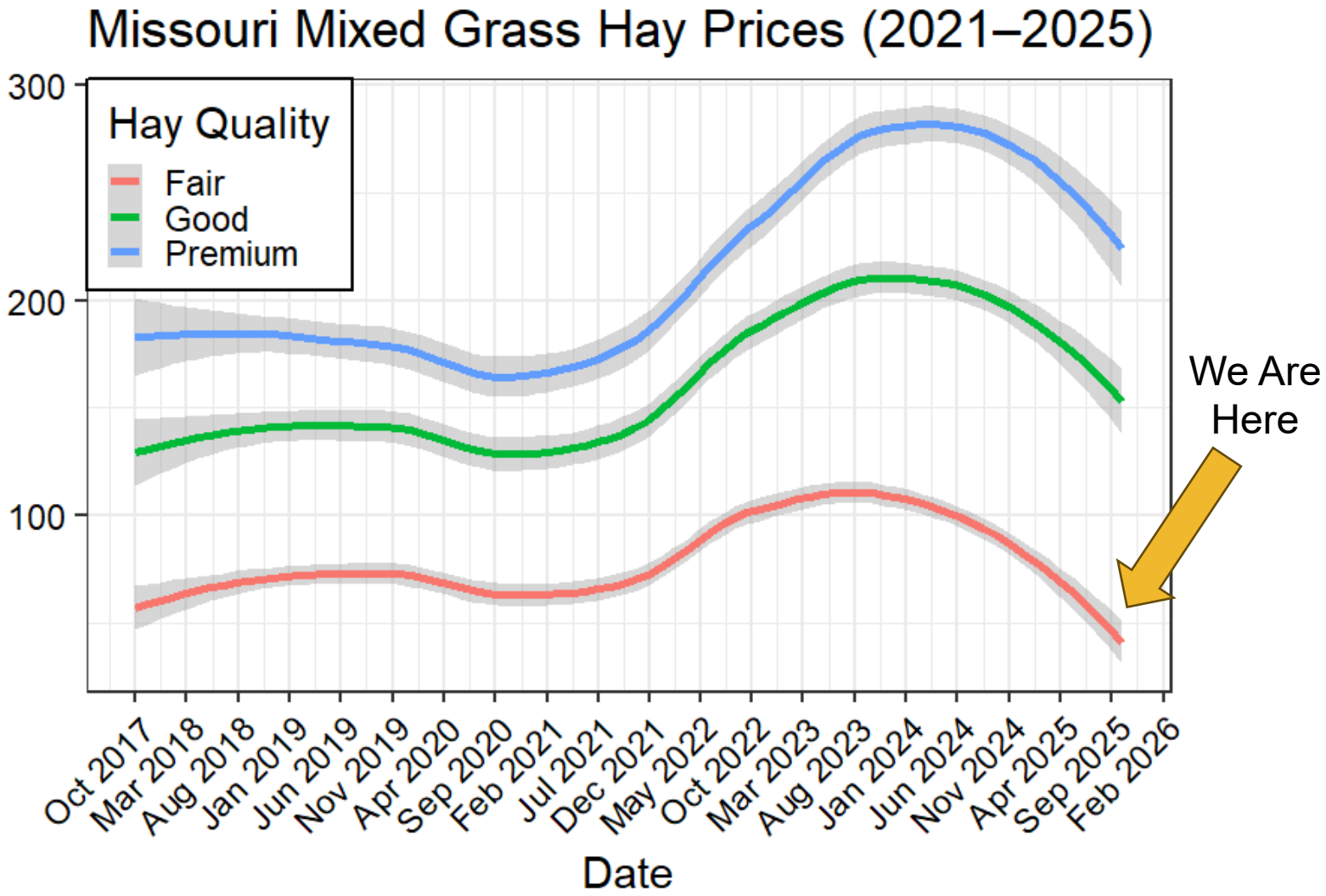
Premium:

- Crude Protein: >13%
- Early maturity, pre head
- extra leafy and fine stemmed
- Late April – Late May

	Mean	Standard Deviation
Premium	217	52
Good	164	38
Fair	80	24

Fair:

- Crude Protein: 5-9%,
- Late maturity, mature seedheads
- Coarse stemmed
- Mid June – Mid July



The Relationship between Crude Protein and Digestibility

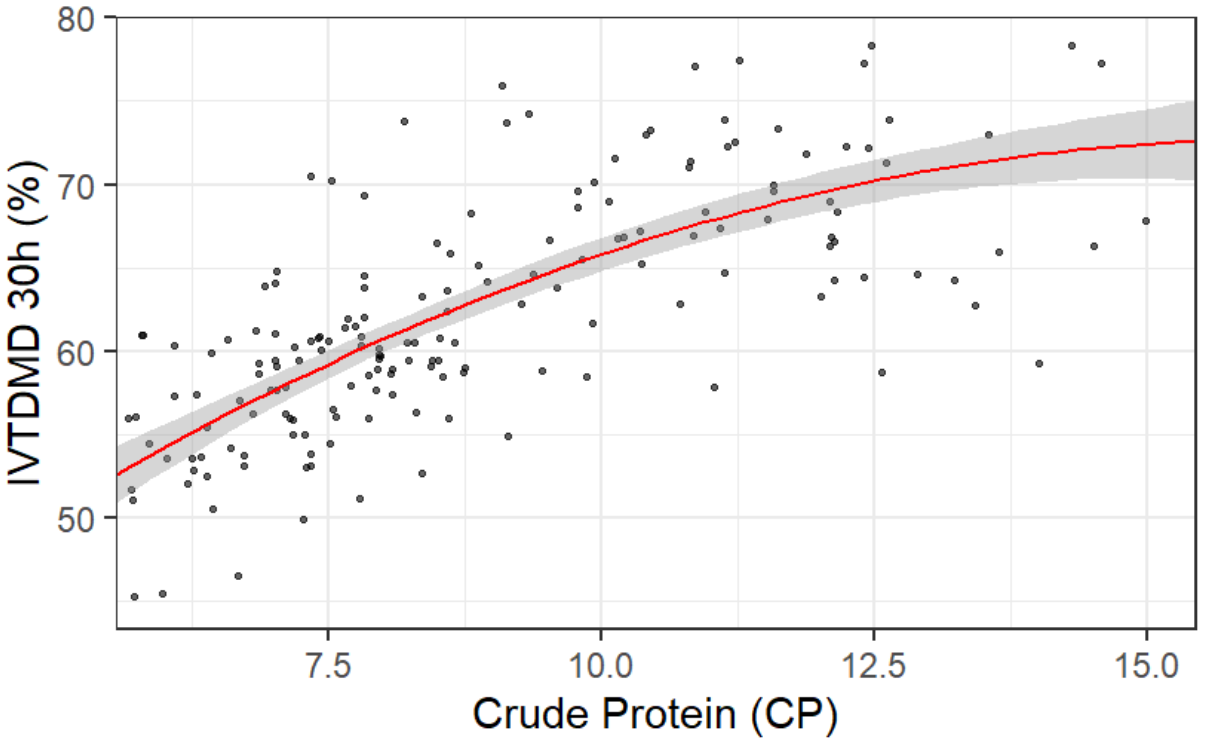
USDA Hay Quality Designation Guidelines
Agricultural Marketing Service
Livestock, Poultry, and Grain Market News

Alfalfa Guidelines (domestic livestock use and not more than 10% grass)

Quality	ADF	NDF	RFV	TDN-100%	TDN-90%	CP
Supreme	<27	<34	>185	>62	>55.9	>22
Premium	27-29	34-36	170-185	60.5-62	54.5-55.9	20-22
Good	29-32	36-40	150-170	58-60	52.5-54.5	18-20
Fair	32-35	40-44	130-150	56-58	50.5-52.5	16-18
Utility	>35	>44	<130	<56	<50.5	<16

Grass Hay Guidelines

Quality	Crude Protein Percent
Premium	Over 13
Good	9-13
Fair	5-9
Utility	Under 5



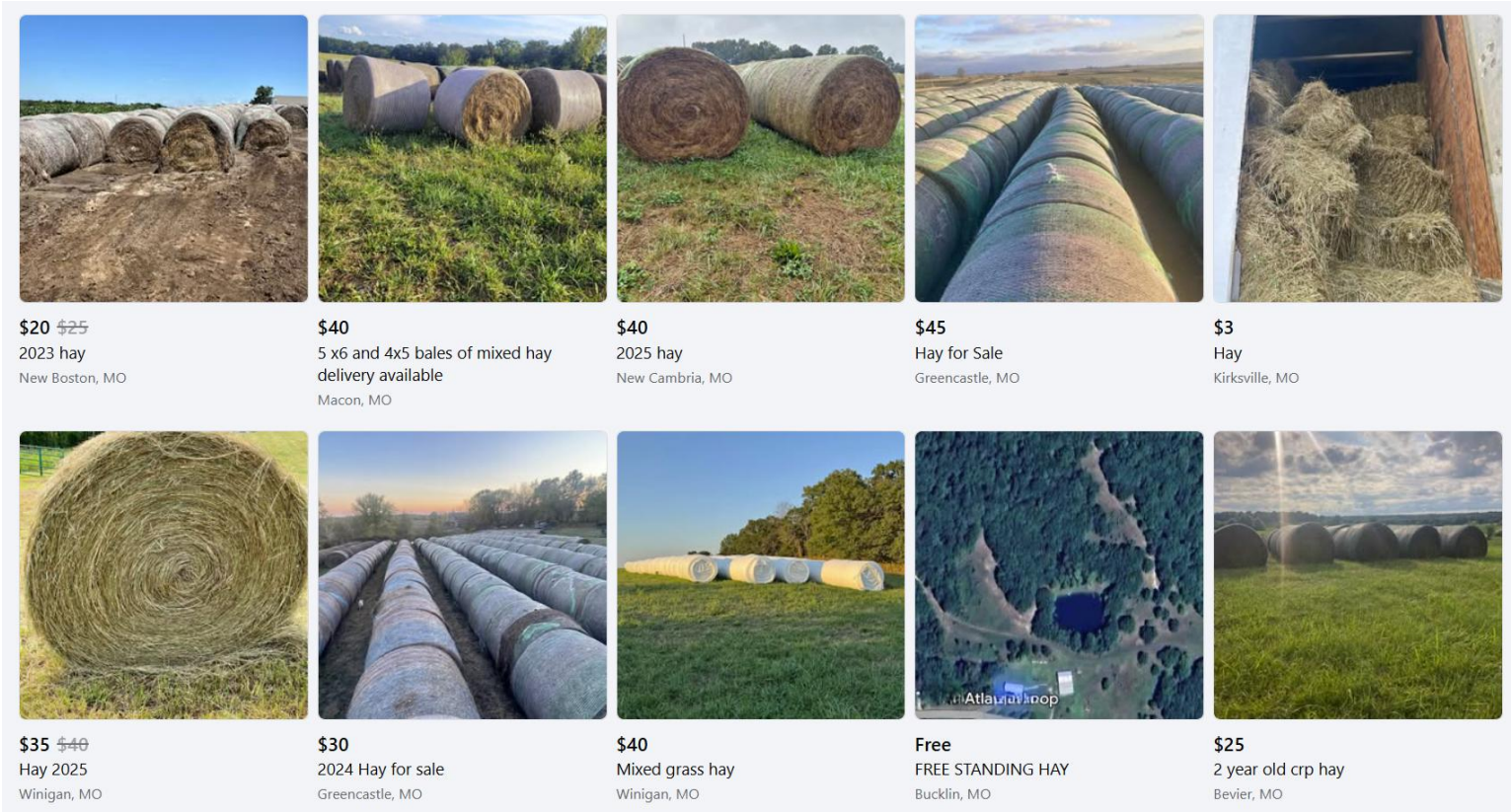
Forage quality at 8 farms (pasture) in central Missouri during July 2025.

The Oversupply of Hay

- Year-dependent
- This year:

Total Costs	Per Acre
Equipment	$ 53.32
Operating	$ 242.52
Total	$ 295.84
Cost/Ton	**$ 98.61**
Cost/Bale	$ 59.17

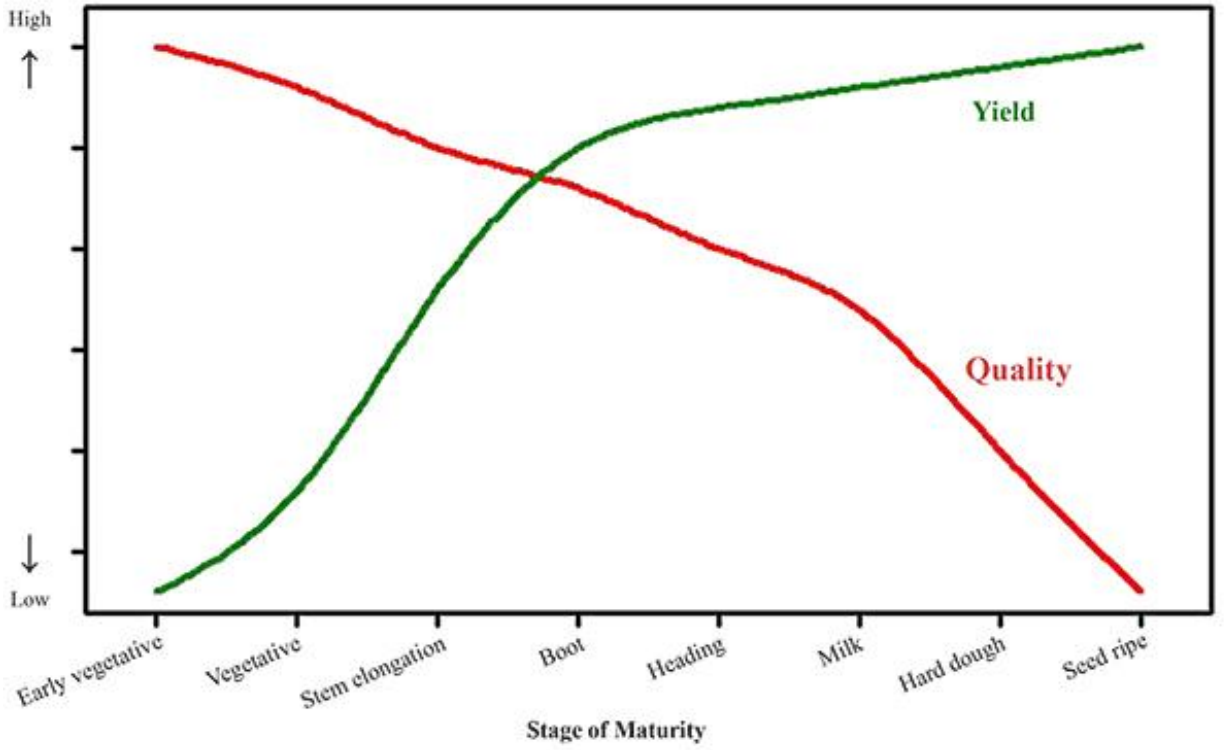
Assuming a 1 cut system-

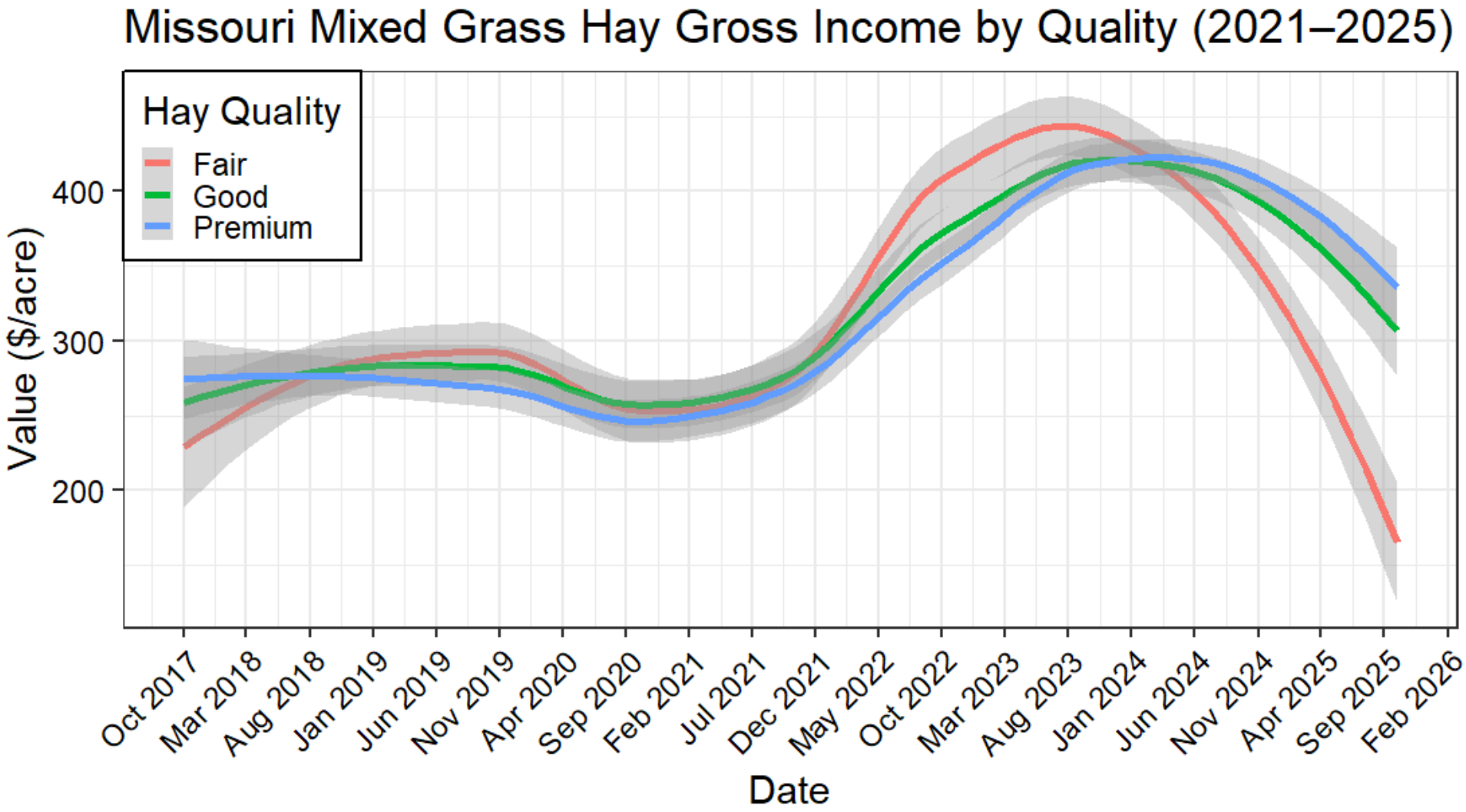


Timing Harvest

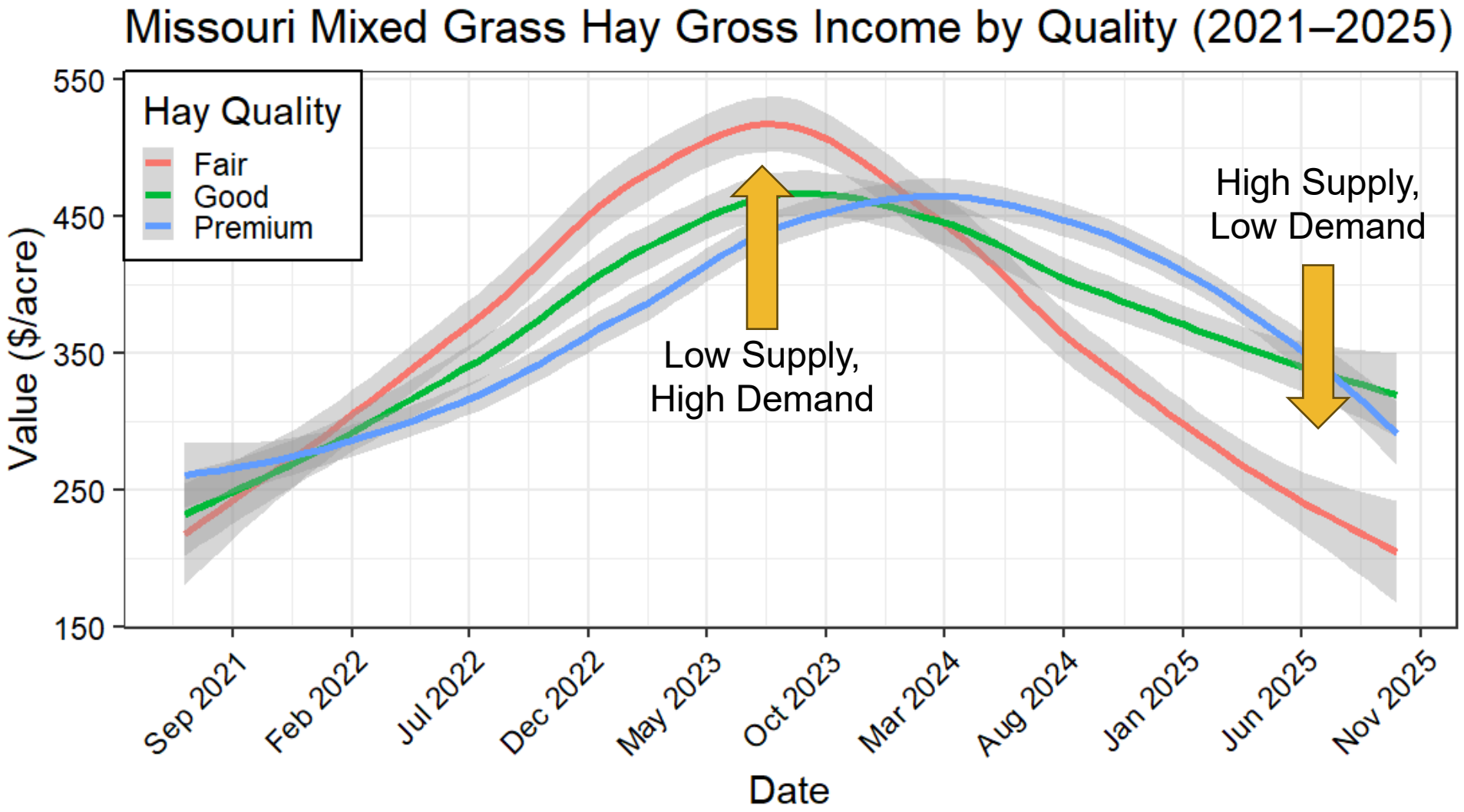
Rule of Thumb: Harvest Fescue Hay in Late Boot or Early Flower Stage

- Manage Yield **and** Quality
- #1 Predictor of Yield: Maturity
- #1 Predictor of Quality: Maturity




Missouri Mixed Grass Hay Gross Income by Quality (2021–2025)
Hay Quality
Fair
Good
Premium
Value ($/acre)
400
300
200
Oct 2017
Mar 2018
Aug 2018
Jan 2019
Jun 2019
Nov 2019
Apr 2020
Sep 2020
Feb 2021
Jul 2021
Dec 2021
May 2022
Oct 2022
Mar 2023
Aug 2023
Jan 2024
Jun 2024
Nov 2024
Apr 2025
Sep 2025
Feb 2026
Date

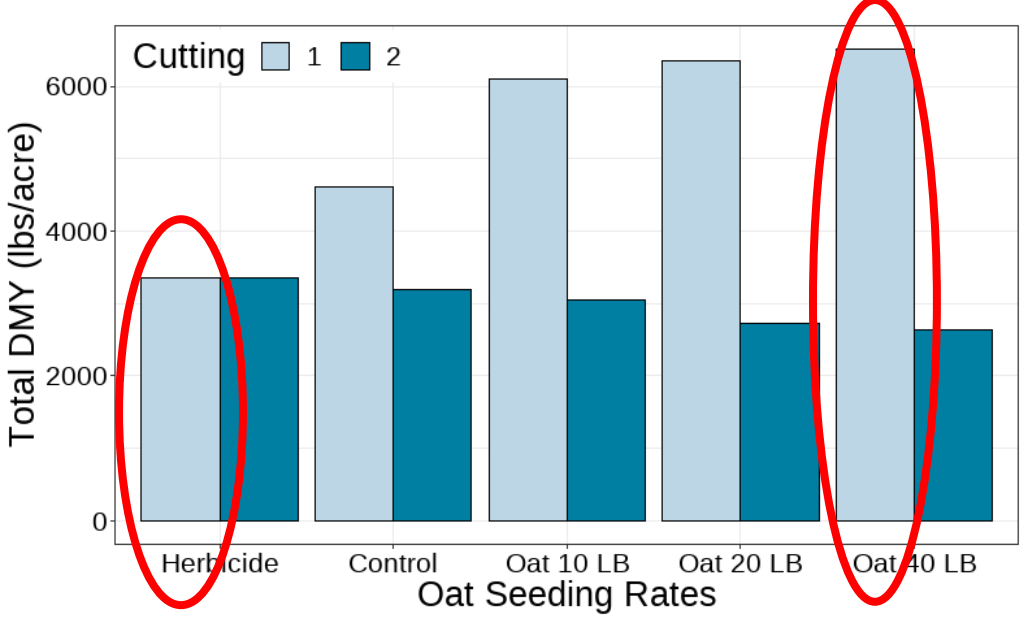
Lever #2: Manage Forage Quality

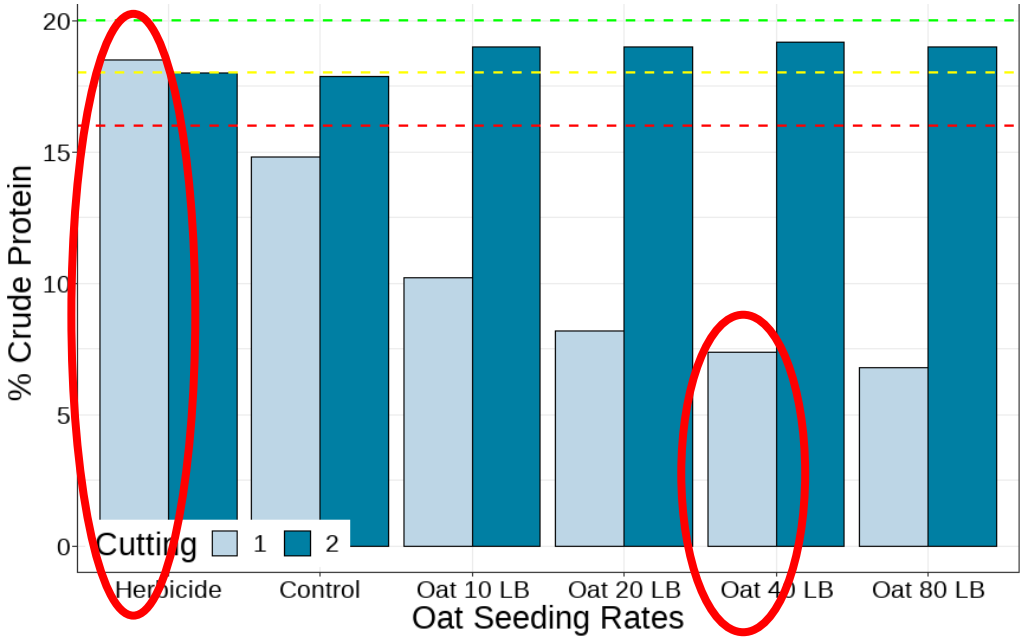


Example from Utah

Year	Price Per Ton		Price Per Acre	
	Fair	Premium	Fair	Premium
2019	$ 86	$ 170	260	280
2021	$ 235	$ 265	705	437

- Deciding to plant an oat companion crop
- Balance yield & quality depending on price
  - Low Prices → Produce Quality
  - High Prices → Produce Quantity





Variable Forage Quality

- You can control the quality of the hay you purchase.
- You cannot always control the quality of the hay you make.

Month

Hay in 3 Days

- Day 1: Swath with gates at widest setting
- Tight crimp (crush stems)
- Day 2: Let it dry/Rake
- Day 3: Rake & Bale

Lever 3: Manage Yield

Case Study:

Acres in Hay Production:	72
Average Yield (Tons)	2
Interest Rate	7.50%
Bale Weight	1200

Total Costs	Per Acre
Equipment	$ 53.32
Operating	$ 242.52
Total	$ 295.84
Cost/Ton	**$ 147.92**
Cost/Bale	$ 88.75

Assuming a 1 cut system-

Tractor 1	
Current Value	$ 30,000
Expected useful life	10
Expected salvage value	$ 15,000
% of hours used for making	80%
Tractor 2	
Current Value	$ 5,000
Expected useful life	5
Expected salvage value	$ 1,000
% of hours used for making	50%
Mower/Swather	
Current Value	$ 15,000
Expected useful life	10
Expected salvage value	$ 8,000
Rake	
Current Value	$ 4,500
Expected useful life	10
Expected salvage value	$ 1,500
Baler	
Current Value	$ 10,000
Expected useful life	10
Expected salvage value	$ 2,000
Truck	
Miles for making & hauling	100
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Total Equipment Costs:	
annual use	$ 48.99
interest	$ 3.61
taxes and housing	$ 0.72
annual ownership costs	$ 53.32

Nutrient Management: Manage pH First

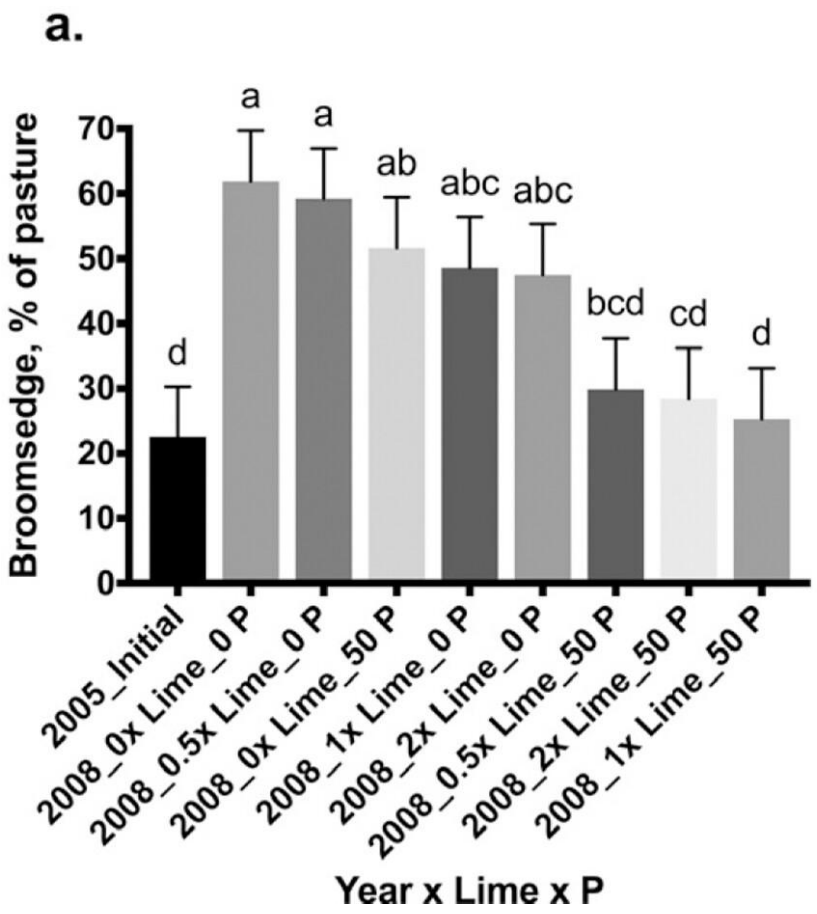
Nutrient	Typical Total Content in Soil (Unavailable)	Typical Available Content (Soil Test)	Notes
	lb/acre		
Phosphorus (P)	500–1,500	10–100	Available P is a small fraction; **strongly tied to pH** and soil type.
Potassium (K)	5,000–25,000	100–600	Most K is in mineral form; only a small portion is exchangeable.
Calcium (Ca)	5,000–20,000	2,000–10,000	Often abundant and readily available in most soils.
Magnesium (Mg)	1,000–5,000	200–1,000	Availability **depends on soil texture and pH**.

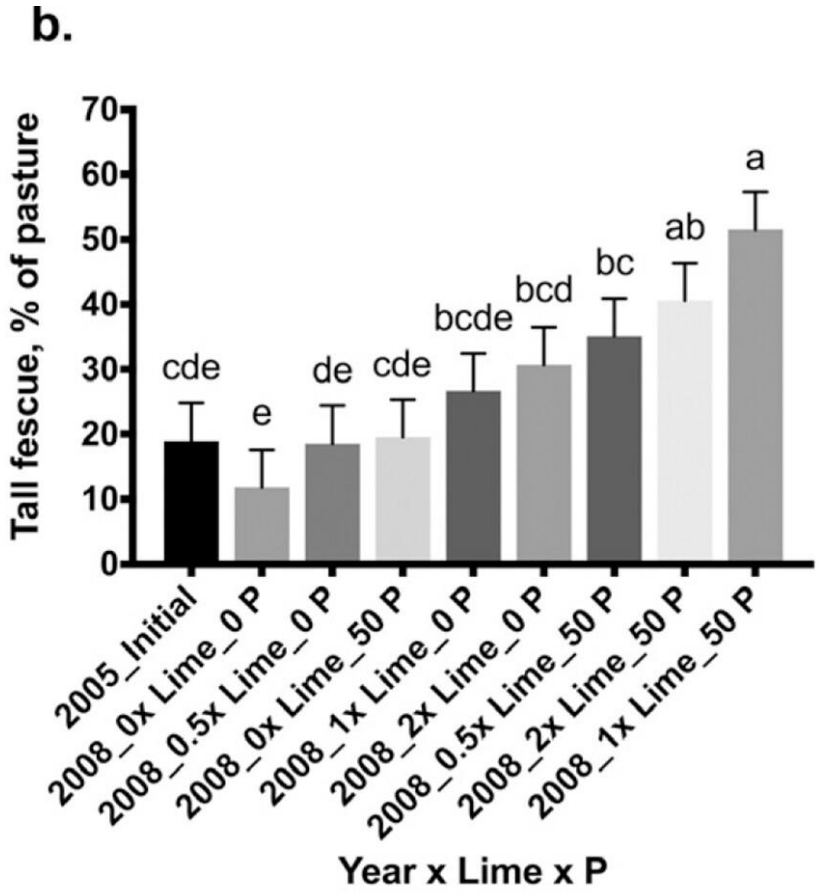
Effect of Increasing Lime Rate on Soil Test Properties

Lime Rate	Soil pH	P	K	Ca	Mg
t/a		ppm		meq/100g soil	
0	5.25	19.1	112	7.6	1.6
0.5	5.38	18.1	126	8.1	1.7
1	5.48	15.7	119	8.5	1.8
2	5.71	21.7	145	9.7	2.2
3	6.28	16.2	114	10.3	2.4
4	6.49	22.2	121	10.9	2.6
6	6.84	29.2	126	11.5	2.8
8	7.18	31.5	123	12.3	3

Source: S. Henning, 2004 Iowa State Univ., ISRF04-13

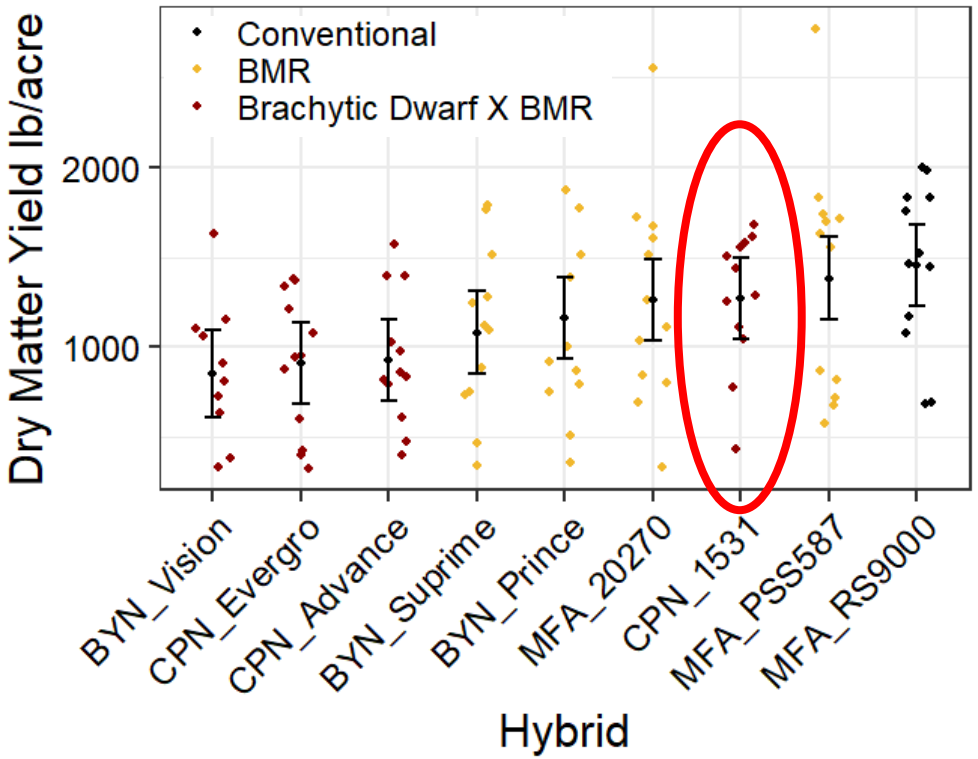
Lever 3: Manage Yield

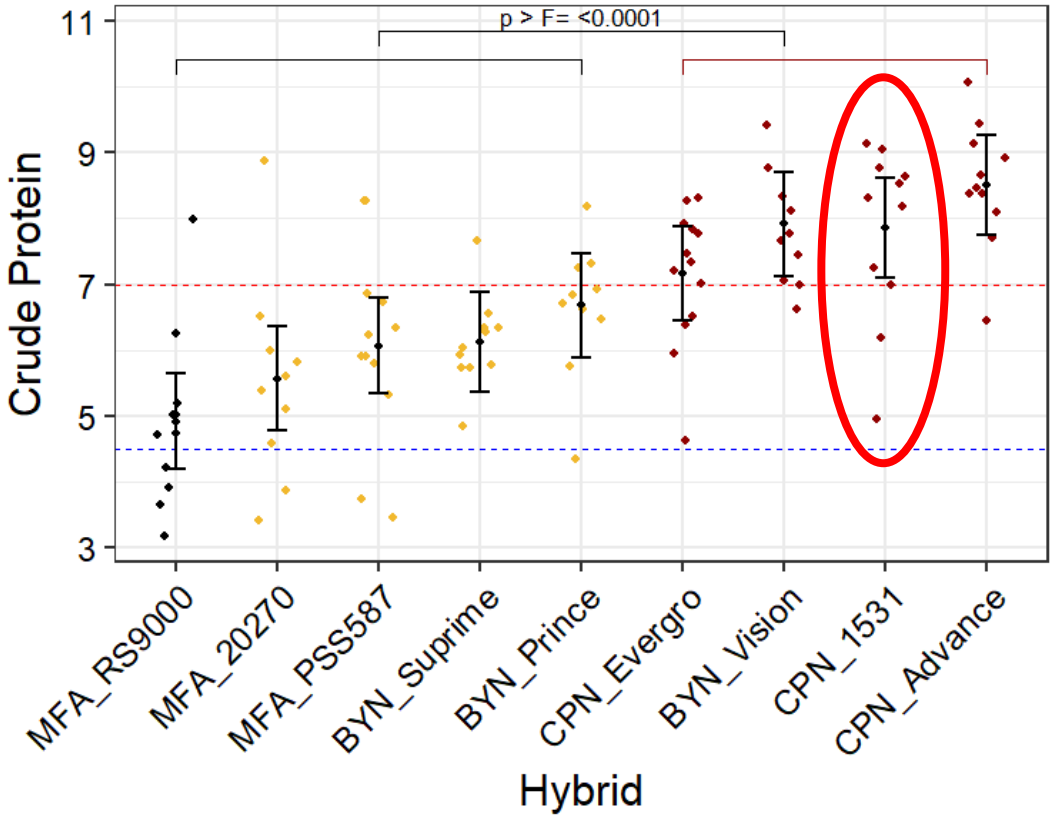




Lime and phosphorus application on broomsedge-infected tall fescue pasture in Southwest Missouri. Applications in 2005 only. From “Lime or Phosphorus: Which is Best to Limit Broomsedge in Tall Fescue Pastures?” Blevins et al., 2018.

Use Quality Technologies to Increase Yield





Ways to make haying more profitable

1. Increase Yield Per Cutting
2. Minimize excess equipment
3. Custom Haying (spread costs over more acreage)

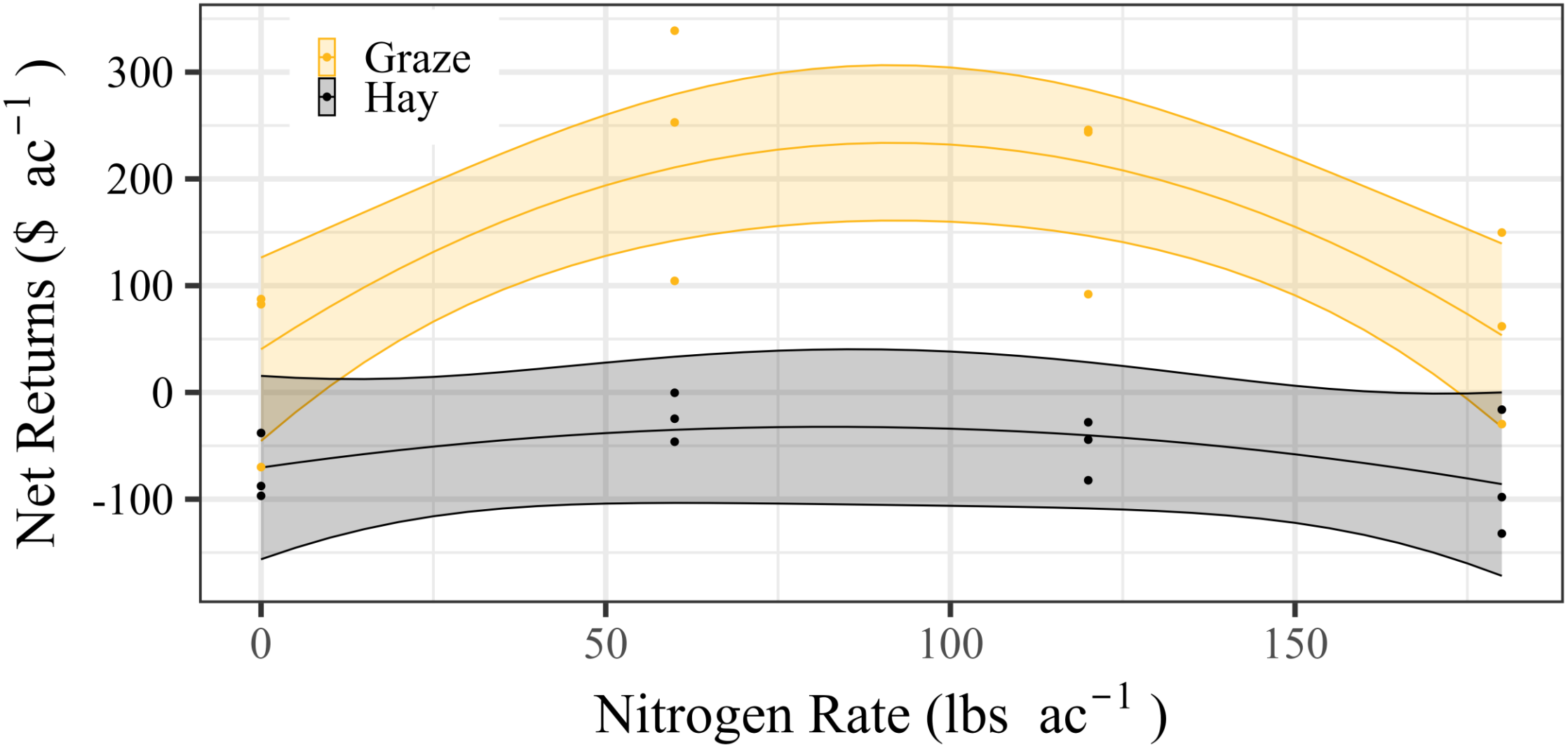
Ways to make haying more sustainable

1. Manage in-field traffic
2. Manage nutrients & pH
3. Feed hay on hayfields when ground is frozen (Return nutrients)
    1. Bale grazing
    2. Unroll Hay
4. Rotate Hay Fields (graze-graze-hay rotation)

The Average Cow-Calf Producer…

1. Keeps 45-60 Cows
2. Makes 75 acres of hay
3. Spends 60 /bale in high-yield years (as much as $120 in low yield years

May be more profitable to sell equip & purchase hay…Economies of scale/overequipped


Graze
Hay
300
200
100
0
-100
Net Returns ($ ac^{-1})
0
50
100
150
Nitrogen Rate (lbs ac^{-1})

Conclusions

1. Increase Yield Per Cutting
2. Minimize excess equipment
3. Custom Baling (spread costs over more acreage)
4. Make Effective nutrient management decisions
5. Read the Market

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"Learn from yesterday, live for today, hope for tomorrow. The important thing is to not stop questioning" *–Albert Einstein*