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Effects of Long-Term Targeted Grazing on Large-Scale Leafy Spurge Infestations

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Background
Sheep and goat grazing is being rediscovered and honed as a viable and effective tool to address contemporary vegetation management challenges such as controlling invasive exotic weeds. Currently, there is a major targeted grazing effort in Montana to control invasive plants such as leafy spurge (*Euphorbia esula*). Montana State University and the Montana Sheep Institute (MSI) Project, and the research/extension team therein, have conducted a long-term research effort and demonstration trials on the use of sheep and goats to manage leafy spurge.

Leafy spurge is a perennial, invasive forb. It spreads by seeds and rhizomes and forms dense monocultures that decrease biological diversity. Mature leafy spurge plants have a 20-25-ft taproot, making mature plants resistant to herbicides. Sheep and goats prefer leafy spurge versus grasses in most situations, but sheep or goat diets rarely exceed 50% leafy spurge.

Montana researchers have developed a targeted grazing prescription for landowners and sheep producers to follow: 1) Graze an infestation until yellow bracts have been removed and monitor the residual height of the desirable species; 2) Stock infestations at approximately 1 sheep per acre per month. 3) Begin grazing period in the late spring and remove all yellow bracts by late June to mid-July and repeat later in the summer.

Purpose Statement
The objective is to develop, implement and evaluate controlled sheep grazing strategies for managing large infestations of leafy spurge. Our specific research objectives were to examine the long-term grazing impacts on leafy spurge following our prescribed grazing approach. An additional objective was to examine the effects of sheep removal on leafy spurge infestations.

Summary of Findings
Vegetation data has been collected on 33 sites infested with leafy spurge prior to the initiation of the grazing plan. Results are presented in Figure 1. There is a linear decrease in total forage production as leafy spurge level increases. Sites with high leafy spurge infestations had less grass productivity (130 vs. 357 and 686 lbs/ac for high vs. medium and low site infestation levels, respectively). This data reinforces what happens if we allow these non-native weeds to continue to invade and dominate the landscape. As leafy spurge invades the landscape the native forb component is dramatically reduced in the landscape. Forbs are a critical component of a healthy wildlife habitat. The noxious weed component gradually replaces the grass component until landscape diversity is compromised. The landscape trend is to a monoculture of the non-native invasive plant. Many sites investigated in this project have been altered because of high weed infestation levels. Most traditional weed control methods (i.e. herbicides) would be economically prohibitive under the current infestation conditions.

Four plots were measured to determine the effect of long-term targeted grazing on leafy spurge infestations (Figure 2). Each of the plots had 7 years of continuous targeted grazing with sheep. Leafy spurge composition was decrease approximately 5% per year of sheep grazing while the grass composition was increased approximately 5% per year. This data also supports the idea that targeted grazing can reduce leafy spurge levels down to where they are tolerable to grazing other livestock species such as cattle. Cattle will only utilize the grass in those areas of the pasture that are not heavily infested with leafy spurge. Over time targeted grazing using sheep should favor the re-establishment of grass and forb component of the landscape.

Targeted grazing was removed from a leafy spurge infested site and vegetation monitoring continued (Figure 3). Following the removal of sheep leafy
spurge composition began to increase and grass composition began to decrease. Figure 4 demonstrates leafy spurge composition of 4 sites utilizing targeted grazing practices and comparing to a site with sheep grazing removed after 2005. This reinforces the idea that leafy spurge infestations will always need some type of management intervention to maintain tolerable levels of leafy spurge. This ranch resumed targeted grazing practices in 2009.

Conclusions
Data collected from MSI projects indicates that over time targeted sheep grazing will favor the re-establishment of grass and forb component and lessen the negative impacts of the leafy spurge component of the landscape. However, once leafy spurge is established some form of control method must be utilized to prevent this weed from becoming the dominant component of the landscape.

Applications
The Montana Sheep Institute is demonstrating that controlled sheep and/or goat grazing are effective in managing established infestations of leafy spurge. However, widespread adoption of this valuable tool in the fight against noxious weeds will not occur until grazing strategies are developed and tested on large-scale infestations.
Figure 1. Vegetation composition prior to targeted grazing of 33 sites infested with leafy spurge.

![Bar chart showing vegetation composition before targeted grazing.](chart1)

Figure 2. Vegetation composition of four sites infested with leafy spurge with seven continuous year of targeted grazing.

![Line chart showing vegetation composition over seven years.](chart2)
Figure 3. Vegetation composition over 8 years: repeated targeted grazing using sheep for the first 5 years; sheep removed after year 5.

![Figure 3](image)

Figure 4. Leafy spurge composition when sheep are removed after year 5 of grazing compared repeated sheep grazing.

![Figure 4](image)