CATTLE AND SHEEP GRAZING LEAFY SPURGE (Euphorbia esula L.) INFESTED RANGELAND
A DEMONSTRATION GRAZING TRIAL ON THE FORT BERTHOLD INDIAN RESERVATION
By:
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Introduction
Weedy forbs and brush cause more losses on the United States 252 million hectares of rangeland than all other pests combined (Quimby et al. 1991), in which herbicides continue to be the main method of controlling these plant species.  Herbicides are effective in controlling noxious weeds and other troublesome plant species, however, due to environmental constraints and costs of herbicides many land managers are forced to use alternative methods.  Leafy spurge (Euphorbia esula L.) is just one of many plant species that cause economic burden to land managers and the rural communities.

The use of sheep as a biocontrol agent in the control of leafy spurge is not a new concept.  In the late 30’s and early 40’s Christensen et al. (1938), Helgeson and Thompson (1939) and Helgeson and Longwell (1942) indicated that sheep consumed leafy spurge and should be integrated into management strategies in controlling leafy spurge, however, there was limited promotion.  Herbicides continue to be the primary method for control of leafy spurge (Lym et al. 1995).  Many areas infested with leafy spurge, however, are in environmentally sensitive areas and most herbicides for controlling leafy spurge are not labeled for application in these sensitive areas.  Which have lead many land managers to choose an alternative control agent such as Angora goats and sheep.  Research conducted in the 1980’s and 1990’s has shown that sheep or goats will reduce leafy spurge stem densities and increase grass and grass-like disappearance, and there are significant benefits in using multi-species grazing to manage leafy spurge infested rangelands (Prosser 1995).

Multi-species grazing is an important idea in rangeland management because rangelands usually consist of one or more classes of vegetation (Merrill et al. 1966).  By using more than one livestock species on a given rangeland containing various vegetative communities provides the potential of increasing red meat production, species diversity, vegetative production, and revenue for a given ranching operation, with proper management plans.  Although multi-species grazing provides the above benefits, the introduction of leafy spurge and its consistency of infesting grasslands in the mid-west exploit the importance of using a multi-species grazing approach.

The objectives of this demonstration trial were to demonstrate that sheep are effective in controlling leafy spurge and to demonstrate the benefits of using a multi-species grazing approach.
**Study Area**

A Demonstration grazing trial was conducted on the SE ¼ of Section 8, SW ¼ of Section 9, and NW ¼ of Section 16, T147N, R93W of McKenzie County, approximately 17 miles southwest of Mandaree, North Dakota. Vegetation in this region is typical of the northern mixed grass prairie (Barker and Whitman 1988) and classified as a wheatgrass-grama-needle grass (*Agropyron, Bouteloua, Stipa*) plant community (Shiflet 1994). Approximately 15 percent of this tract of land was infested by leafy spurge before the onset of the demonstration grazing trial.

The demonstration grazing trial consisted of a 307.2 acre tract of land subdivided into a three pasture twice-over rotational grazing treatment (TOR) and a control. The TOR was grazed approximately from the 3rd week of June up until the 15th of September by one herd of cow/calf pairs and mature dry white-face ewes. A total of 38 animal units of cattle (33 - 1200 lb. cows with calves) and 10 animal units of sheep (60-135 lb. mature white-face ewes without lambs) or a total 120 AUMs grazing on the treatment in 2000 and 2001.

**Methods**

Leafy spurge stem densities were obtained using a 2.7 ft$^2$ quadrat along four 55 yard systematically placed line transects. Transects were selected based on leafy spurge location and data was collected every 2 ½ yards (20 readings/transect). Leafy spurge stem counts were also collect within a 32 ft x 16 ft enclosure (control). Twenty readings were collected within this enclosure by subdividing the enclosure into 2.7 ft$^2$ plots and randomly selecting 20 plots. Treatment and year effects for leafy spurge stem density were analyzed using a general linear model (GLM) (SPSS 1999).

Herbage production and degree of disappearance for leafy spurge, graminoid, shrubs, and other forbs were determined using a pair-plot technique (Milner and Hughes 1968). Ten cages were systematically dispersed in two of the three pastures of the TOR. Two plots were clipped from within each cage and two out of the cage using a 2.7 ft$^2$ quadrat. Samples were oven dried at 140 °F for 48 hours and weighed. Treatment and year effects for herbage production were analyzed using a general linear model (GLM) (SPSS 1999).

**Results**

No significant (P>0.05) changes occurred in leafy spurge stem densities on the TOR or the Control from 2000 to 2001. Leafy spurge stem densities were also similar (P>0.05) between the control and the TOR in 2000 and 2001 (Table 1).

Results showed that there were no significant (P>0.05) change in graminoid, forb, and shrub herbage production after one year of treatment on the TOR. Leafy Spurge production, however, was significantly (P<0.05) lower in the 2001 growing season than the 2000 growing season (Table 2). Table 2 also shows that there were increases in leafy spurge and shrub degree of disappearance in the 2001 grazing season on the TOR.
Table 1. Leafy spurge stem densities on the Fort Berthold Indian Reservation multi-species grazing demonstration study, in 2000 and 2001. (Standard errors are with in parentheses.)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>2000¹</th>
<th>2001¹</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Stems/2.7 ft² Frame</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control²</td>
<td>6.25 (1.13)ax</td>
<td>8.15 (1.17)ax</td>
</tr>
<tr>
<td>Twice-over Rotation²</td>
<td>5.87 (0.93)ax</td>
<td>5.93 (0.52)ax</td>
</tr>
</tbody>
</table>

¹Years with the same letter within each treatment are not significantly different (P>0.05) (a, b, and c).
²Treatments with the same letter are not significantly different (P>0.05) (x, y, and z).

Table 2. Herbage production and degree of disappearance on graminoid, forb, shrub, and Leafy spurge in 2000 and 2001.

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>%disappearance</th>
<th>2001</th>
<th>%disappearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graminoids</td>
<td>lb/acre</td>
<td>%disappearance</td>
<td>lb/acre</td>
<td>%disappearance</td>
</tr>
<tr>
<td>1461.1a</td>
<td>64.0%</td>
<td>1545.5a</td>
<td>47.6%</td>
<td></td>
</tr>
<tr>
<td>Forbs</td>
<td>174.8a</td>
<td>79.3%</td>
<td>78.2a</td>
<td>20.2%</td>
</tr>
<tr>
<td>Shrubs</td>
<td>68a</td>
<td>55.0%</td>
<td>119a</td>
<td>100.0%</td>
</tr>
<tr>
<td>Leafy Spurge</td>
<td>469.2a</td>
<td>68.6%</td>
<td>269b</td>
<td>84.2%</td>
</tr>
</tbody>
</table>

Conclusion
Results showed that there were no significant changes in leafy spurge stem densities, however, it did show that there was a significant decrease in leafy spurge herbage production from 2000 to 2001. Degree of disappearance of leafy spurge also increased in the 2001 grazing season. Based on these results multi-species grazing in a twice-over rotational grazing system decreased the production of leafy spurge, however, it also indicates under a multi-species grazing approach in twice-over rotation grazing system it takes more than two years of grazing to see significant changes in leafy spurge stem density. These findings complement the findings of the Hettinger Research Extension Centers and North Dakota State University, Animal and Range Sciences Department on the use of cattle and sheep in a multi-species approach to control leafy spurge.
Literature Cited


