

# Perennial Grasses Managed as Stockpiled Forage



May 2018

A common practice in the Northern Great Plains is to harvest and store forage as hay for winter feeding. Another forage management practice is stockpiling forage for grazing during the winter months. Understanding the nutritive quality and forage attributes of warm and cool season stockpiled forages is important for meeting livestock nutritional requirements and potentially decreasing winter feed costs.

The Bismarck Plant Materials Center (PMC) evaluated yield and quality of selected warm and cool season grasses managed as stockpiled forage near Gann Valley, South Dakota. The grass plots were designed, established, and managed by Curt Knight, a local rancher with years of grassland experience. He also donated labor for clipping plot samples and funding to cover forage analysis costs.

In this trial, forage quality was assessed on unharvested plants allowed to grow for a full season, and on regrowth of plants harvested in June of each year. The June harvest period allowed adequate time for grass to accumulate biomass before the onset of dormancy at this location. Stockpiled forage will refer to both regrowth and full season growth. Forage yield was determined in December of 2014 and 2015 (See Table 2). Forage quality estimates of crude protein and total digestible nutrients were determined from samples collected in June, September, November/December and February/March 2013-2016, from regrowth and full season growth. To determine the suitability of stockpiled forage as a livestock feed, the dietary requirements of a 1200 lb beef cow served as the standard to assess forage quality. The trial was conducted on a Glenham-Java-Prosper loam soil with 1-2% slope. Average annual precipitation for this area in 2013-2016 is presented on Table 1.

This study provides producers with quantifiable forage data of cool and warm season grasses for winter grazed or stockpiled forage.

**Curt Knight, local rancher, clipping plot samples.**



## Summary

- Good to excellent grass stands were achieved using NRCS seeding specifications. This success supports the seeding recommendations for Conservation Practice 550 (Range Planting) in the NRCS Field Office Technical Guide.
- It is important to select species adapted to your site. Tall fescue and orchardgrass produced the highest forage quality. However, the lack of adapted cultivars or long-term sustainable stands of these species limits their use in the northern portion of the Great Plains. Consult with your local Natural Resources Conservation Service for a list of adapted species and cultivars.
- Productivity and quality differences were exhibited among the species. This would indicate that mixtures of compatible species could extend the grazing season. Such mixtures might include 'AC Saltlander', 'Rosana' western wheatgrass, 'Pierre' sideoats grama and 'Bad River' blue grama as illustrated in the forage quality graphs and tables on pages 4-8.
- Generally, forage quality of stockpiled regrowth was higher than full season growth for many of the species. Selection of species and periods of harvest should be factored into a full season grazing plan.
- Regrowth in a properly managed grazing system can provide high quality forage for winter grazing.
- Forage was mechanically clipped and not grazed. Long term grazing impacts to species longevity were not evaluated and are unknown.
- The forage quality measurements of the grasses included in this summary report should be used as general guidelines. Producers should test their own forages prior to feeding or grazing to determine actual quality.

North Dakota

Natural Resources Conservation Service

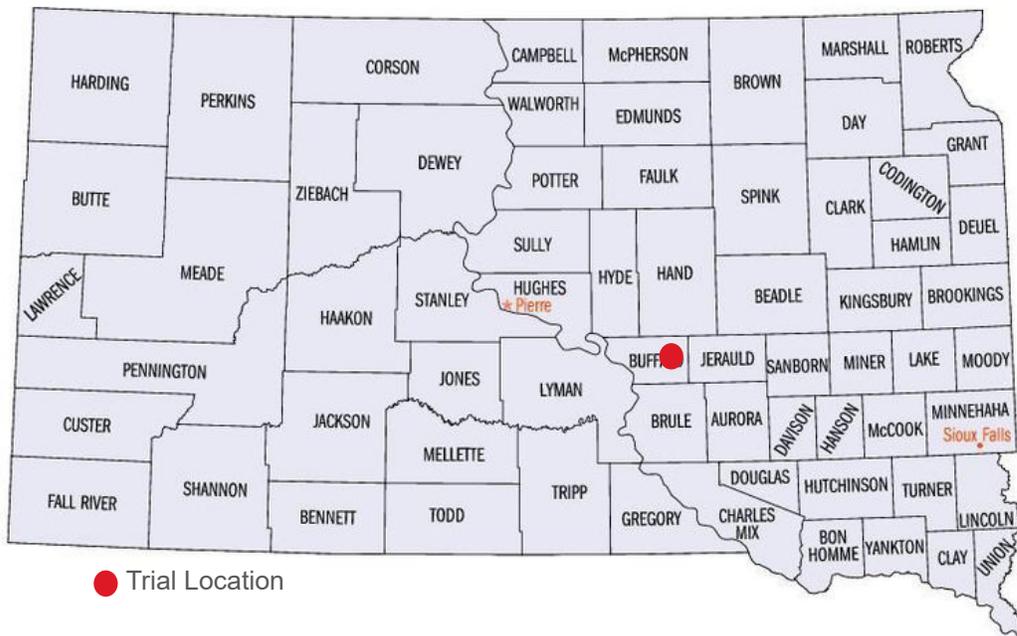


**Table 1. National Weather Service Average Monthly Precipitation for Gann Valley, SD for 2013-2016**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
2013	0.19	0.72	0.53	1.77	4.70	6.15	2.3	1.76	1.30	3.65	0.22	0.68	<b>24.06</b>
2014	0.07	0.46	0.14	2.48	1.11	3.35	1.53	4.47	0.58	0.21	0.62	0.54	<b>15.56</b>
2015	0.07	0.14	0.11	0.28	5.17	3.68	5.23	3.26	5.15	1.15	1.27	1.00	<b>26.51</b>
2016	0.17	0.42	0.55	4.96	3.55	1.84	1.54	4.34	1.57	1.02	0.72	0.77	<b>21.45</b>
4-Yr Avg	<b>0.13</b>	<b>0.44</b>	<b>0.33</b>	<b>2.37</b>	<b>3.63</b>	<b>3.76</b>	<b>2.67</b>	<b>3.46</b>	<b>2.15</b>	<b>1.51</b>	<b>0.71</b>	<b>0.75</b>	<b>21.90</b>
Long-term Avg	<b>0.28</b>	<b>0.39</b>	<b>1.18</b>	<b>2.01</b>	<b>3.03</b>	<b>3.19</b>	<b>2.6</b>	<b>2.2</b>	<b>1.81</b>	<b>1.65</b>	<b>0.71</b>	<b>0.39</b>	<b>21.35</b>

**Table 2. 2-year forage production of warm and cool season stockpiled forages**

Variety/Species	2014	2015	2 Yr. Avg.
<b>Cool Season</b>			
'Fleet' meadow brome	5856	4537	5197
'AC Saltlander' green wheatgrass	4867	2948	3908
'Bozoisky' Russian wildrye	4877	4557	4717
'Rosana' western wheatgrass	4287	3098	3693
Altai wildrye (variety unknown)	5607	8615	7111
'Paiute' orchardgrass	4367	6256	5312
'Teton' tall fescue	3158	7066	5112
<b>Warm Season</b>			
'Pierre' sideoats grama	6436	8005	7221
'Bad River' blue grama	4737	5067	4902



## FORAGE QUALITY TERMS:

**Crude Protein (CP)** - the total amount of protein, some of which is insoluble or non-degradable. Crude protein content is very different across feeds, but within a feed, higher protein is usually associated with higher quality. As plants mature, CP usually decreases.

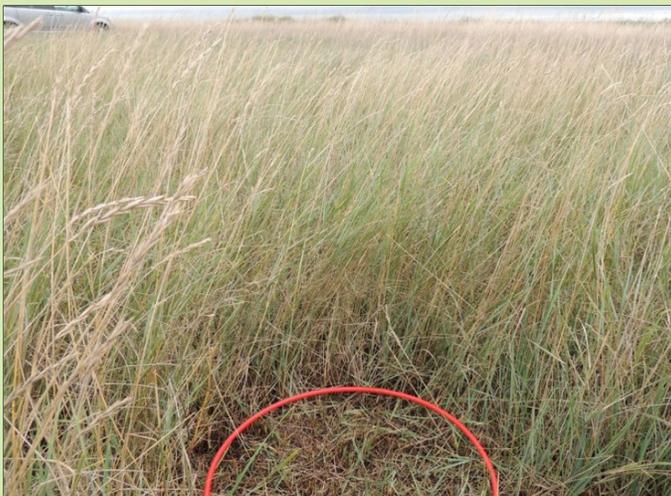
**Total Digestible Nutrients (TDN)** - is an indicator of the concentration of available energy and/or provides an estimate of digestible forage, expressed as caloric value. TDN is not measured directly but is calculated from ADF. TDN is used by many beef producers to balance rations, as it is an easily understood and accepted measure of quality. Higher values indicate higher quality. As plants mature, TDN usually decreases.

**Neutral Detergent Fiber (NDF)** -Higher quality forages typically have lower amounts of NDF. Generally, as NDF content of a feed increases, dry matter intake will decrease, while chewing activity will increase. Within a given feed, NDF is a good measure of feed quality and plant maturity. Neutral detergent fiber values for forages harvested at the boot stage of growth typically range between 45-65%. As plants mature, NDF usually increases.

**Acid Detergent Fiber (ADF)** - Relates to the ability of the animal to digest the forage. Many of the calculated values in forage reports use ADF values. Typically, as the amount of ADF increases, the digestibility of the forage decreases and animals will consume less forage. Like NDF, ADF is a good indicator of feed quality; higher values suggest lower-quality feed. Acid detergent fiber values for forages harvested at the boot stage of growth typically range between 35-48%. As plants mature, ADF usually increases.

**Relative Forage Quality (RFQ)** - A comparison index that reflects the performance that can be expected from cattle that consume the forage. The index uses fiber digestibility to estimate intake as well as TDN (energy) of the forage. It is suggested that forage with a RFQ of 115-130 will maintain a beef cow-calf pair without additional supplementation. A higher number indicates higher quality. As plants mature, RFQ usually decreases.

### ‘Rosana’ western wheatgrass



Full season growth of 'Rosana' western wheatgrass

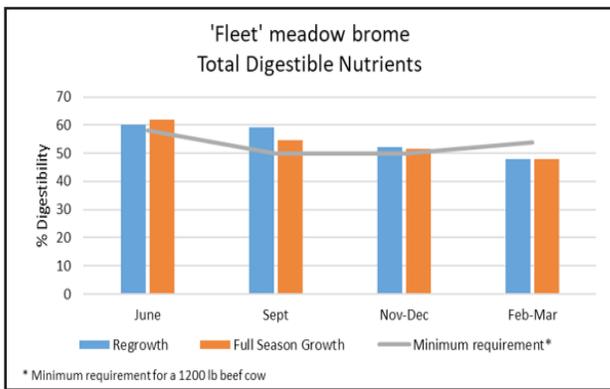
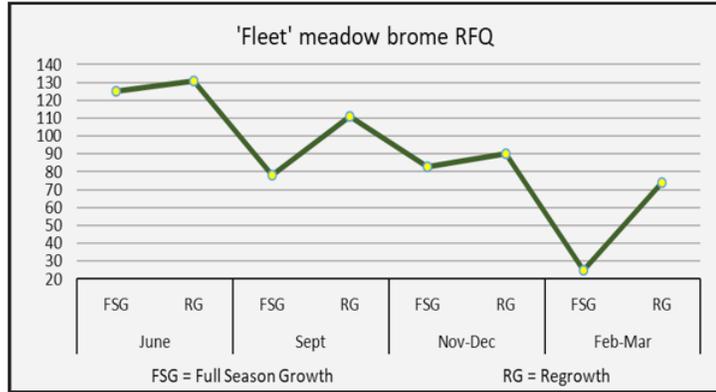
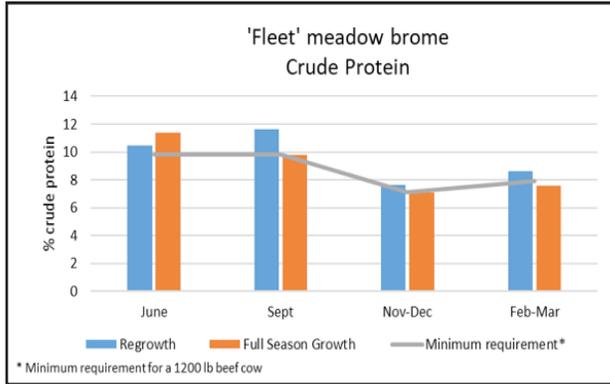


Early regrowth of 'Rosana' western wheatgrass



# Cool Season Forage Attributes

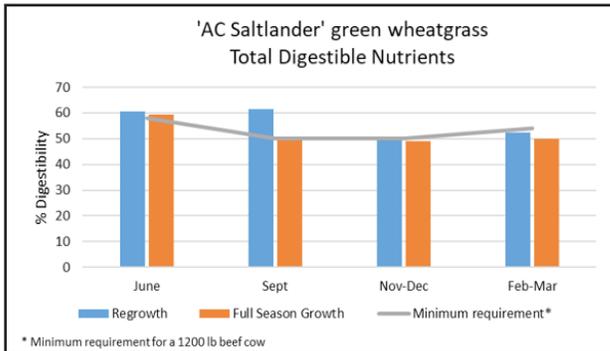
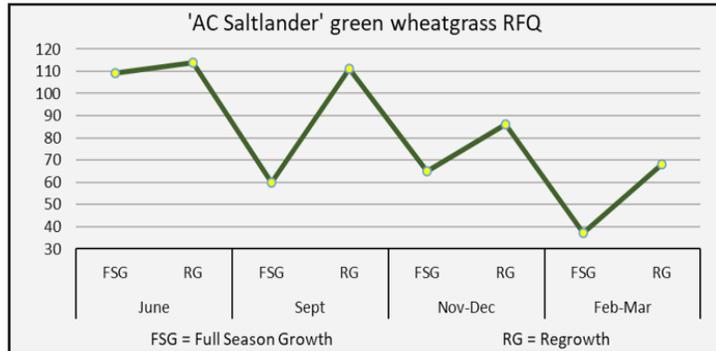
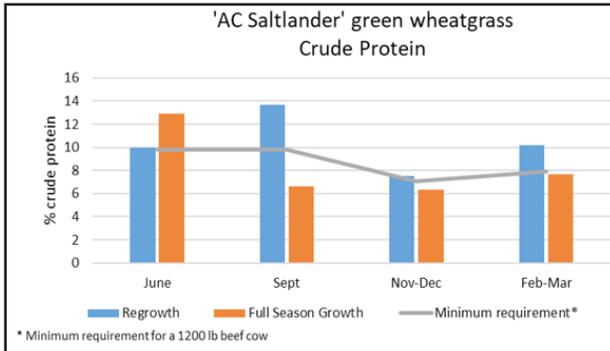
## 'Fleet' meadow brome



'Fleet' meadow brome	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	11	10	10	12	7	8	8	9
TDN (%)	62	60	54	59	52	51	48	53
ADF (%)	36	37	46	40	47	44	53	47
NDF (%)	60	60	69	62	70	66	78	47
RFQ	125	131	78	111	83	90	25	74

FSG = Full Season Growth RG = Regrowth

## 'AC Saltlander' green wheatgrass



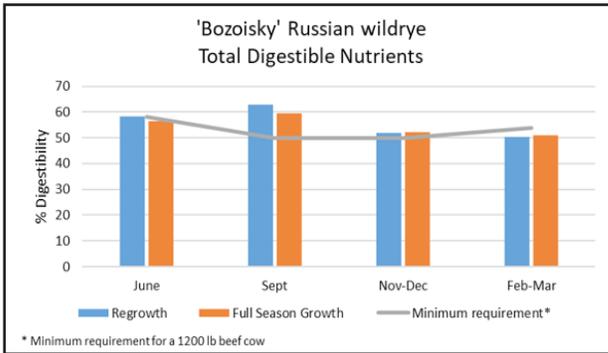
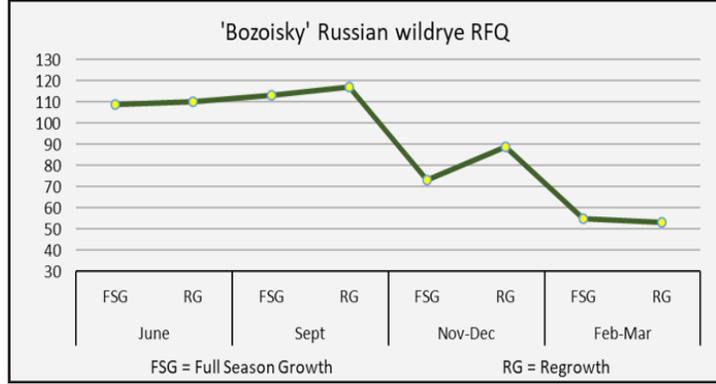
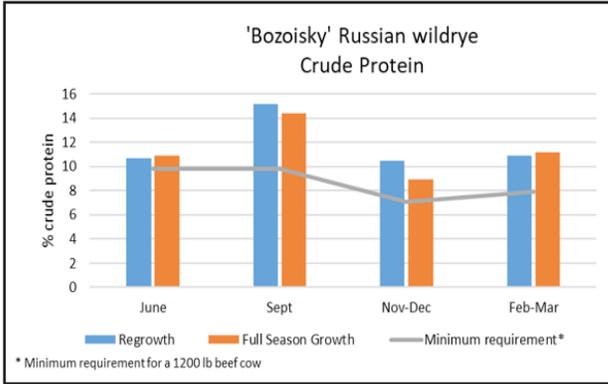
'AC Saltlander' green wheatgrass	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	13	10	7	14	6	8	8	10
TDN (%)	59	61	51	62	49	51	50	53
ADF (%)	38	37	47	38	46	45	49	43
NDF (%)	65	65	73	65	73	70	74	69
RFQ	109	114	60	111	65	86	37	68

FSG = Full Season Growth RG = Regrowth



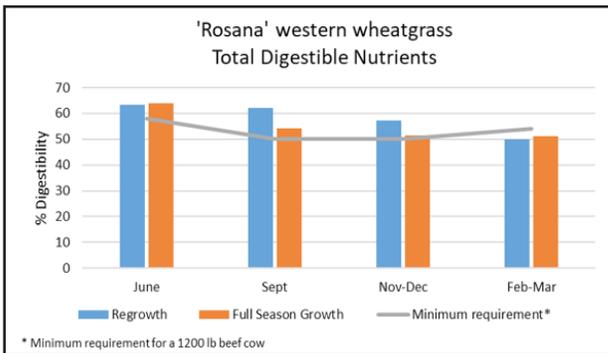
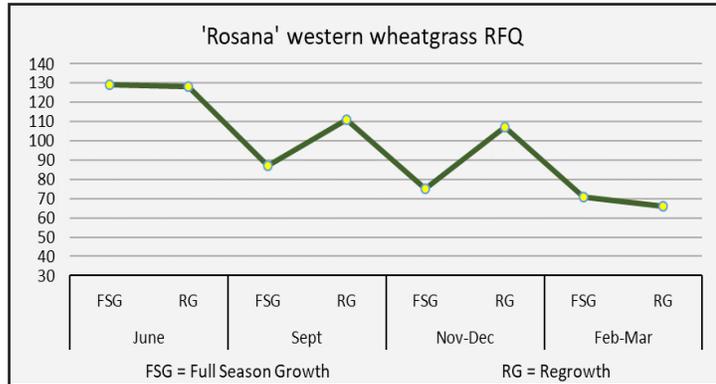
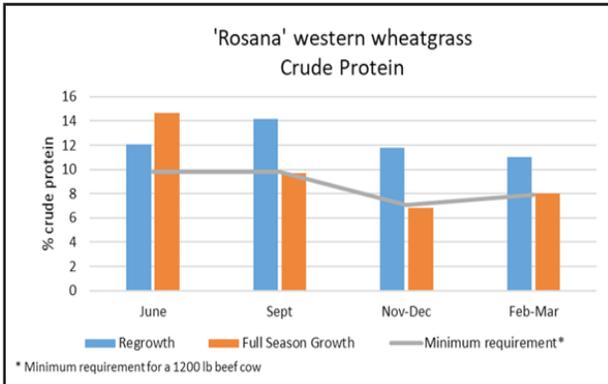
# Cool Season Forage Attributes Continued

## 'Bozoisky' Russian wildrye



'Bozoisky' Russian wildrye	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	11	11	14	15	9	10	11	11
TDN (%)	57	58	59	63	52	52	51	51
ADF (%)	40	39	37	36	45	41	42	45
NDF (%)	66	67	63	62	71	66	69	70
RFQ	109	110	113	117	73	89	55	53

## 'Rosana' western wheatgrass

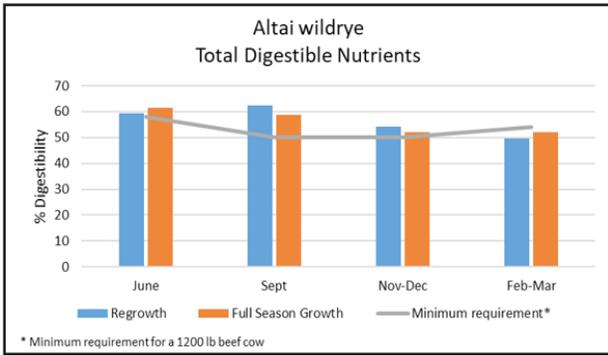
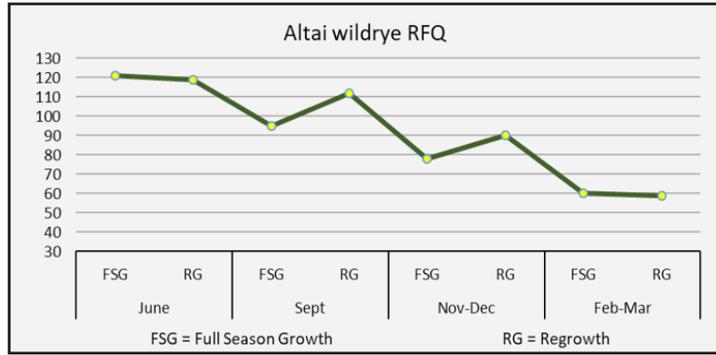
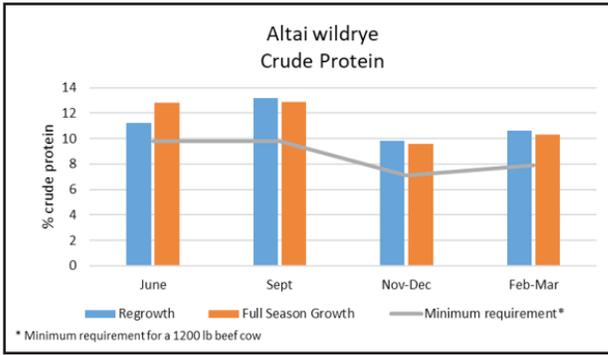


'Rosana' western wheatgrass	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	15	12	10	14	7	12	8	11
TDN (%)	64	63	54	62	52	57	52	50
ADF (%)	34	34	43	36	45	41	46	43
NDF (%)	60	63	68	64	73	65	73	69
RFQ	129	128	87	111	75	107	71	66



# Cool Season Forage Attributes Continued

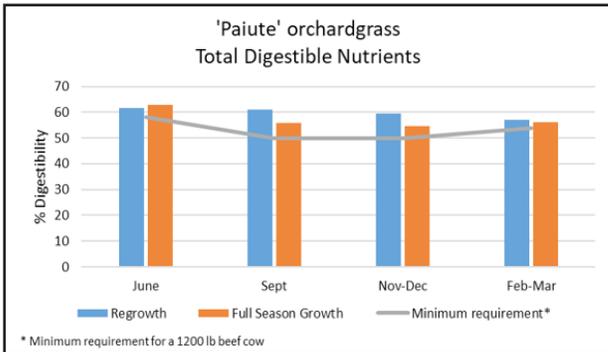
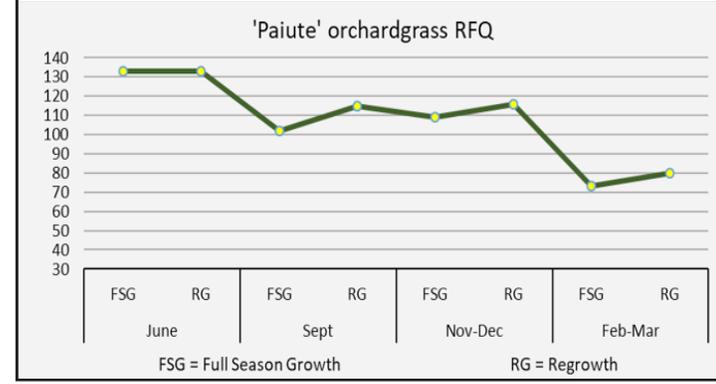
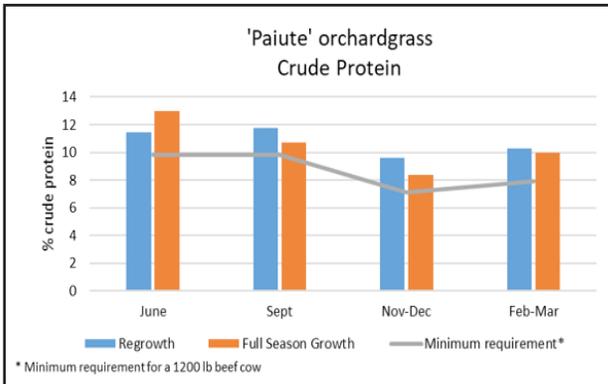
## Altai wildrye



Altai wildrye	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	13	11	13	13	10	10	10	11
TDN (%)	61	59	59	62	52	54	52	50
ADF (%)	36	38	40	37	44	41	45	44
NDF (%)	61	65	67	65	70	66	72	70
RFQ	121	119	95	112	78	90	60	59

FSG = Full Season Growth RG = Regrowth

## 'Paiute' orchardgrass



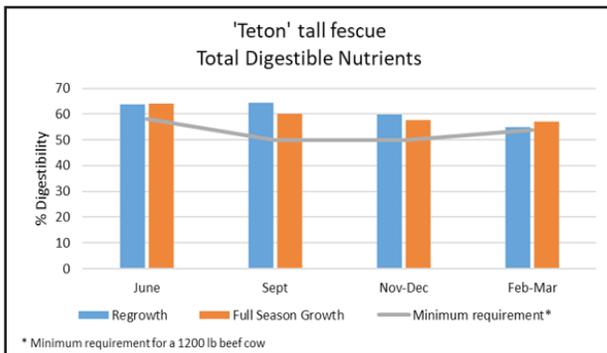
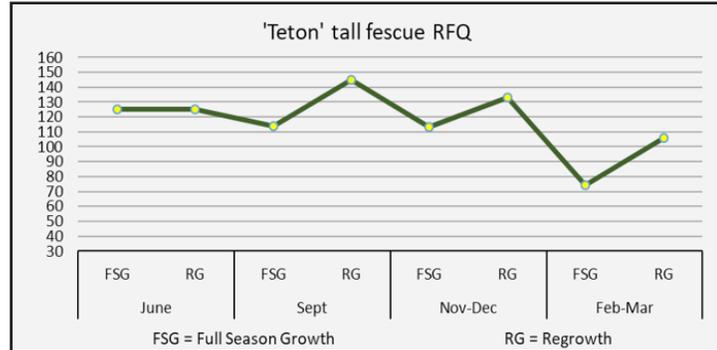
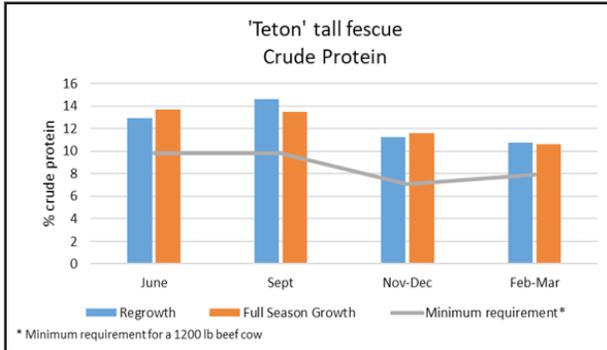
'Paiute' orchardgrass	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	13	11	11	12	8	10	10	10
TDN (%)	63	62	56	61	55	59	56	57
ADF (%)	35	36	42	39	42	36	43	41
NDF (%)	58	62	67	66	64	57	67	62
RFQ	133	133	102	115	109	116	73	80

FSG = Full Season Growth RG = Regrowth



## Cool Season Forage Attributes Continued

### 'Teton' tall fescue



'Teton' tall fescue	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	14	13	14	15	12	11	11	11
TDN (%)	64	64	60	64	58	60	57	55
ADF (%)	34	34	38	31	38	34	41	37
NDF (%)	54	56	61	56	57	57	65	63
RFQ	125	125	114	145	113	133	74	106

FSG = Full Season Growth      RG = Regrowth

## 'Teton' tall fescue



Early Regrowth of 'Teton' tall fescue

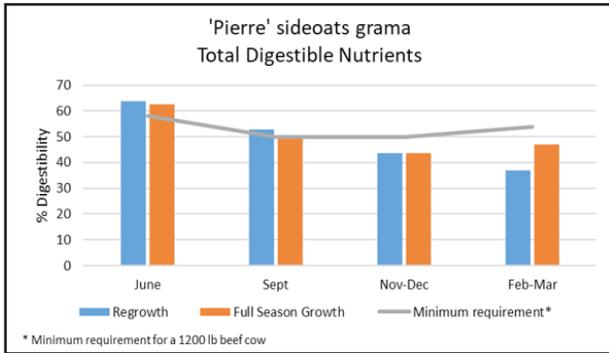
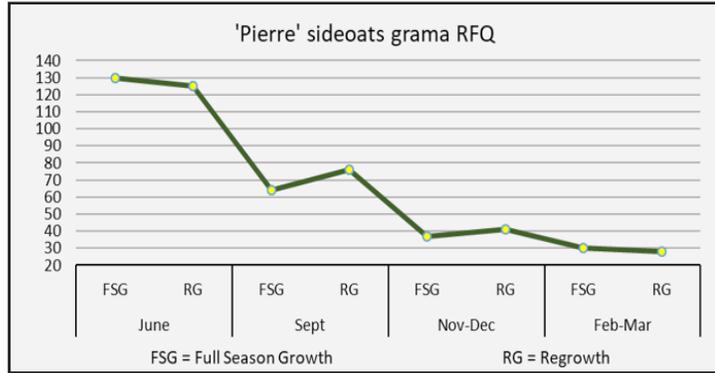
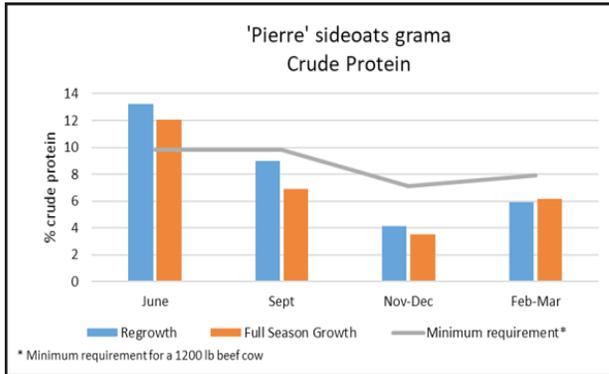


Full Season Growth of 'Teton' tall fescue



# Warm Season Forage Attributes

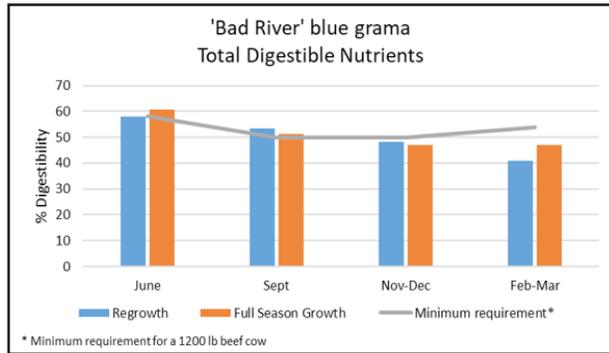
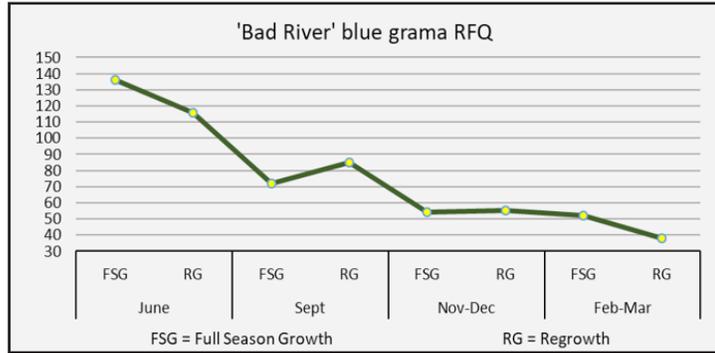
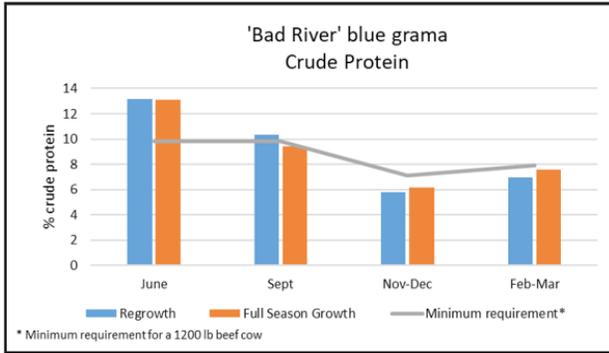
## 'Pierre' sideoats grama



'Pierre' sideoats grama	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	12	13	8	9	4	4	5	6
TDN (%)	63	64	50	53	44	44	47	37
ADF (%)	35	34	50	42	54	50	51	48
NDF (%)	62	63	76	68	75	74	75	75
RFQ	130	125	64	76	37	41	30	28

FSG = Full Season Growth RG = Regrowth

## 'Bad River' blue grama



Bad River blue grama	June		Sept		Nov-Dec		Feb-Mar	
	FSG	RG	FSG	RG	FSG	RG	FSG	RG
CP (%)	13	13	9	10	6	6	8	7
TDN (%)	61	58	51	53	47	48	47	41
ADF (%)	37	39	46	40	46	46	45	46
NDF (%)	61	63	71	69	72	73	74	73
RFQ	136	116	72	85	54	55	52	38

FSG = Full Season Growth RG = Regrowth

