



COVER CROPS FOR COW CHOW

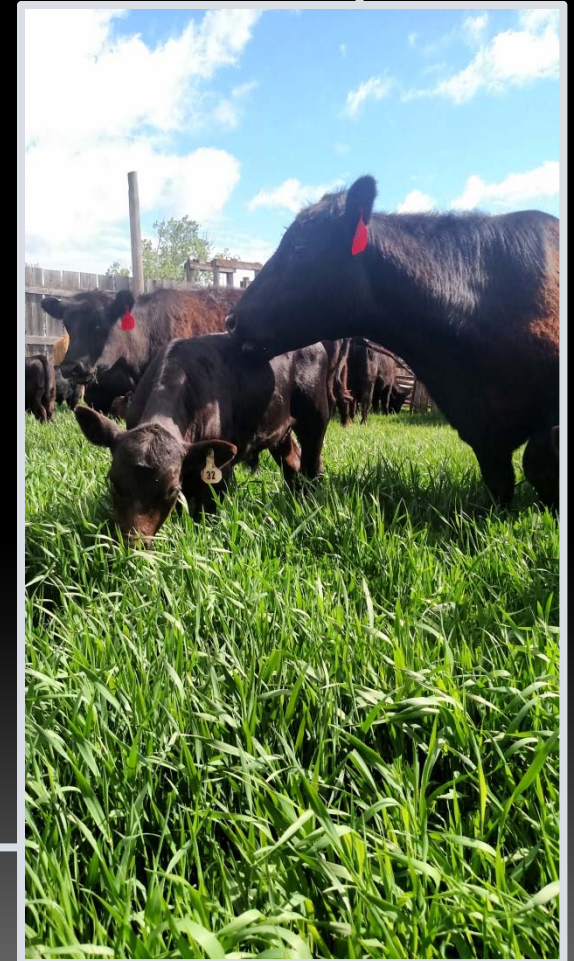
Justin Zahradka

- NDSU B.S. Crop and Weed Sciences, Minor Soil Science

©2017

Why Are We Here?

- Is what we are doing working well?
- Losing less or building soil?
- It is in our minds, is it in our field?



Conservation/Regenerative Agriculture

1. Minimal soil disturbance
2. Cover crops
3. Diverse crop rotation
4. **Animal impact**



Animal Impact

- Cows - Pull, Trample, Tug, Tear
- Plant Roots – put more effort into repairing themselves and leak more root exudates
 - Pushes more carbon into the soil for microbial assistance
 - Accelerates soil building



Farm Overview

- Zero-till: wheat, canola, field peas
- Custom grazing and cow/calf operation
- Seven years of cover crops
 - Graze cattle in fall or spring
- Goals:
 - Capture carbon, build SOM
 - Provide forage for cattle
 - Improve fertility
 - Earn a profit



Soil Profile



Zero-till 2015



2012 Cover Crop



- Dual cropping after wheat harvest

Dual Crop

- Cash crop: HRSW seeded April 11th
 - Harvested July 29th
- Cover crop: radishes and turnips
 - August 2nd – Broadcasted seed at 2 lbs/acre and urea at 35 lbs/acre (16 lbs/acre actual N)
 - Harrowed twice to create seed to soil contact
 - Rained that evening
- Grazed from Sept 30 to Nov 3
 - 34 days

Growth on August 18th – 16 days



September 7th – 36 days



September 23rd – 52 days



October 14th – 14 days grazing



Residue to Cover Surface



Herd Split Into Two Groups

Cover Crop

- 12 Cow/calf pairs
- 10 Heifers
- No Supplements



Control Group

- 11 Cow/calf pairs
- 6 Bred Heifers
- Fed Hay



ADG Results

- Grazing period: 34 days
 - Sept 30 - Nov 3
 - 40 acres
 - 2.3 acres/pair

Cover Crop

- Steer Calves: 2.48 lbs/day
 - Heifer Calves: 2.08 lbs/day
 - Heifers: 1.27 lbs/day
 - Cows: 1.59 lbs/day
- Steers beginning weight: 537 lbs
 - Heifers beginning weight: 484 lbs



Control Group

- Steer Calves: 1.78 lbs/day
- Heifer Calves: 2.30 lbs/day
- Bred Heifers: 3.91 lbs/day
- Cows: 4.06 lbs/day

Field is Covered

- January 23, 2013



Increased Earthworm Activity



2013 Cover Crop

- 35 acres of breakout hayland
- N Building mix: Radish, Turnip, Pea, Lentil, Soybean, clover, millet, oats, sunflower
- July 19th – broadcasted seed at 30 lbs/acre
- Grazed from Sept 28 to November 10

August 2nd – 14 days



August 30th – 42 days



September 14th – 57 days



September 29th – 1 day grazing



Soil is Covered – End of Grazing



Results

- 20 Steers beginning weight 790 lbs
 - Grazing period: 43 days (Sept 28 – Nov 10)
 - 35 acres
 - 1.75 acres/hd
- ADG: 2.18 lbs/day
- RFV 163.28

RFV

Analyses (%)	10/1/2013
Moisture, %	5.85
Dry Matter, 100 C, %	94.15
Ash, %	18.32
Crude Protein, %	11.20
Acid Detergent Fiber, %	26.11
Neutral Detergent Fiber , %	42.05
Calcium, %	1.7598
Phosphorus, %	0.1868
RFV (Relative Feed Value)	163.28

2014 Cover Crop

- Same 35 acres as previous year
- Radish, Sudan grass, Sunn hemp
- July 6 – Drilled seed 1" deep at 20 lbs/acre
- Grazed from September 8th to Oct 18th
- RFV 121.36

Establishment – July 6th



July 31st – 25 Days



August 8th – 33 Days



Sept 8th – Start of Grazing – 64 Days



October 5th – 27 Days Grazing



End of Grazing – Nov 16th



ADG Results

- 53 Steers and 35 Heifers
 - Grazing period: 41 days (Sept 8 – Oct 18)
 - 35 acres
 - 0.4 acres/hd
- Steers: 1.45 lbs/day
 - beginning weight: 634 lbs
- Heifers: 1.50 lbs/day
 - beginning weight: 696 lbs
- RFV: 121.36
- **Produced 2.75 Tons Dry Matter/acre**
- ADG: 0.80 lbs/day on native pasture during summer

RFV

Analyses (%)	10/8/2014
Moisture, % (as-is)	85.80
Dry Matter, 60 C, %	14.20
Dry Matter, 100 C, %	95.99
Ash, %	13.65
Crude Protein, %	9.71
Acid Detergent Fiber, %	33.07
Neutral Detergent Fiber , %	53.83
Calcium, %	0.9718
Phosphorus, %	0.2217
RFV (Relative Feed Value)	121.36

2015 Full Season Cover Crop

- Full Season Cover Crop
- Planted May 5th
- Turnip, Sugarbeet, Forage Barley, Forage Pea, Millet
- No-till seeded



June 16th



July 13th



4-legged Cover Crop Choppers

- 135 HD on 40 acres
- Grazed July 31- Aug 23
 - 24 Days
- Consumed 1.7 Acres/Day



Soil Remains Covered

- Seeded into undisturbed residue following grazing



May 28, 2017

- Native pasture intensive grazing



May 29, 2017

- Following day



August 5, 2017

- Regrowth after about two months



May 31, 2017

- Spring grazing winter rye



August 24, 2017

- Forage crop seeded into rye residue



Fall Regrowth



Cover Crop Analysis	2017
Moisture	14.0%
Dry Matter	86.0%
Crude Protein	12.5%
ADF	34.2%
aNDF	46.9%
TDN	58.1%
RFV	123.57
RFQ	136.83

October 7, 2017



October 16, 2017



Build the Right Herd

- Forage-based
- Smaller frame + rapid growth = more efficient



Calving Pen For Spring 2018

- Rye seeded Oct 2nd into pea stubble
- Calving to start May 5th



Soil

Health

Improvement

Tools

Soil Benefits



Soil Benefits



Soil Benefits



Soil Benefits



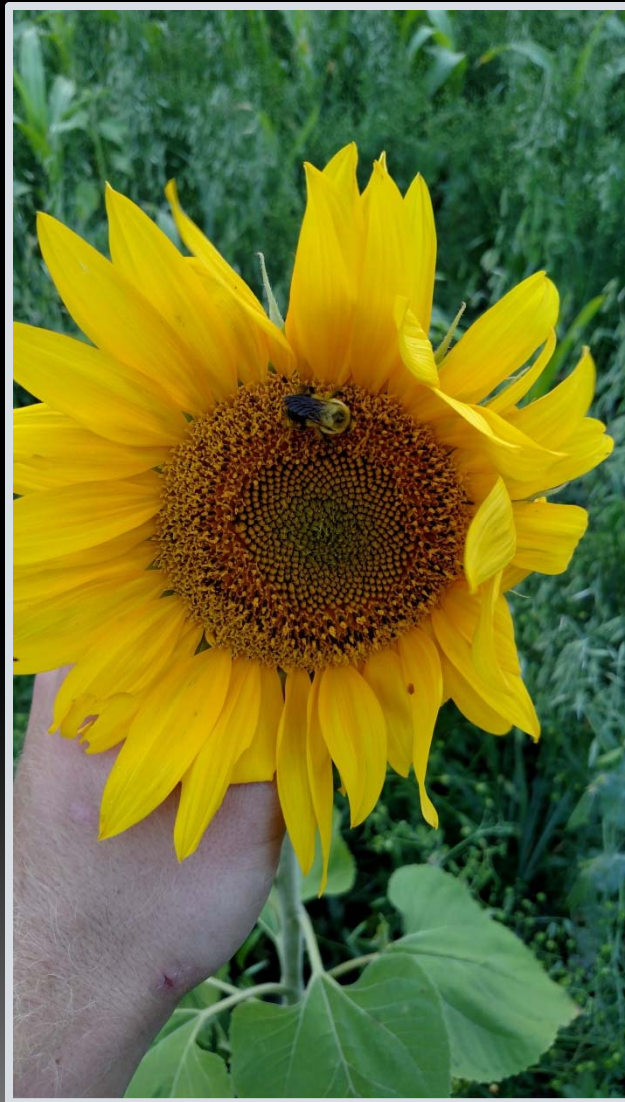
Underground Herd



Building Soil

% Soil Organic Matter			
	2014	2015	2017
Field 1	3.7	3.7	4.0
Field 2	3.8	3.6	4.1
Field 3	5.0	5.7	5.3

Managing Ecosystems, Not Fields



Considerations

- Moisture
- Equipment
- Termination (seed production)
- Toxins in forage
- Insects
- Disease
- Fencing
- Herbicide history
- Residue Breakdown
- Insurance
- Cost

Fencing



Fence Alarm



Portable Water



Hauling Water



CC Recommendations

- 1 Grass, 1 brassica, 1 legume in a cover crop mix
 - Start small, keep it simple
- Plant 50% legumes in mix if trying to achieve N fixation
 - Make sure to inoculate legumes
- Radish and turnip are frost tolerant – survive down to 16° F
- Don't plant only radish and turnip

Grazing Recommendations

- Cattle will acclimate to cover crop
- Diversity prevents upset stomach/bloat
 - Plant less than 35% brassicas in mix
- Graze about 45-50 days after planting for best weight gain
- Grazing calves has been most profitable
- Planting after Aug 15 should eliminate seed production (North Dakota)

What I have Learned

- Start grazing earlier rather than later
- Leave more residue than you think you can handle – its not going to waste
- Cut back on recommended seeding rates
- Add more animal impact

Where to Plant

- After small grains harvest is most economical
- Inter-seeding
- Fly rye onto corn
- After corn silage
- Prevent Plant ground
- After hay crop
- CRP breakout
- Anywhere there is space

Summary

- We are decision makers
- It's not about perfection, its about direction
- You don't have to believe in what I do, but believe in why I am doing it
- Treat problems rather than symptoms

No piece of steel can benefit the soil
like the roots of a good cover crop.



Questions for Me?

- Justin.L.Zahradka@gmail.com
- Twitter - @JustinZahradka

Cost Of Gain – Dual Radish/Turnip

□ Cover Crop

Expense	\$/acre	40 acres		Total lbs gained	lbs
Seed	\$ 11.00	\$ 440.00		Cows	649
Broadcast seed	\$ 8.00	\$ 320.00		Heifers	263
Harrowing	\$ 4.00	\$ 160.00		Yearling steers	506
Urea	\$ -	\$ -		Yearling heifers	424
Land rent	\$ -	\$ -		Total	1842
Labor	\$ -	\$ -			
Total	\$ 23.00	\$ 920.00		Cost of Gain \$/lb	\$ 0.50

□ Feedlot – Hay

Expense			Total lbs. gained	lbs.
Feed	\$ 1,200.00		Cows	1518
(\$50/1400 lb. bale)			Bred Heifers	798
Manure handling	\$ 100.00		Yearling steers	424
Fuel	\$ 100.00		Yearling heifers	313
Labor	\$ -		Total	3053
Total	\$ 1,400.00		Cost of Gain \$/lb.	\$ 0.46

Cost Of Gain – N Mix

Expense	\$/acre	35 acres		Total lbs. gained	lbs.
Seed	\$ 20.00	\$ 700.00		Steers	1875
Broadcast seed	\$ 9.00	\$ 315.00			
Harrowing	\$ 2.50	\$ 87.50			
Urea	\$ -	\$ -			
Land rent	\$ -	\$ -			
Labor	\$ -	\$ -			
Total	\$ 31.50	\$ 1,102.50		Total	1875
				Cost of Gain \$/lb	\$ 0.59

- Nitrogen credit not included

Cost Of Gain – Sudan/Radishes

Expense	\$/acre	35 acres		Total lbs gained	lbs
Seed	\$ 30.00	\$ 1,050.00		Steers	3151
Custom seeding	\$ 15.00	\$ 525.00		Heifers	2258
Hay	\$ -	\$ 1,470.00			
(\$42/1150 lb. bale)					
Fuel	\$ 2.85	\$ 100.00			
Land rent	\$ -	\$ -		Total	5408
Labor	\$ -	\$ -			
Total	\$ 47.85	\$ 3,145.00		Cost of Gain \$/lb	\$ 0.58

Full Season Cover Crop

Full Season Cover Crop 2015		
Summer and fall grazed		
	\$/Acre	Total
Acres	1	40
Land rent	\$ 40.00	\$ 1,600.00
Seed	\$ 28.00	\$ 1,120.00
Custom App	\$ 16.00	\$ 640.00
Fertilizer	\$ -	\$ -
Tillage	\$ -	\$ -
Herbicide	\$ -	\$ -
Fencing	\$ -	\$ -
Labor	\$ -	\$ -
Total	\$ 84.00	\$ 3,360.00

Cost of Gain	
2	ADG LBS/day
31	Days
135	HD
8370	LBS Gained
1.3	Acres/day
\$ 0.40	COG/LB

- Produce more biomass
- Legumes fixing Nitrogen

COG

Cover Crop Input		Cost of Gain	
\$/acre		1.75	ADG LBS/day
\$ 13.00	Seed	45	Days
\$ 5.00	Application & Fuel	135	HD
\$ -	Labor	10631	LBS Gained
		6.1	Acres/day
276	Acres		
\$4,968.00	Total	\$ 0.47	COG/LB

Feeding Hay Input		Cost of Gain	
600	Beginning weight (LBS)	1.25	ADG LBS/day
2.75	% body weight consumed	135	HD
16.5	LBS DM consumed/day	45	Days
135	HD	7594	Total LBS gained
45	Days		
100238	LBS DM consumed	\$ 0.44	COG/LB
1400	LBS DM/bale		
88	bales		
\$ 38.00	\$/bale		
\$ -	Fuel, Labor, Manure etc.		
\$ 3,325.34	Total		