REGENERATING YOUR SOILS
4) Living Root As Long As Possible
Underseeded With Berseem, Crimson and Persian Clover
# Brown’s Ranch Cover Crops

<table>
<thead>
<tr>
<th>Annual Ryegrass – CSG</th>
<th>Canola – CSB</th>
<th>Crimson Clover - CSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oats – CSG</td>
<td>Radish – CSB</td>
<td>Berseem Clover - CSB</td>
</tr>
<tr>
<td>Barley – CSG</td>
<td>Turnip – CSB</td>
<td>Persian Clover - CSB</td>
</tr>
<tr>
<td>Winter Triticale – CSG</td>
<td>Lentil – CSB</td>
<td>Hairy Vetch - CSB</td>
</tr>
<tr>
<td>Forage Winter Wheat - CSG</td>
<td>Sweet Clover – CSB</td>
<td>Winter Pea - CSB</td>
</tr>
<tr>
<td>Rye - CSG</td>
<td>Phacelia – CSB</td>
<td>Collards - CSB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hybrid Pearl Millet – WSG</th>
<th>Sugarbeet – WSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>German Millet – WSG</td>
<td>Cowpea – WSB</td>
</tr>
<tr>
<td>Sorghum/Sudangrass – WSG</td>
<td>Soybean – WSB</td>
</tr>
<tr>
<td>Brown Millet – WSG</td>
<td>Sunn Hemp – WSB</td>
</tr>
<tr>
<td>Egyptian Wheat – WSG</td>
<td>Ethiopian Cabbage – WSB</td>
</tr>
<tr>
<td>Teff – WSG</td>
<td>Safflower – WSB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fava Bean – WSB</th>
<th>Mung Bean – WSB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- We Grow Cash Crops on 90% of Our Cropland Acres Every Year.
- On Those Acres We Also Grow a Cover Crop Either Before, Along With or After the Cash Crop.
- The Other 10% Is a Full Season Cover Crop.
A Biological Primer is a diverse cover crop mix that enhances the life and function of the soil.
Resource Concerns

- Provide crop diversity
- Provide soil surface armor
- Build soil aggregates
- Improve the water cycle
- Integrated Pest Management
- Build soil organic matter
- Nutrient cycling
- Enhance pollinators
- Adjust carbon/nitrogen ratios
- Wildlife winter food & shelter
- Livestock integration
### Filling the Production Gaps

<table>
<thead>
<tr>
<th>January</th>
<th>February</th>
<th>March</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="calendar-january.png" alt="Calendar for January" /></td>
<td><img src="calendar-february.png" alt="Calendar for February" /></td>
<td><img src="calendar-march.png" alt="Calendar for March" /></td>
</tr>
<tr>
<td>April</td>
<td>May</td>
<td>June</td>
</tr>
<tr>
<td><img src="calendar-april.png" alt="Calendar for April" /></td>
<td><img src="calendar-may.png" alt="Calendar for May" /></td>
<td><img src="calendar-june.png" alt="Calendar for June" /></td>
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<tr>
<td>July</td>
<td>August</td>
<td>September</td>
</tr>
<tr>
<td><img src="calendar-july.png" alt="Calendar for July" /></td>
<td><img src="calendar-august.png" alt="Calendar for August" /></td>
<td><img src="calendar-september.png" alt="Calendar for September" /></td>
</tr>
<tr>
<td>October</td>
<td>November</td>
<td>December</td>
</tr>
<tr>
<td><img src="calendar-october.png" alt="Calendar for October" /></td>
<td><img src="calendar-november.png" alt="Calendar for November" /></td>
<td><img src="calendar-december.png" alt="Calendar for December" /></td>
</tr>
</tbody>
</table>
I question the rational?
½” of rainfall cannot infiltrate
Adequate Infiltration: 13.6” in 22 Hours
Pore Spaces Are Essential For Biology And Water Infiltration
Brown’s Ranch Infiltration

1991
½”/Hour

2015
15”/Hour

30 Fold Increase!

Source: NRCS
How much more could you produce if you had the water?

- It’s not how much rainfall you get!
- It’s how much can infiltrate into your soils.
- And be stored there via Organic Matter!
Creating a Water Mecca

- 1% OM in the top 6” of soil can hold 27,000 gallons of water!
Web Soil Survey
1993
- Ranch avg. 1.9% OM
- $1.9 \times 20,000 = 38,000$ gallons/acre
- $38,000 \times 5,000$ acres = 190,000,000 total gallons

2013
- Ranch avg. 7% OM
- $7 \times 20,000 = 140,000$ gallons/acre
- $140,000 \times 5,000$ acres = 700,000,000 total gallons
## Organic Matter/WHC

<table>
<thead>
<tr>
<th>Percent SOM</th>
<th>Sand</th>
<th>Silt Loam</th>
<th>Silty Clay Loam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.0</td>
<td>1.9</td>
<td>1.4</td>
</tr>
<tr>
<td>2</td>
<td>1.4</td>
<td>2.4</td>
<td>1.8</td>
</tr>
<tr>
<td>3</td>
<td>1.7</td>
<td>2.9</td>
<td>2.2</td>
</tr>
<tr>
<td>4</td>
<td>2.1</td>
<td>3.5</td>
<td>2.6</td>
</tr>
<tr>
<td>5</td>
<td>2.5</td>
<td>4.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Berman Hudson  
Journal Soil and Water Conservation 49(2) 189-194  
March – April 1994  
Summarized by:  
Dr. Mark Liebig, ARS, Mandan, ND  
Hal Weiser, Soil Scientist, NRCS, Bismarck, ND
Fall Seeded Biennials
Mob Grazing High Carbon Biennials
Carbon!
3 Years Later-New Topsoil
Seeding Into Cover Crop Residue 7/12
Armor on the Soil
Cover Crop Seed
Diversity

- Sunflower
- Sorghum/Sudangras
- German Millet
- Soybean
- Cowpea
- Kale
- Radish
- Turnip
- Sunn Hemp
- Safflower
- Buckwheat
- Fava Bean
- Persian Clover
- Berseem Clover
- Hairy Vetch
- Hybrid Pearl Millet
- Crimson Clover
- White Millet
- Oats
- Flax
- It All Begins With Photosynthesis!
Feeding the Whole
Insects
Phacelia and a Native Pollinator
Lady Beetles (Predators)
1,700 beneficial insect species for every 1 pest specie!
We Have Not Used A Pesticide Since Before The Turn Of The Century With The Exception Of Treated Seed Corn And That Was Discontinued In 2010. No Need To As The Predator Insects Take Care Of The Pests For Us!
The Reason Producers Have Pest Problems Is Because Of A Lack Of DIVERSITY!

(No Home For The Predators)
5) Animal Impact
Opportunity To Integrate
Grass Finishing on a Warm Season Mix
Converting Cover Crop to Dollars
Allow Your Livestock To Do What They Do Best!
1/3 for the critters above ground,
2/3 for those below ground
Planting Into Cover Crop Residue
No-Till Planting Through Heavy Residue
Brown’s Ranch
Same Field

June 16, 2009

July 1, 2009
Rapid residue decomposition
Healthy!
|
---|---|---|---|---|
**Plant Type:** Corntable Cell的内容 | **Stage:** Tassel | **Result** | **Deficient** | **Low** | **Sufficient** | **High** |
---|---|---|---|---|---|---|
Nitrogen, % N | 3.52 | | | | | |
Phosphorus, % P | 1.75 | | | | | |
Potassium, % K | 2.60 | | | | | |
Calcium, % Ca | 0.44 | | | | | |
Magnesium, % Mg | 0.26 | | | | | |
Sulfur, % S | 0.26 | | | | | |
Zinc, ppm Zn | 31 | | | | | |
Iron, ppm Fe | 202 | | | | | |
Manganese, ppm Mn | 62 | | | | | |
Copper, ppm Cu | 12.1 | | | | | |
Boron, ppm B | 17.6 | | | | | |
142 bu./acre
Our Management Has To Allow Our Soil To Live!
Soil Organic Matter is the “House” microbes live in, Water Extractable Organic Carbon is the “Food” they eat.

2% SOM, 12,000 ppm C

100-300 ppm C from water extract = microbial food
Dr. Rick Haney

Rick Haney
Soil Scientist
USDA – ARS
Grassland, Soil & Water Research Laboratory
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Temple, TX  76502
(254) 770-6503
rick.haney@ars.usda.gov
2012 Corn

- Income/Acre: 142bu./acre @ 6.98/bu. = $991.16/ac
- Expenses
  - Seed $61.66
  - Herbicide $12.50
  - Crop Insurance $17.94
  - Planting $18.00
  - Combining $22.00
  - Trucking $28.40
  - Land Cost $45.00

$205.50

Return to labor and management $785.66/acre

Cost per bushel $1.44
Soil Organic Matter

Upward Trend

1993  1.7 to 1.9%
Present  5.3 to 6.1%
Assumptions: 2,000,000 pounds of soil in top 6”.  
1% OM = 20,000 pounds.  

**Nutrients:**  
Nitrogen: 1000# $ .56/lb. N = $560  
Phosphorus: 100# $ .67/lb. P = $67  
Potassium: 100# $ .54/lb. K = $54  
Sulfur: 100# $ .50/lb. S = $50  
Carbon: 10000# $4/T = $20  

Value of 1% SOM nutrients/acre = $751  
5% SOM = $3,755
SOIL CARBON is the key driver for the nutritional status of plants – and therefore the mineral density in animals and people.

SOIL CARBON is the key driver for soil moisture holding capacity (frequently the most limiting factor for production).

Soil carbon is the key driver for farm profit.
Brown’s Ranch

Topsoil Depth

- 3”
- 14”

Plot including high diversity of plants, livestock and carbon. High nutrient densities

2013

- 4.2% OM
- Multi-species Covers (Extended Growing Season)

11.1% OM

2013

- 6.1% OM
- Multi-species Covers/Livestock Integration

1993

- No-till
- 1.7% OM

1995

- Cash Crop Diversity
- 2.0% OM

1997

- Cover Crop Integration
- 3.1% OM
Soil-Water-Sunlight

Cash Crops

Cover Crops

Perennials

Vegetables

Grain

Pork

Sheep

Poultry

Cow/Calf

Wildlife

Screenings

Broilers

Dogs

Bees

Breeding Stock

Layers

GF Beef

Retail

Retail Lvstk. Feed

Broilers

Cover Crop Seed

Retail Broilers

Selling Puppies

Retail

Retail Pork

All Nat. Beef

Retail Eggs

All Nat. Grain

Retail Lamb

Pet Food

Retail Beef

Deer

Hunting

Eco-Tourism

Value-Added

Regenerating Landscapes
We are now profitable EVERY year, regardless of price!
We Enjoy Signing The Back Of The Checks –

NOT THE FRONT!
We Do This Without Any Government Subsidies Of Crop Insurance, Eqip CSP Or Any Other Program!
One’s Ability To Be Successful With Regenerative Agriculture Is Directly Related To One’s Understanding Of How Soil Functions!
All About A Healthy Soil Ecosystem!
Contact Information

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- Paul Brown (Cell): 701 527-5573
  - E-mail: paul_brown_24@hotmail.com

- Join Brown’s Ranch on Facebook

- Website: www.brownsranch.us