



Zach Knutson

▶ Making Pasture
Pencil Out



About Me

- Master in Agricultural & Applied Economics from VT
- Bachelor in Animal Science and Agribusiness from UW-RF
- Converted ~100 acres of cropland to pasture from 2020-2023
- Graze registered cow/calf pairs, stockers, sheep, and direct-market meat products

What to expect after converting Cropland to Perennial Pasture

- The Context
- The Methods
- The Numbers

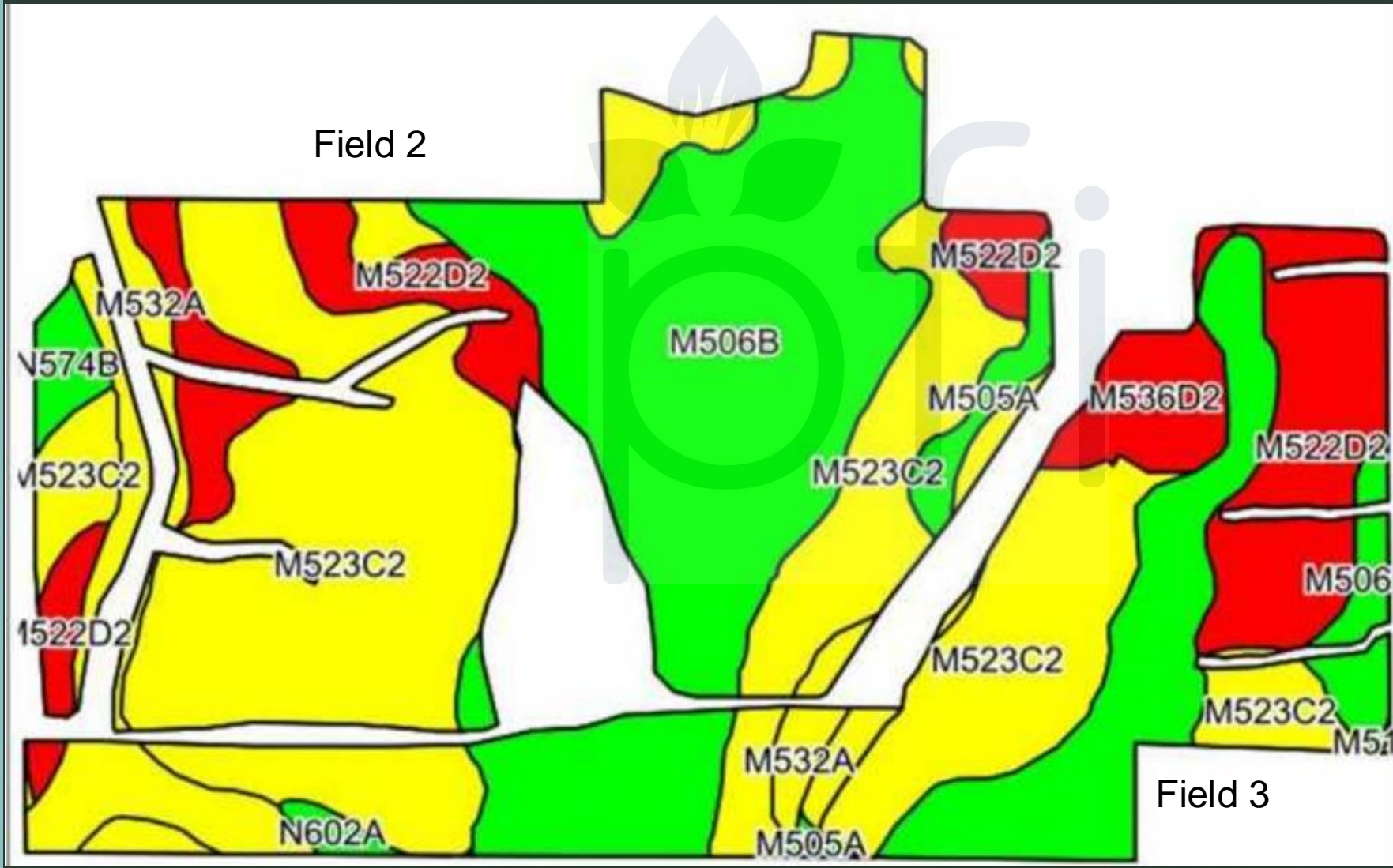


The Context: Soil Types

- 8 different soil types
- CPI's of 58-74 and 91-98
- Silt Loam
- Clay Loam
- Silty Clay

| Acres | Percent of field | PI Legend | Soil Drainage | Non-Irr Class *c | Productivity Index |
|-------------------------|------------------|-----------|-------------------------|------------------|--------------------|
| 40.91 | 40.2% | Yellow | Moderately well drained | IIle | 77 |
| 34.96 | 34.3% | Green | Moderately well drained | Ile | 95 |
| 13.68 | 13.4% | Red | Well drained | IVe | 65 |
| 6.40 | 6.3% | Yellow | Poorly drained | IIw | 74 |
| 2.74 | 2.7% | Red | Well drained | IVe | 58 |
| 1.59 | 1.6% | Green | Somewhat poorly drained | Iw | 98 |
| 1.04 | 1.0% | Green | Well drained | Ile | 91 |
| 0.46 | 0.5% | Green | Somewhat poorly drained | Ie | 98 |
| Weighted Average | | | | | 81.4 |

Each field has a variety of soil quality



Field 1

Field 2

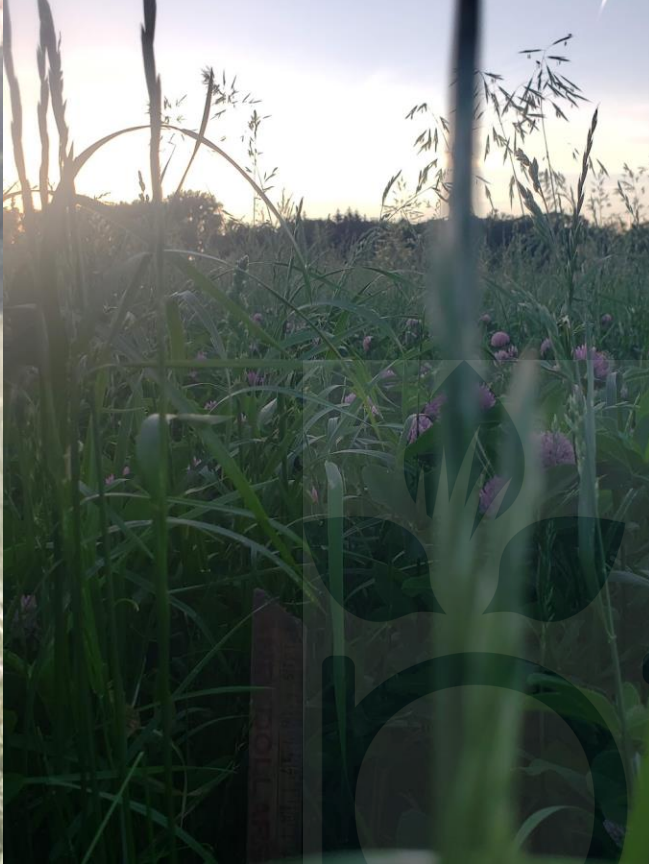
Field 3



Field #1, April 21, 2020

- Drilled directly into corn stubble
- No fertilizer applied after conventional corn came off, still no fertilizer since
- Seed Mix: Diversemaster from Prairie Creek Seed

| Components | % |
|--------------------|----|
| Tall Fescue | 12 |
| Meadow Fescue | 10 |
| Italian Ryegrass | 10 |
| Perennial Ryegrass | 10 |
| Red Clover | 8 |
| Alfalfa | 8 |
| Alaskan Brome | 6 |
| Meadow Brome | 6 |
| Birdsfoot Trefoil | 5 |
| Hybrid Ryegrass | 5 |
| Timothy | 4 |
| Festulolium | 4 |
| Orchardgrass | 4 |
| Alsike Clover | 4 |
| White Clover | 4 |



Field #1, Year 2



- June 7, 2021
- July 29, 2021





Field #2, April 21, 2021

- Drilled into bean stubble with oats & peas nurse crop
- Fertilized at planting with (per acre):
 - 150# Potash
 - 150# MESZ
 - 25# AMS



| Species | Variety | Seeds/Sq ft | PLS Rate Planned / ac |
|---------------|---------|-------------|-----------------------|
| Meadow Fescue | | 31.7 | 6.0 |
| Orchard grass | | 15.0 | 1.0 |
| Tall Fescue | | 31.3 | 6.0 |
| Red Clover | | 9.5 | 1.5 |
| Alfalfa | Grazing | 30.3 | 6.0 |

Field #2, Year 1



- Cut first crop on June 30th, 2021
- Volunteer peas regrowth back to >60" on October 26, 2021
- Lots of foxtail after we took off the nurse crop





Field #3

- 3 years of continuous cover crops prior to planting
 - Winter biennials followed by summer annuals on repeat
- Cover crops were strictly grazed
- Perennials planted Fall '22/Spring '23
- Fertilizer applied in Summer '23 due to poor performance
- Aug 17, 2021 upper left
- May 30, 2022 on right



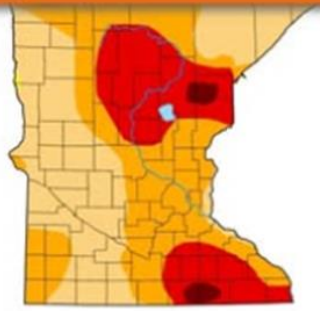
COMPONENTS:

- 40% Tower Tall Fescue
- 40% HLR Orchardgrass
- 20% Fleet Meadow Brome
- 10% Hakari Alaska Brome

Quick Summary of Differences

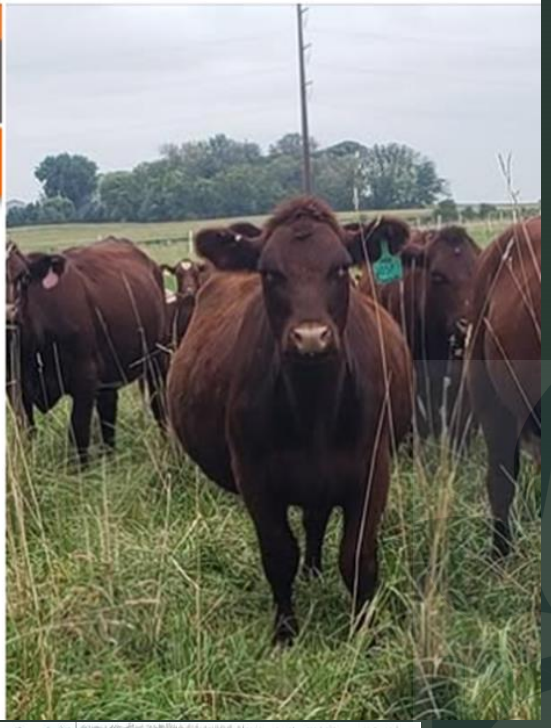
| | Field #1 | Field #2 | Field #3 |
|-------------|--------------|---------------------|--|
| Soil Prep | Corn Stubble | Bean Stubble | Cover Crops |
| Fertilizer? | Never | Pre-plant | Post-plant |
| Seed Mix | 15-way | 5-way + 2-way nurse | 20+way cover crop mixes followed by 6-way perennials |

U.S. Drought Monitor



Map released: Thurs. September 14, 2023

Data valid: September 12, 2023 at 8 a.m. EDT



In the Drought

- Field #1 (top left), #2 (bottom left), and #3 (right)

The Numbers! Year 1:

- Field #1: 27.25 AU/acre/day grazed every 14-21 days, 5 rotations before rested (max), D2 drought
- Field #2: Averaged ~2.1 ton/ac dry matter
 - Stockpile grazing from Oct-Jan ~51 AU/Ac after D3 summer
- Field #3: Ranged from 3.1 Au/Ac/day to 35.1 Au/Ac depending on the month in D2-D3 drought

The Numbers! Year 2:

- Field #1: 51.4 AU/Ac/Day on ~30-day rotations through D2
- Field #2: Averaged ~2.3 tons/acre hay
 - Grazing ~41 Au/Ac/day on 45-day rotations through D3 drought
 - Grazing started ~30 days after cutting hay, continued into Dec
- Field #3: Averaged ~1 ton/acre hay
 - Grazing ~20 Au/Ac/day on ~30-day rotations through D2

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The Numbers!

Averaged out grazing Apr-Dec
D1 summers, 45-day rotations

- Field #1: 29 AU/Ac/day
- Field #2: 65 AU/Ac/day
- Field #3: 19.7 AU/Ac/day

Planning for the Conversion

- Soil Test, Soil Test, Soil Test
- Correct deficiencies before investing in seeds
- Nurse Crop > Continuous Cover Crops

Planning for the Conversion

- Year 1: Plan for plenty of rest on the paddock
- Year 2: Peak production
- Years 3+: More consistent and better drought-resistance
- Track production in years 1-3 to help decide when to reseed