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LAND & LIVESTOCK

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Irrigated Perennial Cool Season Grass Hay Trial

Seventh year of trial conducted at Ray Daly's along lower Piney Creek in southern Sheridan County and Larry Vignaroli's along Clear Creek near Ucross in northern Johnson County. See December 2008 Land & Livestock newsletter (Grass Hay Studies_2) for purpose of trial. If you do not have a copy of this newsletter you can obtain one from the Johnson County Extension office or at the following web site:

http://uwadmnweb.uwyo.edu/JohnsonCES/Johnson/Newsletters/Johnson_Newsletters_main.htm

Management Practices

Nitrogen fertilizer – actual lb N/ac

Daly's: 100 on 19 Apr 2005, 19 May 2006, 9 May 2007, and 5 May 2008, 68 on 28 Apr 2009, and 60 on 16 Apr 2010; Vignaroli's: 30 on 12 May 2006, 100 on 1 May 2007, 7 May 2008, and 1 May 2009, none in 2010.

Spring Irrigation

Daly's (side roll): late May 2004, none 2005, early June 2006, none 2007, 2008 and 2010, and early June 2009; Vignaroli's (flood): none 2004, 2005, 2007 and 2010, late May 2006, and mid-May 2008 and 2009.

Hay Yields: Differences between Grasses

Over the seven years of the study Manchar smooth bromegrass and Regar meadow bromegrass have produced yearly averages of 3.1 and 3.0 T/ac, respectively, between the two sites followed by Mandan and Luna pubescent wheatgrass at 2.8 T/ac (Tables 1 and 2). NewHy hybrid wheatgrass averaged 2.5 T/ac, Bozoisky Russian wildrye 1.7 T/ac, and Rosana western wheatgrass 1.4 T/ac.

Critana thickspike wheatgrass has been overtaken by other grasses at both sites, thus yield data has not been obtained for it since 2008 at Daly's and 2006 at Vignaroli's.

Rosana western wheatgrass and Bozoisky Russian wildrye are also being overtaken by other grasses. Rosana is present at a stand sufficient to take samples only in 3 of 4 plots at Daly's and 2 of 3 at Vignaroli's, and Bozoisky only in 2 of 4 plots at Daly's and 1 of 3 at Vignaroli's. In addition, Hycrest crested wheat-grass has died out at Daly's and is being overtaken by other grasses at Vignaroli's (present in 1 of 3 plots).

As mentioned in last year's report the two native range grasses (Rosana and Critana) would not be recommended for irrigated hay/pasture production as they are not as productive as the introduced grasses and do not start growth as early in the spring. Possibly why they are and have been overtaken by the introduced rhizomatous grasses. Bozoisky and Hycrest are introduced bunch grasses and this growth form is possibly why they have been overtaken by the introduced rhizomatous grasses. However, they both may have a place in irrigated pasture as long as they are not planted with or near rhizomatous introduced grasses such as the bromes. Note: Don't know why Hycrest died out at Daly's. It had decent stands in 2007 but started dying out in 2008.

Differences between 2009 and 2010

Why grass hay yields averaged 0.3 T/ac less in 2010 compared to 2009 at Vignaroli's (Table 2) may have been due to the plots not receiving nitrogen fertilizer in 2010. To ensure a fairer comparison to yields from the Daly site harvests were taken from areas within each plot that had received 100 lb N/ac over the previous three years. Why grass hay yields at Daly's averaged 0.6 T/ac less in 2010 compared to 2009 is not clear (Table 1). May maximum daily temperatures averaging 8.2 F lower in 2010 compared to in 2009 (Table 3) might have been a reason but they averaged 8.8 F lower at Vignaroli's as well so probably not.

Grass Hay Yields compared to Alfalfa

Irrigated alfalfa hay yields averaged 2.7 T/ac between 2004 and 2009 for Johnson and Sheridan counties (Table 4). For these same years the bromes and the pubescent wheatgrasses averaged 3.0 and 2.8 T/ac, respectively, from a single late June harvest (see below for regrowth yields). However, the grasses would require nitrogen fertilizer applied by early May to consistently maintain these yields.

Grass Regrowth Forage Yields

Regar meadow brome has produced the most late summer/early fall regrowth at Daly's and Vignaroli's averaging 2000 lb/ac between the two sites (Tables 5 and 6). Manchar smooth brome, NewHy hybrid wheatgrass, Bozoisky Russian wildrye, Luna and Mandan pubescent wheatgrass, and Rosana western wheatgrass produced an average of 1825, 1655, 1490, 1235, 1230, and 1145 lb/ac, respectively. Unfortunately, I did not communicate to Vignaroli's new ranch foreman to not harvest the grass plots when they took the second cutting of alfalfa. Thus, regrowth of the grasses was limited this year due to the August cutting.

Except for NewHy hybrid wheatgrass which produced 100 lb/ac more late-summer/early fall regrowth this year compared to last year at Daly's the other grasses did not produce as much, especially Rosana western wheatgrass and Bozoisky Russian wildrye (Table 5). Although the plots were irrigated in mid-August the dry late summer and fall possibly limited their regrowth, although it generally was sufficient for fall/winter grazing.

Between the two sites Regar meadow brome has been the most productive grass followed closely behind by Manchar smooth brome, than Mandan pubescent wheatgrass, Luna pubescent wheatgrass, NewHy hybrid wheatgrass, and Bozoisky Russian wildrye.

Table 1: Grass hay yields in tons per acre (Least Squares Means) at Ray Daly's along lower Piney Creek, southern Sheridan County.

Grasses ¹	23-Jun 2004	20-Jun 2005	21-Jun 2006	26-Jun 2007	26-Jun 2008	29-Jun 2009	29-Jun 2010	Total ²
Luna PWG	2.5	3.7	2.8	2.9	1.3	2.6	2.3	18.1 ab
Mandan PWG	2.5	3.7	2.7	3.3	1.2	2.8	2.2	18.3 ab
NewHy HWG	2.2	3.3	2.6	2.7	1.3	2.8	1.6	16.2 bc
Critana TWG	1.1	2.4	1.7 ³	2.2 ³	0.7 ⁵			6.5 e
Rosana WWG	1.5	2.0 ³	1.5 ³	2.2 ³	1.1 ³	1.6 ³	1.3 ³	8.5 de
Hycrest CWG	3.0	4.2	2.2	3.4	0.8 ⁴	2.7 ⁵		14.0 bc
Bozoisky RWR	1.6	3.0	2.0	3.4 ³	1.5 ⁴	2.8 ⁴	2.1 ⁴	12.4 cd
Manchar SBG	2.1	5.0	3.3	2.8	2.1	3.5	2.6	21.3 a
Regar MBG	2.0	5.2	2.6	4.1	1.8	3.3	3.1	22.0 a
Average	2.10	3.7	2.4	3.0	1.4	2.8	2.2	

¹Grasses: PWG = pubescent wheatgrass; HWG = hybrid wheatgrass; TWG = thickspike wheatgrass; WWG = western wheatgrass; CWG = crested wheatgrass; RWR = Russian wildrye; SBG = smooth bromegrass; and MBG = meadow bromegrass

²Grass hay totals followed by the same small letter are not significantly different at the 0.05 level of probability.

³In 3 of 4 plots

⁴In 2 of 4 plots

⁵In 1 of 4 plots

Table 2: Grass hay yields in tons per acre (Least Squares Means) at Larry Vignaroli's along lower Clear Creek, northern Johnson County.

Grasses ¹	30-Jun 2004	30-Jun 2005	26-Jun 2006	21-Jun 2007	26-Jun 2008	24-Jun 2009	28-Jun 2010	Total ²
Luna PWG	2.4	2.8	2.6	4.1	3.9	3.1	2.9	21.1 a
Mandan PWG	2.1	2.4	2.8	4.8	4.5	3.6	2.8	20.7 a
NewHy HWG	2.2	2.5	2.3	3.6	3.8	2.6	2.4	18.5 ab
Critana TWG	1.1	1.6	1.2					3.7 d
Rosana WWG	1.3	1.6	1.7	2.8	2.3 ³	2.0 ³	1.8 ³	11.1 c
Hycrest CWG	1.9	2.2	2.7	3.7	3.2	2.4 ⁴	3.8 ⁴	15.5 b
Bozoisky RWR	1.0	1.1	1.8	2.8	2.9	2.3 ³	1.8 ⁴	11.4 c
Manchar SBG	2.2	2.5	2.0	3.8	4.7	3.7	3.6	21.9 a
Regar MBG	1.2	2.5	1.5	3.6	4.3	4.1	3.7	20.5 a
Average	1.8	2.1	2.1	3.6	3.8	3.2	2.9	

¹Grasses: PWG = pubescent wheatgrass; HWG = hybrid wheatgrass; TWG = thickspike wheatgrass; WWG = western wheatgrass; CWG = crested wheatgrass; RWR = Russian wildrye; SBG = smooth bromegrass; and MBG = meadow bromegrass

²Grass hay totals followed by the same small letter are not significantly different at the 0.05 level of probability.

³In 2 of 3 plots

⁴In 1 of 3 plots

Table 3: Maximum and minimum monthly temperatures (°F) at the Daly and Vignaroli sites in April, May, and June 2009 and 2010.

Period	Daly's			Vignaroli's		
	Maximum	Minimum	Average	Maximum	Minimum	Average
2009:						
Apr 13 – 30	57.4	31.7	44.6	59.6	32.8	46.2
May	69.0	34.9	51.9	70.5	37.1	53.8
June	69.6	42.9	56.3	70.7	44.6	57.6
<i>Average</i>	<i>66.6</i>	<i>37.2</i>	<i>51.9</i>	<i>68.1</i>	<i>38.9</i>	<i>53.5</i>
2010:						
Apr 09 – 30	60.3	30.7	45.9	61.7	31.7	47.2
May	60.8	34.2	47.5	61.7	36.2	49.0
June	73.1	44.3	58.7	73.9	47.2	60.5
<i>Average</i>	<i>65.1</i>	<i>37.0</i>	<i>51.1</i>	<i>66.1</i>	<i>39.1</i>	<i>52.6</i>

Table 4: Irrigated alfalfa hay yields (Tons/acre) 2004 through 2009 for Johnson and Sheridan counties (Wyoming Agricultural Statistics 2010, pp.)

County	2004	2005	2006	2007	2008	2009	<i>Average</i>
Johnson	1.8	2.3	1.9	3.1	2.8	2.7	2.4
Sheridan	2.5	3.4	2.5	3.2	3.1	3.0	2.9
<i>Average</i>	<i>2.15</i>	<i>2.85</i>	<i>2.20</i>	<i>3.15</i>	<i>2.95</i>	<i>2.85</i>	<i>2.7</i>

Table 5: Grass regrowth dry matter forage yields in pounds per acre (Least Squares Means) at Ray Daly's along lower Piney Creek, southern Sheridan County.

Grass ¹	11-Oct 2005	26-Sep 2007	8-Oct 2008	29-Sep 2009	7 Oct 2010	<i>Total</i> ²
Luna PWG	1900	1335	955	1040	820	6045 <i>b</i>
Mandan PWG	1510	1450	1195	1440	1075	6665 <i>b</i>
NewHy HWG	1420	1545	1180	1175	1275	6595 <i>b</i>
Critana TWG	1875	1535	780			3490 <i>c</i>
Rosana WWG	1540	1515	720	1425	795	4865 <i>bc</i>
Hycrest CWG	1345	810	355	730		3025 <i>c</i>
Bozoisky RWR	1745	1950	1380	1855	1110	6550 <i>b</i>
Manchar SBG	3005	1890	1395	1545	1210	9045 <i>a</i>
Regar MBG	2515	1745	1695	1735	1565	9255 <i>a</i>
<i>Average</i>	<i>1870</i>	<i>1535</i>	<i>1110</i>	<i>1330</i>	<i>1150</i>	

¹Grass species: PWG = pubescent wheatgrass; HWG = hybrid wheatgrass; TWG = thickspike wheatgrass; WWG = western wheatgrass; CWG = crested wheatgrass; RWR = Russian wildrye; SBG = smooth brome grass; and MBG = meadow brome grass

²Grass regrowth totals followed by the same small letter are not significantly different at the 0.05 level of probability.

Table 6: Grass regrowth dry matter forage yields in pounds per acre (Least Squares Means) at Larry Vignaroli's along Clear Creek, northern Johnson County.

Grass ¹	3 Oct 2007	6 Oct 2008	28 Sep 2009	Total ²
Luna PWG	1720	820	1605	3845 <i>bcd</i>
Mandan PWG	1330	1110	1175	3155 <i>cd</i>
NewHy HWG	3020	1390	2215	6625 <i>a</i>
Critana TWG				
Rosana WWG	2315	1580	2445	4285 <i>bc</i>
Hycrest CWG	995	1305	565	1965 <i>d</i>
Bozoisky RWR	2280	1445	1625	5350 <i>ab</i>
Manchar SBG	2445	1495	1600	5540 <i>ab</i>
Regar MBG	1865	2370	2520	6750 <i>a</i>
Average	2025	1490	1765	

¹Grass species: PWG = pubescent wheatgrass; HWG = hybrid wheatgrass; TWG = thickspike wheatgrass; WWG = western wheatgrass; CWG = crested wheatgrass; RWR = Russian wildrye; SBG = smooth brome grass; and MBG = meadow brome grass

²Grass regrowth totals followed by the same small letter are not significantly different at the 0.05 level of probability.

Appendix Tables

Appendix Table 1: Precipitation (inches) recorded at the Daly and Vignaroli sites in April, May, and June 2009 and at the Daly site in 2010 (Gauge did not work at Vignaroli's in 2010).

Year	Daly's				Vignaroli's			
	April	May	June	Total	April	May	June	Total
2009	0.3	0.4	1.7	2.4	0.4	0.3	1.4	2.1
2010	1.0	4.9	1.7	7.6				

Appendix Table 2: Precipitation (inches) recorded at the Banner 3.5 E and Buffalo 7.3 NE Community Collaborative Rain, Hail, and Snow network sites in April, May, and June 2007 – 2010.

Year	Banner 3.5 E ¹				Buffalo 7.3 NE ²			
	April	May	June	Total	April	May	June	Total
2007	1.3	4.3	3.1	8.7	1.2	3.5	2.6	7.3
2008	0.8	5.5	2.4	8.7	0.9	6.6	2.0	9.5
2009	1.0	0.3	3.0	4.3	1.3	0.7	2.2	4.2
2010	0.9	5.4	2.6	8.9	0.3	4.8	1.2	6.3

¹Banner 3.5 – 6.4 miles WNW of Daly's, and 13.9 miles WNW of Vignaroli's

²Buffalo 7.3 NE – 12.0 miles SSE of Daly's, and 8.8 miles SSW of Vignaroli's

Appendix Table 3: Monthly maximum and minimum temperatures (°F), and precipitation (in.) at Johnson County Airport – Buffalo¹ in April, May, and June 2004 – 2010.

Year	Maximum temperatures			Minimum temperatures			Precipitation		
	April	May	June	April	May	June	April	May	June
2004	57.2	63.6	69.3	31.4	39.7	47.2	0.8	1.2	1.0
2005	54.5	58.8	73.5	31.5	38.2	48.4	2.2	6.3	3.0
2006	58.9	66.7	79.8	33.5	41.2	52.3	0.5	1.3	1.0
2007	50.8	66.2	75.1	31.5	42.9	48.7	1.3	2.4	2.1
2008	51.1	57.9	69.9	24.4	37.8	47.1	0.5	6.2	1.1
2009	51.1	64.7	67.9	30.5	40.9	47.7	0.8	0.4	3.6
2010	52.3	59.9	70.8	31.6	36.4	49.2	1.1	5.7	1.7

¹Johnson County Airport – Buffalo: 14 miles S of Daly's and 15 miles SSW of Vignaroli's

Appendix Table 4: Monthly maximum and minimum temperatures (°F), and precipitation (in.) at Clearmont 5 SW¹ in April, May, and June 2004 – 2010.

Year	Maximum temperatures			Minimum temperatures			Precipitation		
	April	May	June	April	May	June	April	May	June
2004	60.5	66.9	73.4	30.3	38.3	45.9	0.4	1.9	0.8
2005	58.2	63.1	76.7	30.3	37.7	47.3	2.9	4.2	1.3
2006	62.6	69.8	82.9	32.3	38.7	47.9	1.0	1.3	1.1
2007	55.8	68.2	78.3	30.8	40.8	47.6	1.0	5.6	2.1
2008	55.7	62.6	73.2	23.1	38.3	44.0	0.6	5.2	3.0
2009	54.7	71.2	68.3	28.7	38.0	45.0	0.7	0.0	2.0
2010	56.3	61.7	73.4	30.8	36.5	47.2	1.5	4.0	1.9

¹Clearmont 5 SW: 12 miles E of Daly's and 5.5 miles ENE of Vignaroli's

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