



“Winter Series Meetings” Crop Diversity, Cover Crops and Beef Production

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► Goals:

- Briefly identify the value soil organic matter (SOM) and role of cover crops in the semi-arid region of western ND and southeastern Montana
- Discuss a couple models for beef production within a multi-crop rotation that includes cover crops
- Production economics

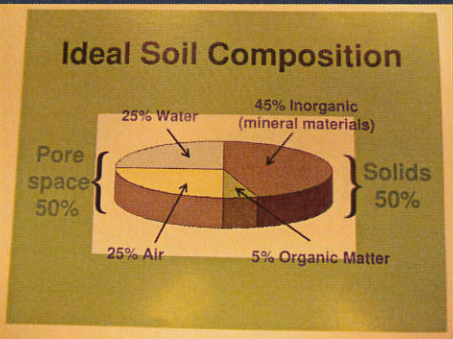


Healthy Soil Performs Five Vital Functions:

- **Regulates water** - Soil helps control where rain, snowmelt, and irrigation water goes. Water and dissolved solutes flow over the land or into and through the soil.
- **Sustains plant and animal life** - The diversity and productivity of living things depends on soil.
- **Filters potential pollutants** - The minerals and microbes in soil are responsible for filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials, including industrial and municipal by-products and atmospheric deposits.
- **Cycles nutrients** - Carbon, nitrogen, phosphorus, and many other nutrients are stored, transformed, and cycled in the soil.
- **Supports structures** - Buildings need stable soil for support, and archeological treasures associated with human habitation are protected in soils.



Ideal Soil Composition




Basic differences among land systems




Soil Organic Matter Characteristics

- Density of SOM is less than soil - Has more space for air and water
- Every pound of SOM can hold up to 18-20# of water
- SOM acts like a sponge!




Value of Organic Matter


- ▶ 1. Provides Nutrient Supply
 - ▶ Each Percent of Soil Organic Matter Releases:
 - ▶ 20-30 pounds of nitrogen
 - ▶ 4.5 -6.0 pounds of phosphorus
 - ▶ 2 to 3 pounds of sulfur
- ▶ 2. Water Holding Capacity
 - ▶ Stated another way, SOM will hold up to 90% of it's weight in water
- ▶ 3. Soil Structure Aggregation
 - ▶ SOM aids the increase of aggregation; water infiltration and holding capacity
- ▶ 4. 1-3% Increase in SOM can reduce soil erosion by 20 - 30%, due to infiltration







▶ Keeping the soil surface covered as much as is practical reduces evaporation and death of living organisms in the soil



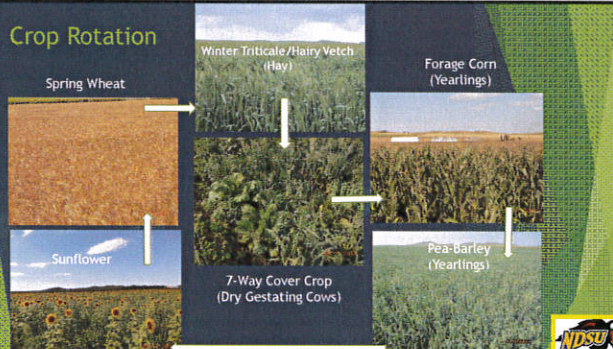

- 140 F Soil bacteria die
- 130 F 100% of moisture is lost through evaporation and transpiration
- 113 F Bacteria and other living organisms begin to die
- 100 F 15% of moisture is used for growth, 85% is lost through evaporation and Transpiration
- 70 F Most moisture used for crop growth



Connecting Crop Rotation and Cover Crops with Beef Production







Crop Rotation

Cover Crop Blend and Cost

Crops	#/Acre	\$/#	Cost/Ac
Sunflower	2	4.50	9.00
Everleaf Oat - 114	20	0.37	7.40
Flex Winter Pea	20	0.40	8.00
Hairy Vetch	5	1.75	8.75
Winfred Forage Rape	1	3.50	3.50
Ethiopian Cabbage	1	4.00	4.00
Hunter Leaf Turnip	1	3.50	3.50
Cost/Ac			44.15





Crop Production Change

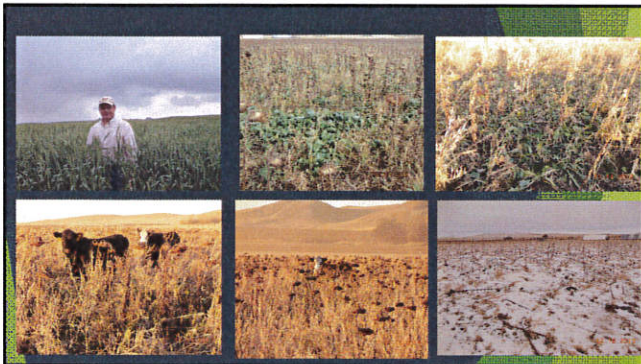
	SpW-C Bu/A	SpW-R Bu/A	Wtr Trit/ H-Vetch T/A (Hay)	Cover Crop T/A	Forage Corn Bu/A	Forage Corn T/A	Pea-Bly T/A	Sunflower Lbs/A
Fert: # N	70 #	0 #	0 #	0 #	70 #	70 #	0 #	0 #
2011	28	30.1	2.71	No Germ	15	1.65	Pea 19 Bu	891
2012	55.7	45.1	1.59	4.25	55.3	3.66	3.11	1590
2013	46.8	39.2	2.50	3.25	88.0	4.59	4.53	1959
Average	43.5	38.1	2.27	3.75	52.8	3.3	3.82	1480



Cover Crop Procedure

Double Crop After Spring Wheat (Rotation) Harvest:

	Winter Triticale/Hairy Vetch	7-Way Cover Crop
Seeding Date	August 23, 2012	June 22, 2013
Seed #/A	Wtr/Trit - 80#; H-Vetch - 24#	7-Way Blend - 49#
Seeding Depth	1.5 in	1.0 in
Equipment	1590 JD No-Till Drill	1590 JD No-Till Drill
Use:	Hay	Grazing
Innoculant	Nitra Stix C	Cell Tech Peat/Pea&Lentil
Fertilizer N, P, K, S, Z (12-40-0-10-1)	18#/A Potash 42#/A	None

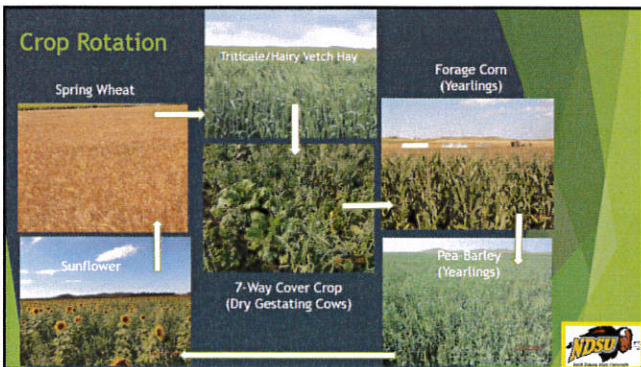


Cover Crop Carrying Capacity & Cost

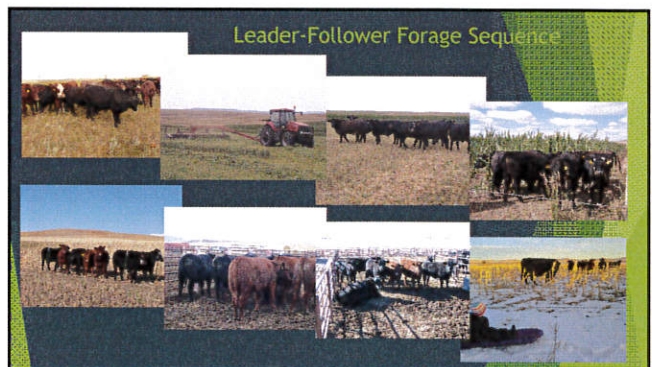
	Cover Crop	Wtr Triticale/H-Vetch Hay
Cow Wt (AUM = 1.25)	1450	
A/Cow/Month	0.62	
Cost/A (Owned Land), \$	56.15	
Cost/Cow/Month, \$	30.18	
Hay Cost/A (Owned Land)*, \$		113.12
Hay Value: \$50/T, 2.27 T/A, \$		113.15

* Hairy Vetch Seed = \$2.05/#
24#/A = \$49/A

Crop Rotation

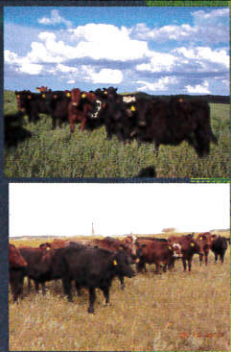


Leader-Follower Forage Sequence



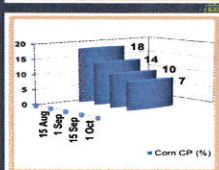
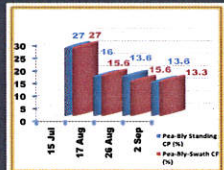
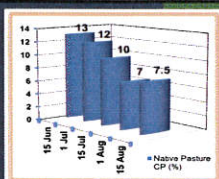
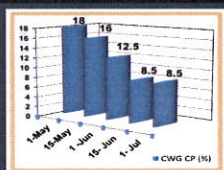
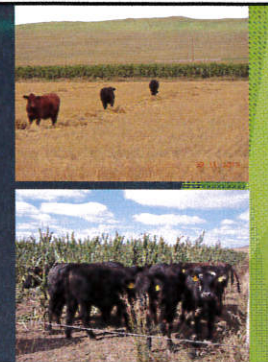
Grazing Sequence Perennial Pastures

- ▶ Early May
 - ▶ Crested Wheatgrass
 - ▶ (39 Days)
- ▶ Mid-June
 - ▶ Native Range
 - ▶ (61 Days)



Grazing Sequence (Annual Forage)

- ▶ Mid-August
 - ▶ Pea-barley
 - ▶ Protein bridge
 - ▶ (27 Days)
- ▶ Mid-September
 - ▶ Unharvested corn
 - ▶ (55-77 Days)



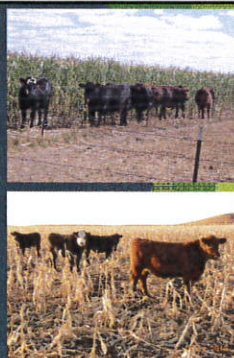
Grazing and Annual Forage Effect on Muscling and Intramuscular Fat Deposition

	PST	Ann
Rib-eye Area, (Sq. In.)	8.66	10.86
Percent Intramuscular Fat, %	3.22	4.13
Feedlot DOF, days	91	66



Corn: Steer Performance & Economics

Steer Gain, lb	215
Steer Grazing Days	77
Beef Value @ \$1.30	279.23
Beef Value/A (\$2233.83/4.3 A)	519.50
Corn Value/A (\$3.70, 88 Bu)	325.23
Farming Cost/A	164.00
Net Beef Value	355.50
Net Corn Value	161.23
Beef Value Increase	194.27
Beef: Corn Equivalent (\$/Bu)	5.91

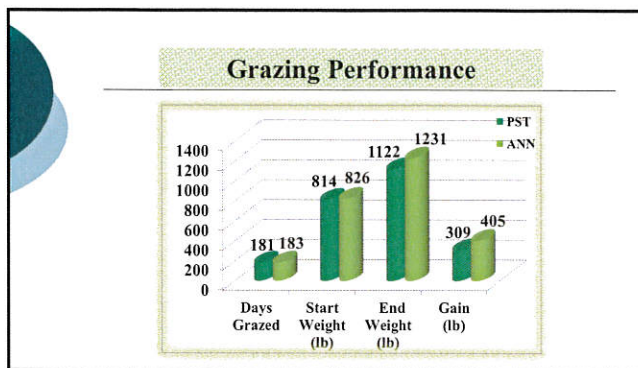


Corn: Cow Residue Grazing

Residue:	
Grazing Days	29
A/Cow/Day	0.018534
A/Cow/Mth	0.56
A/100 Cows/Mth	56
Hay Saved:	
1450 #	40#/Day, 1,160 #
Cow @ 3% of BW	
Hay @ \$50/T (1160/2000 = 58%)	Hay Savings: \$29/Cow



What is the outcome when the steers are retained and finished?



Perennial and Annual Forage Net Return

Better gain from the continuous availability of higher quality forage results in a greater forage investment return.

	Gain/Steer, Lb	Forage Cost/Steer	Gross Return/Steer	Net Return/Steer
Pasture Only Steers:	309	\$157	\$371	\$214
Pasture + Ann. Forage:	405	\$238	\$486	\$248

Income and Expense

	PST	ANN	FLT
Steer Cost, \$	1042	1052	1034
Wintering Cost, \$	60	60	60
Grazing Cost, \$			
Perennial Grass, \$	157	94	
Field Pea-Barley, \$		50	
Unharvested Corn, \$		94	
Feedlot Cost, \$	381	276	578
Transport, Health & Brand, \$	108	104	123
Total System Expense, \$	1749	1730	1796
Carcass Value, \$	1718	1739	1497

