

Appendix 1. Herbaceous forage quality by plant species, year, and season.

	Year	Early Summer		Mid Summer		Fall		Source
		%N	%Protein	%N	%Protein	%N	%Protein	
Bluebunch Wheatgrass								
burned	1989					1.02	6.4	Singer et al. 2003
	1990					0.74	4.6	Singer et al. 2003
unburned	1989					0.67	4.2	Singer et al. 2003
	1990					0.62	3.9	Singer et al. 2003
ungrazed	1990	2.81		1.65				Merrill et al. 1994
grazed	1990	2.46		2.38				Merrill et al. 1994
ungrazed	1990			1.10				Singer and Harter 1996
grazed	1990			1.30				Singer and Harter 1996
ungrazed	1986			1.23	7.70			Singer 1995
grazed	1986			1.44	9.00			Singer 1995
mean		2.64		1.52		0.76		
Idaho Fescue								
burned	1989					1.71	10.7	Singer et al. 2003
	1990					1.18	7.4	Singer et al. 2003
unburned	1989					1.87	11.7	Singer et al. 2003
	1990					0.94	5.9	Singer et al. 2003
Hayden Valley								
	2000	2.26	14.10		10.20	1.54	9.6	Olenicki and Irby 2003
ungrazed	1990	1.72		1.33				Merrill et al. 1994
grazed	1990	2.58		1.74				Merrill et al. 1994
ungrazed	1990			1.20				Singer and Harter 1996
grazed	1990			1.50				Singer and Harter 1996
ungrazed	1986			1.12	7.00			Singer 1995
grazed	1986			1.54	9.60			Singer 1995
mean		2.19		1.40		1.43		

Appendix 1 continued.

Appendix 1 continued

	Year	Early Summer		Mid Summer		Fall		Source
		%N	%Prot-ein	%N	%Prot-ein	%N	%Prot-ein	
Koeleria macrantha								
				1.4				Singer and Harter 1996
				1.3				Singer 1995
Poa								
burned	1989					2.75	17.2	Singer et al. 2003
	1990					1.23	7.7	Singer et al. 2003
unburned	1989					1.39	8.7	Singer et al. 2003
	1990					1.02	6.4	Singer et al. 2003
		1.89	11.80	1.06	6.60	1.90	11.9	Olenicki and Irby 2003
mean		1.90		1.06		1.66		
Carex								
		2.11	13.20	1.47	9.20	1.26	7.9	Olenicki and Irby 2003
Deschampsia								
		1.90	11.90	1.22	7.60	1.10	6.9	Olenicki and Irby 2003

Appendix 2. Dry matter digestibility (%) of forage species

Species	Year	Season			Source
		Early Summer	Mid Summer	Fall	
Bluebunch Wheatgrass					
Burned	1989			57	Singer et al. 2003
	1990			46	Singer et al. 2003
Unburned	1989			50	Singer et al. 2003
	1990			45	Singer et al. 2003
Ungrazed	1990		58		Singer and Harter
Grazed	1990		59		Singer and Harter
Ungrazed	1986		61		Singer 1995
Grazed	1986		61		Singer 1995
Mean			60	50	
Idaho Fescue					
Burned	1989			67	Singer et al. 2003
	1990			57	Singer et al. 2003
Unburned	1989			64	Singer et al. 2003
	1990			54	Singer et al. 2003
Hayden	2000	65	69	66	Olenicki and Irby 2003
Ungrazed	1990				Merrill et al. 1994
Grazed	1990				Merrill et al. 1994
Ungrazed	1990		59		Singer and Harter
Grazed	1990		61		Singer and Harter
Ungrazed	1986		60		Singer 1995
Grazed	1986		65		Singer 1995
mean		65	69	61	

Appendix 2. Continued.

Species	Year	Season			Source
		Early Summer	Mid Summer	Fall	
Poa					
Burned	1989			79	Singer et al. 2003
	1990			57	Singer et al. 2003
Unburned	1989			68	Singer et al. 2003
	1990			54	Singer et al. 2003
		77	60	63	Olenicki and Irby 2003
mean		77	60	64	
Koeleria macrantha					
			65		Singer and Harter 1996
			61		Singer 1995
Carex		70	69	65	Olenicki and Irby 2003
Deschampsia		67	69	63	Olenicki and Irby 2003

Appendix 3. Forage quality of herbaceous plants on the northern winter range (Singer et al. 2003).

	%N Mean	% Protein		DMD		
		Burned	Unburned	Mean	Burned	Unburned
<b>Forest</b>						
Lodgepole	0.88	5.7	5.3	41	38	44
Wet	0.29	3.6		19.5	39	
Douglas Fir-dry	0.73	4.5	4.6	44.5	43	46
Douglas Fir-moist	0.85	5.3	5.3	46	44	48
<b>Dry Grass</b>						
Xeric sage-grass	0.78	4.8	5	50.5	47	54
Dry sage-grass	0.83	5.2	5.2	52	52	52
Dry valley			3.4			58
<b>Moist Grass</b>						
Mesic sage-grass	0.73	4.7	4.4	47.5	48	47
<b>Wet</b>						
Deschampsia	0.72	4.3	4.7	46	46	46
Sedge	0.68	3.8	4.7	43	44	42

Appendix 4. Forage nitrogen concentration of plants on the northern elk winter range (Coughenour 1991b).

<b>Forage Type</b>	<b>Ungrazed</b>	<b>Grazed</b>	<b>Mean</b>
Grass -Live	1.3	1.9	1.6
Grass-Dead	0.75	0.85	0.8
Forb-Live	1.5	1.6	1.55
Forb-Dead	1.35	1.65	1.5
Dwarf Shrub Live	1.7	2.1	1.9
Dwarf Shrub-Deas	0.8	1.15	0.98

Appendix 5. Forage nitrogen concentration of plants on the northern elk winter range (Houston 1982).

<b>Forage Type</b>	<b>%Protein</b>	<b>%N</b>
Bluebunch Wheatgrass	3	0.48
Idaho Fescue	5	0.80
Sedge/ Hairgrass	4.6	0.74
Pinegrass/ Bluegrass	4.5	0.72
Aspen twigs	5.2	5.20
Rabbitbrush	9.2	1.47
Willows	6.6	1.06
Douglas Fir	6.1	0.98
Sagebrush leaf/twig	13.5	2.16
deciduous shrubs twigs	6.9	1.10
conifer twigs	6.7	1.07
Sagebrush twig	10.2	1.63

Appendix 6. Forage quality data for Yellowstone graminoid species from sources other than Yellowstone.

	Crude Protein %				% N				Source
	avg	max	min	dead	avg	max	min	dead	
<b>Wet/Moist</b>									
Carex aquatilis	7.19		5.4		1.15		0.86		FEIS
Carex spp.	16	17			2.56	2.72			Baker and Hobbs 1982
Calamagrostis rubescens		16	9.3			16.00	1.49		FEIS
Phlem pratense		13.3	5.7	2.9		2.13	0.91	0.46	FEIS
Deschampsia ceaspitosa		27	9	4.4		4.32	1.44	0.70	FEIS
	12	15	9		1.92	2.40	1.44		Baker and Hobbs 1982
<b>Dryland</b>									
Carex geyeri	5.6				0.90				Clark et al. 2001
Poa pratensis	4.5	16.6	9.5	3.3		16.60	1.52	0.53	FEIS
Pseudoroegneria spicata		25	15	5		4.00	2.40	0.80	FEIS



Appendix 7. Forage quality data for forbs found in Yellowstone, but from sources other than Yellowstone.

	Crude Protein %				% N				Source
	avg.	max	min	dead	avg	max	min	dead	
Linnea borealis	7				1.12				FEIS
Thalictrum fendleri	11				1.76				FEIS
Epilobium angustifolium	13	19	7		2.08	3.04	1.12		FEIS
Polygonom bistortoides	16								Baker and Hobbs 1982
Trifolium spp.	20	23	17		3.20	3.68	2.72		Baker and Hobbs 1982
Mean	13.4	21	12		2.04	3.36	1.92		

Appendix 8. Forage quality data for shrubs found in Yellowstone, but from sources other than Yellowstone.

	Crude Protein %				% N				Source
	avg.	max	min	dead	avg	max	min	dead	
Artemesia tridentata (wyomingensis)	19.8				3.17				FEIS
Artemesia cana			11				1.76		FEIS
Vaccinium									
Vaccinium scopularum	9	10	8		1.44	1.60	1.28		Baker and Hobbs 1982
Misc. deciduous									
Achnatherum richardsonii		10.3	5.1	4.1		10.30	0.82	0.66	FEIS
Symphocarpus albus		13.1	5.6	5.2		2.10	0.90	0.83	FEIS
Physocarpus malvaceus	8.1				1.30				FEIS
Mahonia repens	5.1				0.82				FEIS
Dasiphora floribunda		12.9	9.5			2.06	1.52		FEIS

Appendix 9. Dry matter digestibility for Yellowstone forage species, based on data from sources outside Yellowstone.

	DMD %			Source
	Average	Maximum	Minimum	
<b>GRASSES</b>				
<b>Wet/Moist</b>				
Calamagrostis rubescens		67	58	FEIS
	66			Baker and Hobbs 1982
Deschampsia ceaspitosa	67	70	62	Baker and Hobbs 1982
Carex spp.	67	77	55	Baker and Hobbs 1982
<b>Dryland</b>				
Carex geyeri	53			Clark et al. 2001
Carex rossii	40			FEIS
Poa pratensis	48			FEIS
Pseudoroegneria spicata		72	60	FEIS
<b>SHRUBS</b>				
Vaccinium scopularum	26	29	24	Baker and Hobbs 1982
<b>FORBS</b>				
Linnea borealis	59			FEIS
Thalictrum fendleri				FEIS
Epilobium angustifolium	80			FEIS
Polygonom bistortoides	58			Baker and Hobbs 1982
Trifolim spp.	75			Baker and Hobbs 1982
<i>Mean</i>	68			