FORAGE SUITABILITY GROUP
Clayey Subsoil

FSG No.: **G066XY210NE**
Major Land Resource Area: 66 - Dakota-Nebraska Eroded Tableland

Physiographic Features
The soils in this group are found on upland slopes and terraces.

	Minimum	Maximum
Elevation (feet):	1970	2950
Slope (percent):	0	11
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	High	Very high

Climatic Features
This group occurs in a mid-continental climate characterized by wide seasonal temperature and precipitation fluctuations and extremes.

Annual precipitation varies widely from year to year in MLRA 66. Average annual precipitation for all climate stations listed below is about 21 inches. About 77 percent of the annual precipitation occurs during the months of April through September. On average there are about 29 days with greater than .1 inches of precipitation during that same time period. Precipitation is less than needed for optimum forage production and is the single largest factor limiting production from this group on non-irrigated lands.

Average annual snowfall ranges from 33 inches at O'Neill, NE to 43 inches at Harrington, SD. Snow cover at depths greater than 1 inch range from 43 days at Springview, NE to 64 days at Harrington, SD.

Average July temperatures across the MLRA are about 74 degrees F., and average January temperatures are about 20 degrees F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -38 at Harrington and a high of 110 both recorded at Mission, Springview, and O'Neill. The MLRA lies in USDA Plant Hardiness Zones 4b and 5a.

The climate data listed in the tables below represent high and low ranges and averages for the climate stations and dates listed. For additional climate data access the National Water and Climate Center at www.wcc.nrcs.usda.gov

	From	To
Freeze-free period (28 deg)(days): **(9 years in 10 at least)**	120	150
Last Killing Freeze in Spring (28 deg): **(1 year in 10 later than)**	May 23	May 08
Last Frost in Spring (32 deg): **(1 year in 10 later than)**	Jun 01	May 20
First Frost in Fall (32 deg): **(1 year in 10 earlier than)**	Sep 07	Sep 17

	From	To
First Killing Freeze in Fall (28 deg): (1 year in 10 earlier than)	Sep 11	Sep 26
Length of Growing Season (32 deg)(days): (9 years in 10 at least)	104	130
Growing Degree Days (40 deg):	4580	5148
Growing Degree Days (50 deg):	2615	3038
Annual Minimum Temperature:	-25	-15
Mean annual precipitation (inches):	18	25

Monthly precipitation (inches) and temperature (F):

2 years in 10:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precip. Less Than	0.08	0.11	0.33	0.62	1.70	1.51	1.54	0.91	0.65	0.53	0.15	0.16
Precip. More Than	0.54	1.24	2.70	3.97	5.70	5.65	4.96	3.94	4.34	2.64	1.49	0.85
Monthly Average:	0.34	0.49	1.42	2.16	3.40	3.46	3.07	2.22	2.15	1.32	0.71	0.52
Temp. Min.	7.1	12.4	20.8	31.7	42.4	52.3	58.5	55.8	45.2	33.5	20.7	10.0
Temp. Max.	30.3	36.2	46.8	62.1	72.9	82.8	88.7	86.5	76.2	64.5	46.4	33.3
Temp. Avg.	19.7	24.8	34.1	47.1	57.9	68.0	74.2	72.1	61.8	49.8	34.7	22.9

Climate Station	Location	From	To
SD3574	Harrington SD	1961	1990
SD5620	Mission SD	1966	1990
SD5638	Mission SD	1961	1990
SD0778	Bonesteel SD	1961	1990
NE8090	Springview NE	1961	1990
NE6290	O'Neill NE	1961	1990

Soil Interpretations

The clayey subsoil group consists of well drained, moderately deep to very deep, medium to fine textured soils formed from or overlying materials weathered from shale. Available water capacity ranges from low to high, and permeability is mostly slow and very slow.

Some of these soils have medium surface textures, but all have clayey subsoils.

Drainage Class:	Well drained	To	Well drained
Permeability Class: (0 - 40 inches)	Very slow	To	Slow
Frost Action Class:	Low	To	Moderate

	Minimum	Maximum
Depth:	20	
Surface Fragments >3" (% Cover):	0	3
Organic Matter (percent): (surface layer)	1.0	4.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	0	2
Sodium Absorption Ratio: (0 - 12 inches)	0	2
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.6	8.4
Available Water Capacity (inches): (0 - 60 inches)	3	11
Calcium Carbonate Equivalent (percent): (0 - 12 inches)	0	10

Soil Component List **(Some phases of these soils may also occur in other FSGs)**

Boyd
Labu
Longford
Verdel
Verdigre

Adapted Species List

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many of those species can be accessed on the web at http://plants.usda.gov/.

Cool Season Grasses	Symbol	Dry	Irrig
Crested wheatgrass	AGCR	G	NS
Green needlegrass	NAVI4	G	NS
Intermediate wheatgrass	THIN6	G	G
Meadow bromegrass	BRBI2	G	G
Orchardgrass	DAGL	F	G
Pubescent wheatgrass	THIN6	G	G
Russian wildrye	PSJU3	G	NS
Smooth bromegrass	BRINI2	G	G
Tall wheatgrass	THPO7	F	NS
Western wheatgrass	PASM	G	NS

Warm Season Grasses	Symbol	Dry	Irrig
Big bluestem	ANGE	G	G
Indiangrass	SONU2	G	G
Little bluestem	SCSC	G	NS
Sideoats grama	BOCU	G	NS
Switchgrass	PAVIV	G	G
Legumes	**Symbol**	**Dry**	**Irrig**
Alfalfa	MESA	G	G
Birdsfoot trefoil	LOCO6	F	G
Canada milkvetch	ASCAC6	F	NS
Cicer milkvetch	ASCI4	G	F
Illinois bundleflower	DEIL	F	NS
Purple prairieclover	DAPUP	F	NS
Red clover	TRPR2	F	G
White prairieclover	DACAC	F	NS

G - Good adaptation for forage production on this group of soils in this MLRA
F - Fair adaptation but will not produce at its highest potential
NS - Species is not adapted to the site and should not be planted

Production Estimates

Production estimates listed here should only be used for making general management recommendations. On site production information should always be used for making detailed planning and management recommendations.

The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields, and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

The production estimates listed below represent total annual above ground plant production on an air-dry-matter basis. Estimates of hay and grazing yields can be calculated from these numbers by multiplying them by a harvest efficiency. A 70 percent harvest efficiency is commonly used when converting to hay yields. Pasture harvest efficiency is highly dependent on the grazing management system applied, ranging from 25 to 50 percent.

Forage Crop	Dryland Management Intensity High (lbs/ac)	Dryland Management Intensity Low (lbs/ac)	Irrigated Management Intensity High (lbs/ac)	Irrigated Management Intensity Low (lbs/ac)
Alfalfa	6900	3100		
Alfalfa/Intermediate wheatgrass	6300	2600	14300	8600
Alfalfa/Smooth bromegrass	6300	2600	14300	8600
Big bluestem	6300	2900		
Intermediate wheatgrass	5700	2000	11400	6900
Smooth bromegrass	5100	2000	11400	6900
Switchgrass	6300	2900		

Forage Growth Curves

Growth curves estimate the seasonal distribution of growth of the various forage crops. They indicate when the forages may be available for grazing or mechanical harvest.

Growth Curve Number: SD0001
Growth Curve Name: Alfalfa
Growth Curve Description: Alfalfa, MLRAs 107, 102B, 63B, 66, 65

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	30	25	20	15	5	0	0	0

Growth Curve Number: SD0004
Growth Curve Name: Cool season grass
Growth Curve Description: Cool season grass, state wide

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	40	30	10	5	5	0	0	0

Growth Curve Number: SD0005
Growth Curve Name: Warm season grass
Growth Curve Description: Warm season grass, state wide

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	10	40	35	15	0	0	0	0

Growth Curve Number: SD0003
Growth Curve Name: Irrigated Alfalfa
Growth Curve Description: Irrigated Alfalfa, state wide

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	25	25	20	15	10	0	0	0

Soil Limitations

The primary limiting factor to these soils is their tight, slowly permeable nature. Because of their slow water intake runoff is increased causing the soils to be droughty. This will be especially apparent on those soils with lower available water holding capacity. On steeper slopes, water erosion is a potential problem during establishment, when renovating stands, and in thin established stands. Livestock trail erosion is a potential problem in established stands.

Management Interpretations

The impact on yields due to the tight, slowly permeable nature and droughtiness of these soils can be reduced by selecting species adapted to those soil conditions when establishing new stands or renovating stands. Including sod forming grass species in stands, especially on steeper slopes will reduce the potential for sheet and rill erosion. Incorporate erosion control practices during the establishment period. Properly locating facilitating practices such as fences, lanes, and water developments can help control livestock movement, reduce trailing perpendicular to steeper slopes, and evenly distribute grazing pressure.

FSG Documentation

Similar FSGs:

FSG ID	FSG Narrative
G066XY800N	Claypan soils have elevated salinity, sodicity, and/or alkalinity and are less productive.

Inventory Data References:

Agriculture Handbook 296-Land Resource Regions and Major Land Resource Areas
Natural Resources Conservation Service (NRCS) National Water and Climate Center data
USDA Plant Hardiness Zone Maps
National Soil Survey Information System (NASIS) for soil surveys in South Dakota and Nebraska counties in MLRA 66
South Dakota and Nebraska NRCS Field Office Technical Guides
NRCS National Range and Pasture Handbook
Various South Dakota and Nebraska Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production.

State Correlation:

This site has been correlated with the following states:
NE
SD

Forage Suitability Group Approval:

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Original Date:	4/4/02
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Approval Date:	