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## **LAND & LIVESTOCK**

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### **Irrigated Perennial Cool Season Grass Hay Trial**

This was the sixth year of this 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](http://uwadmnweb.uwyo.edu/JohnsonCES/Johnson/Newsletters/Johnson_Newsletters_main.htm)

#### **Management Practices**

Nitrogen fertilizer at 100 lb N/ac applied at Daly site on 19 Apr 2005, 19 May 2006, 9 May 2007, and 05 May 2008, and 68 lb N/ac on 28 Apr 2009; at Vignaroli site 30 lb N/ac on 12 May 2006, 100 lb N/ac on 1 May 2007, 7 May 2008, and 1 May 2009.

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

#### **Hay Yield Differences between 2007 & 2008 and between 2008 & 2009**

Why the grasses at Daly's produced less than half the amount of hay in 2008 as they did in 2007 (Table 1) whereas at Vignaroli's yields were similar both years (Table 2) is possibly due to no spring irrigation at Daly's. Although April and May precipitation for the area averaged about 1.5 inches more in 2008 compared to in 2007 (Tables 3, 4, and 5), timing of the precipitation may have influenced yields. An average of four inches of precipitation occurred by mid-May in 2008 whereas in 2007 only an average of two inches had fallen. The mid-May irrigation at Vignaroli's may have compensated for the

dry April/early May period in 2008. In addition, daily temperatures at Daly's in 2008, especially in May, may have been much cooler compared to at Vignaroli's and stunted grass growth. However, this is purely speculative so data logger thermometers were placed at both sites in April 2009 to measure daily temperatures.

Grass hay yields in 2009 were greater at Daly's compared to in 2008 by an average of 1.3 T/ac (Table 1, Hycrest excluded) but were less at Vignaroli's by an average of 0.7 T/ac (Table 2). April and May temperatures at Buffalo and Clearmont 5W were warmer in 2009 compared to in 2008 (Tables 3 and 4) and this might explain the higher yields at Daly's even though May 2009 was drier than in 2008 and irrigation did not occur until early June in 2009. However, at Vignaroli's the plots were irrigated in mid-May 2009 but cooler June temperatures compared to in 2008 might explain the lower yields although they averaged 0.2 T/ac more compared to at Daly's. Daily temperatures averaged 1.6, 1.9, and 1.3 F warmer at Vignaroli's compared to at Daly's for the last 18 days of April, and for May, and June, respectively (Table 6).

#### **Hay Yields: Differences between Grasses**

Over the six years of the study Manchar smooth brome grass and Regar meadow brome grass produced the most hay at a yearly average of 3.1 T/ac between the two sites followed by Mandan and Luna pubescent wheatgrass at 3.0 T/ac (Tables 1 and 2). The wheatgrasses averaged 0.5 T/ac less than the brome grasses at Daly's but 0.3 T/ac more at Vignaroli's. NewHy hybrid wheatgrass and Hycrest crested wheatgrass averaged 2.7 T/ac, and Bozoi sky Russian wildrye and Rosana western wheatgrass 2.0 T/ac.

Because Critana thickspike wheatgrass has been overtaken by other grasses at both sites yield data for it was not obtained in 2009 at

Daly's and in 2007, 2008, and 2009 at Vignaroli's. Thus past yield data is not included in this report. Rosana western wheatgrass is also being overtaken by other grasses making it difficult to obtain yield data for it. This aside, these two native range grasses would not be recommended for irrigated hay fields due to their low productivity compared to introduced grasses. In addition, Hycrest crested wheatgrass at Daly's appears to be dying out and it is being overtaken by other grasses. Thus, why there is no 2009 hay yield data for it from this site. It is also being overtaken at Vignaroli's. It too would probably not be recommended for irrigated hay production.

#### **Grass Hay Yields compared to Alfalfa**

Irrigated alfalfa hay yields averaged 2.7 T/ac between 2004 and 2008 for Johnson and Sheridan counties (Table 7). For these same years the two brome grasses and the two pubescent wheatgrasses averaged 2.9 T/ac 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**

In early fall 2005 at Daly's and 2007 – 2009 at Daly's and Vignaroli's regrowth of the grasses was harvested to determine available dry matter forage for grazing. Regar meadow brome grass produced an average of 2065 lb/ac of regrowth followed by Manchar smooth brome grass, Bozoi sky Russian wildrye, NewHy hybrid wheatgrass, Rosana western wheatgrass, Luna and Mandan pubescent wheatgrass, and Hycrest crested wheatgrass at 1910, 1755, 1705, 1650, 1340, 1315, and 870 lb/ac, respectively (Table 8). Except for Hycrest crested wheatgrass, regrowth of the other grasses would provide a cow on average one to two months fall/winter grazing per acre.

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

| Grasses <sup>1</sup> | 23-Jun<br>2004 | 20-Jun<br>2005 | 21-Jun<br>2006 | 26-Jun<br>2007 | 26-Jun<br>2008 | 29-Jun<br>2009 | Total               |
|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| Luna PWG             | 2.5            | 3.7            | 2.8            | 2.9            | 1.3            | 2.6            | 15.8 c <sup>2</sup> |
| Mandan PWG           | 2.5            | 3.7            | 2.6            | 3.3            | 1.2            | 2.8            | 16.1 bc             |
| NewHy HWG            | 2.2            | 3.3            | 2.6            | 2.7            | 1.3            | 2.8            | 14.9 c              |
| Rosana WWG           | 1.5            | 2.0            | 1.5            | 2.2            | 1.1            | 1.6            | 9.9 d               |
| Hycrest CWG          | 3.0            | 4.2            | 2.2            | 3.4            | 0.8            |                | 13.6 cd             |
| Bozoisky RWR         | 1.6            | 3.0            | 2.0            | 3.3            | 1.5            | 2.8            | 14.2 cd             |
| Manchar SBG          | 2.1            | 5.0            | 3.3            | 2.8            | 2.1            | 3.5            | 18.8 ab             |
| Regar MBG            | 2.0            | 5.2            | 2.6            | 4.1            | 1.8            | 3.3            | 19.0 a              |
| Average              | 2.2            | 3.8            | 2.5            | 3.1            | 1.4            | 2.8            |                     |

<sup>1</sup>Grasses: PWG = pubescent wheatgrass; HWG = hybrid wheatgrass; WWG = western wheatgrass; CWG = crested wheatgrass; RWR = Russian wildrye; SBG = smooth bromegrass; and MBG = meadow bromegrass

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

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

| Grasses <sup>1</sup> | 30-Jun<br>2004 | 30-Jun<br>2005 | 26-Jun<br>2006 | 21-Jun<br>2007 | 26-Jun<br>2008 | 24-Jun<br>2009 | Total               |
|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| Luna PWG             | 2.4            | 2.8            | 2.6            | 4.1            | 3.9            | 3.1            | 18.9 a <sup>2</sup> |
| Mandan PWG           | 2.1            | 2.4            | 2.8            | 4.8            | 4.5            | 3.6            | 20.2 a              |
| NewHy HWG            | 2.2            | 2.5            | 2.3            | 3.6            | 3.8            | 2.6            | 17.0 ab             |
| Rosana WWG           | 1.3            | 1.6            | 1.7            | 2.8            | 2.7            | 2.0            | 12.1 c              |
| Hycrest CWG          | 1.9            | 2.2            | 2.7            | 3.7            | 3.2            | 2.3            | 16.0 b              |
| Bozoisky RWR         | 1.0            | 1.1            | 1.8            | 2.8            | 2.9            | 2.3            | 11.9 c              |
| Manchar SBG          | 2.2            | 2.5            | 2.0            | 3.8            | 4.6            | 3.7            | 18.8 a              |
| Regar MBG            | 1.2            | 2.5            | 1.5            | 3.6            | 4.3            | 4.1            | 17.2 ab             |
| Average              | 1.8            | 2.2            | 2.2            | 3.6            | 3.8            | 3.2            |                     |

<sup>1</sup>Grasses: PWG = pubescent wheatgrass; HWG = hybrid wheatgrass; WWG = western wheatgrass; CWG = crested wheatgrass; RWR = Russian wildrye; SBG = smooth bromegrass; and MBG = meadow bromegrass

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

Table 3: Monthly maximum and minimum temperatures (°F), and precipitation (in.) at Johnson County Airport – Buffalo<sup>1</sup> in April, May, and June 2004 – 2009.

| 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 | 0.76          | 1.17 | 0.96 |
| 2005 | 54.5                 | 58.8 | 73.5 | 31.5                 | 38.2 | 48.4 | 2.15          | 6.31 | 2.99 |
| 2006 | 58.9                 | 66.7 | 79.8 | 33.5                 | 41.2 | 52.3 | 0.47          | 1.33 | 1.01 |
| 2007 | 50.8                 | 66.2 | 75.1 | 31.5                 | 42.9 | 48.7 | 1.33          | 2.35 | 2.12 |
| 2008 | 51.1                 | 57.9 | 69.9 | 24.4                 | 37.8 | 47.1 | 0.49          | 6.21 | 1.14 |
| 2009 | 51.1                 | 64.7 | 67.9 | 30.5                 | 40.9 | 47.7 | 0.85          | 0.38 | 3.62 |

<sup>1</sup>Johnson County Airport – Buffalo: 14 miles S of Daly’s and 15 miles SSW of Vignaroli’s

Table 4: Monthly maximum and minimum temperatures (°F), and precipitation (in.) at Clearmont 5 SW<sup>1</sup> in April, May, and June 2004 – 2009.

| 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 | 0.36          | 1.94 | 0.75 |
| 2005 | 58.2                 | 63.1 | 76.7 | 30.3                 | 37.7 | 47.3 | 2.95          | 4.19 | 1.34 |
| 2006 | 62.6                 | 69.8 | 82.9 | 32.3                 | 38.7 | 47.9 | 0.98          | 1.34 | 1.10 |
| 2007 | 55.8                 | 68.2 | 78.3 | 30.8                 | 40.8 | 47.6 | 1.04          | 5.57 | 2.10 |
| 2008 | 55.7                 | 62.6 | 73.2 | 23.1                 | 38.3 | 44.0 | 0.57          | 5.20 | 3.03 |
| 2009 | 54.7                 | 71.2 | 68.3 | 28.7                 | 38.0 | 45.0 | 0.68          | 0.00 | 1.95 |

<sup>1</sup>Clearmont 5 SW: 12 miles E of Daly’s and 5.5 miles ENE of Vignaroli’s

Table 5: 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 – 2009.

| Year | Banner 3.5 E <sup>1</sup> |     |      |       | Buffalo 7.3 NE <sup>2</sup> |     |      |       |
|------|---------------------------|-----|------|-------|-----------------------------|-----|------|-------|
|      | 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   |

<sup>1</sup>Banner 3.5 – 6.4 miles WNW of Daly’s, and 13.9 miles WNW of Vignaroli’s

<sup>2</sup>Buffalo 7.3 NE – 12.0 miles SSE of Daly’s, and 8.8 miles SSW of Vignaroli’s

Table 6: Maximum and minimum monthly temperatures (°F) at the Daly and Vignaroli sites between mid-April and June 2009.

| Period      | Daly’s  |         |             | Vignaroli’s |         |             |
|-------------|---------|---------|-------------|-------------|---------|-------------|
|             | Maximum | Minimum | Average     | Maximum     | Minimum | Average     |
| 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        |
| Average     | 66.6    | 37.2    | <b>51.9</b> | 68.1        | 38.9    | <b>53.5</b> |

Table 7: Irrigated alfalfa hay yields (Tons/acre) 2004 through 2008 for Johnson and Sheridan counties (Wyoming Agricultural Statistics 2009, pp. 96-98)

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

Table 8: Grass regrowth dry matter forage yields in pounds per acre (Least Squares Means) at Ray Daly's along lower Piney Creek, southern Sheridan County, and at Larry Vignaroli's along Clear Creek, northern Johnson County.

| Grass <sup>1</sup> | Ray Daly's     |                |               |                | Larry Vignaroli's |               |                |
|--------------------|----------------|----------------|---------------|----------------|-------------------|---------------|----------------|
|                    | 11-Oct<br>2005 | 26-Sep<br>2007 | 8-Oct<br>2008 | 29-Sep<br>2009 | 3 Oct<br>2007     | 6 Oct<br>2008 | 28 Sep<br>2009 |
| Luna PWG           | 1900           | 1335           | 955           | 1040           | 1720              | 820           | 1605           |
| Mandan PWG         | 1510           | 1450           | 1195          | 1440           | 1330              | 1110          | 1175           |
| NewHy HWG          | 1420           | 1545           | 1180          | 1175           | 3020              | 1390          | 2215           |
| Rosana WWG         | 1540           | 1515           | 720           | 1425           | 2315              | 1580          | 2445           |
| Hycrest CWG        | 1345           | 810            | 355           | 730            | 995               | 1305          | 565            |
| Bozoisky RWR       | 1745           | 1955           | 1380          | 1855           | 2280              | 1445          | 1625           |
| Manchar SBG        | 3005           | 1890           | 1395          | 1545           | 2445              | 1495          | 1600           |
| Regar MBG          | 2515           | 1745           | 1695          | 1735           | 1865              | 2370          | 2520           |
| <i>Average</i>     | 1875           | 1530           | 1075          | 1370           | 1995              | 1440          | 1720           |

<sup>1</sup>Grass species: PWG = pubescent wheatgrass; HWG = hybrid wheatgrass; WWG = western wheatgrass; CWG = crested wheatgrass; RWR = Russian wildrye; SBG = smooth bromegrass; and MBG = meadow bromegrass

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