Experiments to Investigate the Impact of Weed Removal on Cattle Grazing Preference in Missouri Pastures

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• Cattle prefer to eat a grass-based diet. However, as grass becomes scarce they will consume other plants that are not as preferred such as weeds (Olsen 1999, Marten 1978).

• Previous research shows that many weeds can be just as nutritious as the desired forage, especially in the early vegetative stages of growth (Marten and Andersen 1975; Payne et al. 2010; Rosenbaum et al. 2011).

• Research has also shown that cattle do not graze randomly, but rather preferentially and often based on memory and a previous grazing experience (Lyons and Machen 2001).
Objectives:

In mixed tall fescue and legume pastures, to determine the effects of herbicide application and subsequent weed and legume removal on:

1. Weed Density
2. Forage Grass & Legume Groundcover
3. Total Forage Yields
4. Beef Cattle Grazing Distribution
Materials and Methods: Use of GPS Tracking Collars

- At each location, Lotek 3300 GPS tracking collars were fitted to 3 crossbred beef cows ranging from 800 to 1,100 lbs in weight.

- Collars were set to fix and record GPS satellite positions at 1-hr intervals throughout the experiment.

- Cattle were fitted with collars 1 month prior to the herbicide applications at each location in order to provide a baseline level of the grazing preference and distribution within each pasture.
Albany, Missouri (2009):
- 90 acre continuously grazed pasture
- Initial density of 24 weeds/m²

Shelbina, Missouri (2010):
- 31 acre continuously grazed pasture
- Initial density of 18 weeds/m²

Galena, Missouri (2009):
- 35 acre continuously grazed pasture
- Initial density of 9 weeds/m²
Results: Forage Response
Influence of Pasture Herbicide Treatment on Weed Density over Time (Albany, MO 2009)

Indicates a significant difference between herbicide-treated and untreated weed density, LSD=0.05.
Influence of Pasture Herbicide Treatment on Weed Density over Time (Galena, MO 2009)

Indicates a significant difference between herbicide-treated and untreated weed density, LSD=0.05.
Influence of Pasture Herbicide Treatment on Weed Density over Time (Shelbina, MO 2010)

Indicates a significant difference between herbicide-treated and untreated weed density, LSD=0.05.
Influence of Pasture Herbicide Treatment on Clover Groundcover over Time (Albany, MO 2009)

* Indicates a significant difference between herbicide-treated and untreated weed density, LSD=0.05.
Influence of Pasture Herbicide Treatment on Clover Groundcover over Time (Galena, MO 2009)

Indicates a significant difference between herbicide-treated and untreated weed density, LSD=0.05.
Influence of Pasture Herbicide Treatment on Clover Groundcover over Time (Shelbina, MO 2010)

Indicates a significant difference between herbicide-treated and untreated weed density, LSD=0.05.
Comparisons of Forage Yield Components Between Herbicide-treated and Untreated Portions of a Pasture for 3 Months Following Application (Albany, MO 2009)

Weeds  Grass+Clover

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<tr>
<th>Months After Application</th>
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<td>210 B</td>
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*Indicates a significant difference between herbicide-treated and untreated total forage yields, LSD=0.05.*
Comparisons of Forage Yield Components Between Herbicide-treated and Untreated Portions of a Pasture for 3 Months Following Application (Galena, MO 2009)

Indicates a significant difference between herbicide-treated and untreated total forage yields, LSD=0.05.
Comparisons of Forage Yield Components Between Herbicide-treated and Untreated Portions of a Pasture for 4 Months Following Application (Shelbina, MO 2010)

There were no differences between herbicide-treated and untreated total forage yields, LSD=0.05.
Results:
Cattle Grazing Response
Change in Cattle Distribution on Herbicide-treated and Untreated Portions of a Pasture for 4 Months Following Application (Albany, Missouri 2009)

Means followed by the same letter are not different, LSD=0.05.
Change in Cattle Distribution on Herbicide-treated and Untreated Portions of a Pasture for 3 Months Following Application (Galena, Missouri 2009)

Means followed by the same letter are not different, LSD=0.05.
Change in Cattle Distribution on Herbicide-treated and Untreated Portions of a Pasture for 4 Months Following Application (Shelbina, MO 2010)

Means followed by the same letter are not different, LSD=0.05.
Albany
Fix Points Prior to Application (7/8-7/29)

- Treated – 53% (250 fixes)
- Untreated – 47% (225 fixes)

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Albany
Fix Points 1 Month After Application (7/30-8/25)

- Treated – 51% (295 fixes)
- Untreated – 49% (283 fixes)
Albany
Fix Points 2 Months After Application (8/26-9/29)

- Treated – 77%
  (511 fixes)
- Untreated – 23%
  (156 fixes)
Albany
Fix Points 3 Months After Application (9/30-10/27)

- Treated – 84%
  (1043 fixes)
- Untreated – 16%
  (202 fixes)

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Albany
Fix Points 4 Months After Application (10/28-11/24)

- Treated – 77% (869 fixes)
- Untreated – 23% (328 fixes)
Albany
Fix Points for All 4 Months After Application

- Treated -72%
  (2,718 fixes)

- Untreated -28%
  (969 fixes)

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Conclusions: Forage Response

• At all locations, broadleaf weeds were substantially reduced and legumes were almost completely eliminated in herbicide-treated compared to untreated portions of the pastures.

• By 3 months after treatment, the weed content of the total forage yields was lower in herbicide-treated compared to untreated portions of the pastures at Albany and Galena but not Shelbina.

• By 3 months after treatment, the forage grass and legume component of the total forage yields was higher in herbicide-treated compared to untreated portions of the pastures at Galena but not Albany or Shelbina.
Conclusions: Cattle Distribution

• By 3 to 4 months after treatment, the distribution of cattle in herbicide-treated compared to untreated portions of the pastures increased by 1.5 to 5x across 3 research locations.

• The degree of distribution increase correlated to initial and final weed density:
  – Albany = 24 weeds/m², 5x distribution increase
  – Shelbina = 18 weeds/m², 1.6x distribution increase
  – Galena = 9 weeds/m², 1.5x distribution increase

• Results also suggest that cattle preferentially graze weed-free pastures, even when legumes are removed through herbicide treatment.