Nutritional Properties of Windrowed and Standing Basin Wildrye over Time

Steve Foster, Pershing County Extension Educator
Barry Perryman, Associate Professor; College of Agriculture, Biotechnology and Natural Resources

Introduction
Many Nevada farmers and ranchers are in constant search of economical, high-producing winter forages for their beef cattle production system. There are many alternative forages and small grains that can be rotated with alfalfa or used in pastures, including: teff, wheat, barley and traditional grass hays. An often overlooked forage but one that is common in Nevada and the Intermountain West is basin wildrye (Leymus cinereus).

This fact sheet is a summary of the on-farm research conducted at the University of Nevada, Reno’s Gund Ranch. The study compared the nutritional properties of windrowed and standing basin wildrye over time, and assessed the effect of managed fire on basin wildrye standing crop production (Bruce, B., Perryman, B., Shenkoru, T., Conley, K. and Wilker, J. 2011. Nutritional Properties of Windrowed and Standing Basin Wildrye over Time. College of Agriculture, Biotechnology, and Natural Resources, University of Nevada, Reno).

Basin Wildrye Characteristics
Basin wildrye can produce a large amount of forage and can grow on many different ecological sites within the 8- to 20-inch precipitation zone (USDA NRCS, 2007). Basin wildrye is a very tall and robust grass that has been used for winter grazing since early settlement times (Hillman, 1896). Since settlement in the 1860s, basin wildrye has been recognized as superior winter forage that was abundant on vast areas of intermountain basins within the larger Great Basin. Today, many of these areas are entirely shrub dominated with only remnant stands of this once abundant native grass (Hazelton et al., 1961).

An important characteristic of basin wildrye is elevated meristematic growing points. This feature means that spring and early summer grazing, as well as mowing, are not recommended. Both actions can remove and reduce the number of growing points causing a decline in plant vigor and survival (Griffiths, 1902; USDA NRCS, 2007). However, when used as late summer, fall or winter forage, concerns about growing point location diminish because the plants are dormant. In essence, the plants have completed their important physiological processes and removal of leaf material is largely inconsequential to the plant.

Traditional methods of mechanical harvest also tend to remove the elevated growing points. Mechanical harvesters, however, can be adjusted to elevate the cutting bars above growing points. Leaving more residual stubble height also reduces smothering problems for plants under the windrow (Berger and Volesky, 2010).

Methods
Windrowed and standing wildrye forages were assessed for nutritional value dynamics over time and standing wildrye crop production was measured for its response to prescribed fire.
Great Basin wildrye plants at the University of Nevada, Reno's Gund Ranch were sampled for nutritional analysis in 2005 and 2008-09 on the first of June, and then a portion of the basin wildrye was windrowed. Near the first of each succeeding month July through October in the first year and July through February in the second year, both standing and windrowed basin wildrye were sampled and analyzed for dry matter, crude protein, ADF (acid detergent fiber), NDF (neutral detergent fiber)-to-ADF ratio, along with the following minerals: magnesium, calcium, potassium, zinc, iron and copper.

In addition, an area dominated by salt rabbitbrush (Chrysothamnus nauseosus sbsp. consimilis) was subjected to a prescribed burn in the fall of 2003. Within the rabbitbrush matrix, Great Basin wildrye was the dominant understory species. Sampling for Great Basin wildrye standing crop was then performed in mid-July of 2005 and 2008 for total tons of production.

**Results**

There was more dry matter in the standing forage until October, after which the windrows contained more dry matter. Crude protein was consistently higher in the windrow, and rapidly decreased in the standing crop. The ADF content was consistently lower in the windrow.

Phosphorus levels in 2005 were lower in the windrow in July, maintained that level, and in subsequent months became higher than in the standing forage. The NDF-to-ADF ratio was consistently higher in the windrow. Neutral detergent fiber showed no difference between standing and windrowed crops, (Table 1, *Average principle nutrient content by month for standing and windrowed basin wildrye, 2005 and 2009*).

Magnesium and calcium decreased in the windrow compared to standing crop. Potassium, zinc, iron and copper were higher in the windrow. Manganese and sodium showed no difference between standing and windrowed crops (Table 2, *Macro-mineral content by month for standing and windrowed basin wildrye, 2005 and 2009*).

Overall, windrowed basin wildrye provided greater nutritional quality over time than standing basin wildrye forage.

In the prescribed burn areas, Great Basin wildrye standing crop yields were increased over non-burned areas. Standing crop production was five to six times higher in the burned area in both sample years (2005 and 2009), (Table 3, *Standing Crop Production: Prescribed Burning vs Non-Burning*).
**Table 1. Average principle nutrient content by month for standing and windrowed basin wildrye, 2005 and 2009.**

<table>
<thead>
<tr>
<th></th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov*</th>
<th>Dec*</th>
<th>Jan*</th>
<th>Feb*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standing DM %</strong></td>
<td>44.95</td>
<td>34.40</td>
<td>40.35</td>
<td>53.90</td>
<td>82.15</td>
<td>91.50</td>
<td>96.20</td>
<td>97.10</td>
<td>96.20</td>
</tr>
<tr>
<td><strong>Windrowed DM %</strong></td>
<td>89.40</td>
<td>79.50</td>
<td>88.75</td>
<td>80.50</td>
<td>91.30</td>
<td>97.00</td>
<td>94.80</td>
<td>94.50</td>
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<tr>
<td><strong>Standing CP %</strong></td>
<td>13.75</td>
<td>10.65</td>
<td>11.30</td>
<td>6.20</td>
<td>4.55</td>
<td>4.20</td>
<td>3.00</td>
<td>2.40</td>
<td>1.90</td>
</tr>
<tr>
<td><strong>Windrowed CP %</strong></td>
<td>13.40</td>
<td>15.80</td>
<td>14.20</td>
<td>16.50</td>
<td>15.00</td>
<td>12.90</td>
<td>11.20</td>
<td>9.10</td>
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</tr>
<tr>
<td><strong>Standing ADF %(dmb)</strong></td>
<td>40.45</td>
<td>44.05</td>
<td>43.00</td>
<td>45.45</td>
<td>48.75</td>
<td>53.80</td>
<td>56.00</td>
<td>55.40</td>
<td>57.90</td>
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<tr>
<td><strong>Windrowed ADF %(dmb)</strong></td>
<td>36.60</td>
<td>38.85</td>
<td>38.70</td>
<td>43.90</td>
<td>44.00</td>
<td>44.40</td>
<td>44.80</td>
<td>46.70</td>
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<tr>
<td><strong>Standing NDF %(dmb)</strong></td>
<td>58.55</td>
<td>65.70</td>
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<td>70.10</td>
<td>78.60</td>
<td>79.20</td>
<td>80.70</td>
<td>81.60</td>
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<tr>
<td><strong>Windrowed NDF %(dmb)</strong></td>
<td>60.60</td>
<td>64.05</td>
<td>64.70</td>
<td>77.15</td>
<td>74.70</td>
<td>72.30</td>
<td>70.30</td>
<td>74.80</td>
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<tr>
<td><strong>Standing ADF/NDF</strong></td>
<td>1.45</td>
<td>1.50</td>
<td>1.50</td>
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<td>1.45</td>
<td>1.50</td>
<td>1.40</td>
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</tr>
<tr>
<td><strong>Windrowed ADF/NDF</strong></td>
<td>1.65</td>
<td>1.65</td>
<td>1.70</td>
<td>1.60</td>
<td>1.70</td>
<td>1.60</td>
<td>1.60</td>
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</tr>
</tbody>
</table>

- DM is dry matter, %; CP is crude protein, % dry matter basis (dmb); ADF is acid detergent fiber, % (dmb); NDF is neutral detergent fiber, % (dmb); and NDF/ADF ratio is NDF divided by ADF.
- * Denotes only the values from 2008-2009 forage analysis.
**Conclusion**

Windrowing Great Basin wildrye in June allowed capitalization of the forage increase provided by prescribed burning. The nutritional quality of the windrowed forage was well above that of the unharvested standing crop. Swathing and windrowing basin wildrye provides a higher quality forage in the fall and winter in many areas within the Great Basin and other interior basins of the Intermountain West.

Increased production combined with the advantages of windrowing will provide ranchers with additional winter feed options without requiring a great deal of new input capital. Work still remains to determine actual cost effectiveness and if repeated mowing with an elevated cutter bar will cause any long-term decline to the basin wildrye plant community.
Publications Cited


