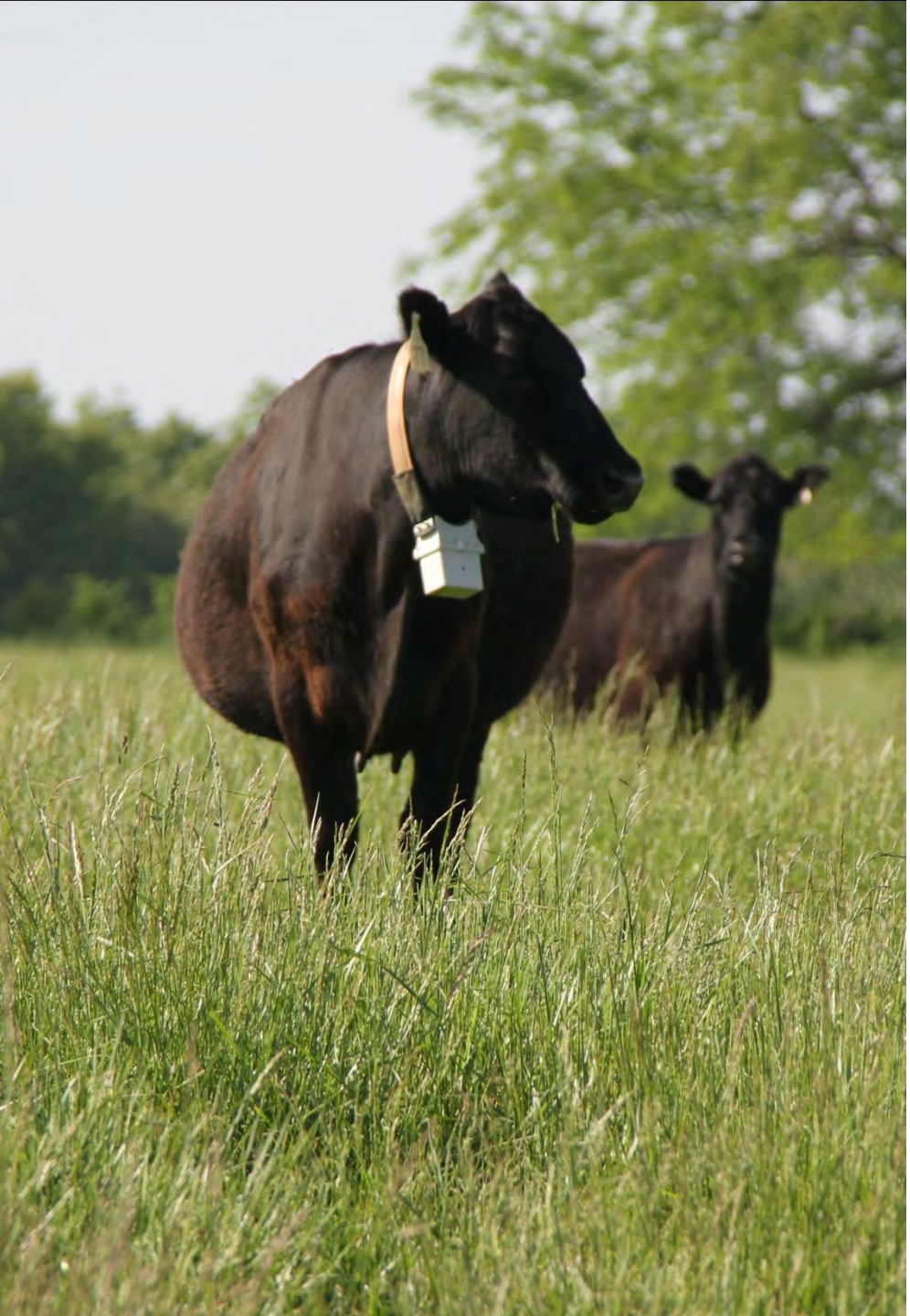
Experiments to Investigate the Impact of Weed Removal on Cattle Grazing Preference in Missouri Pastures

- 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:

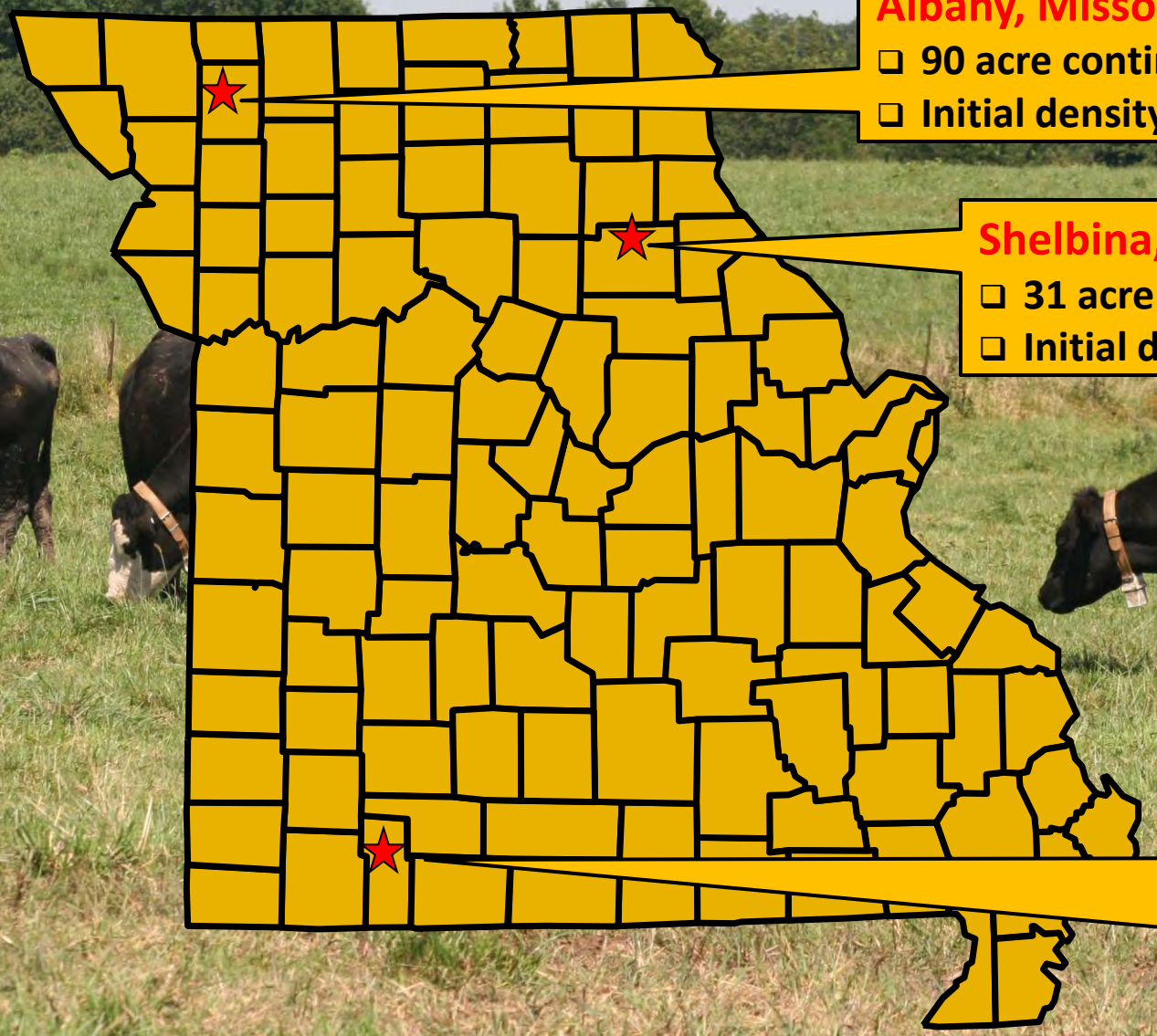
1. **Weed Density**
2. **Forage Grass & Legume Groundcover**
3. **Total Forage Yields**
4. **Beef Cattle Grazing Distribution**



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.

Research Locations



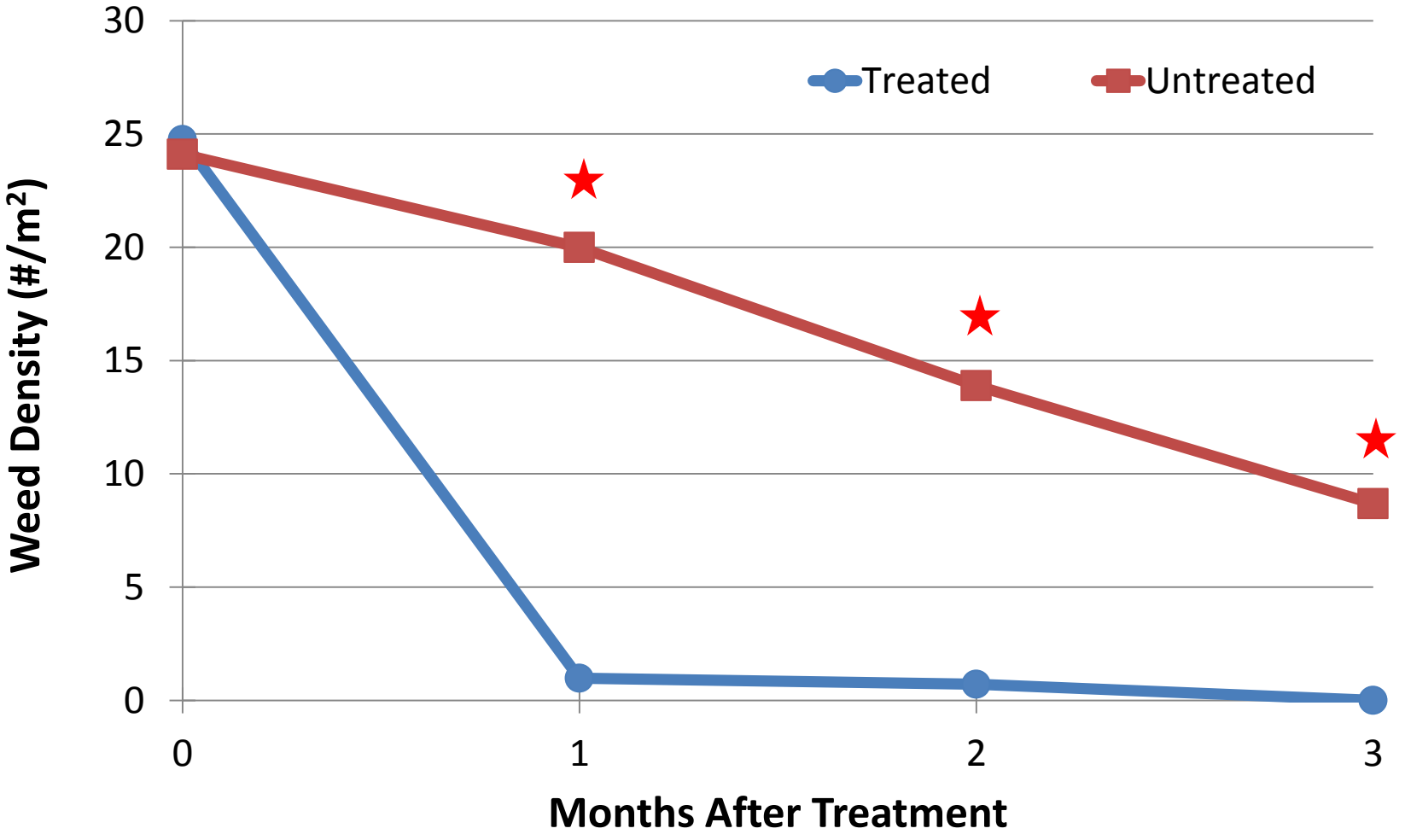
Albany, Missouri (2009):
- 90 acre continuously grazed pasture
- Initial density of 24 weeds/m^2

Shelbina, Missouri (2010):
- 31 acre continuously grazed pasture
- Initial density of 18 weeds/m^2

Galena, Missouri (2009):
- 35 acre continuously grazed pasture
- Initial density of 9 weeds/m^2

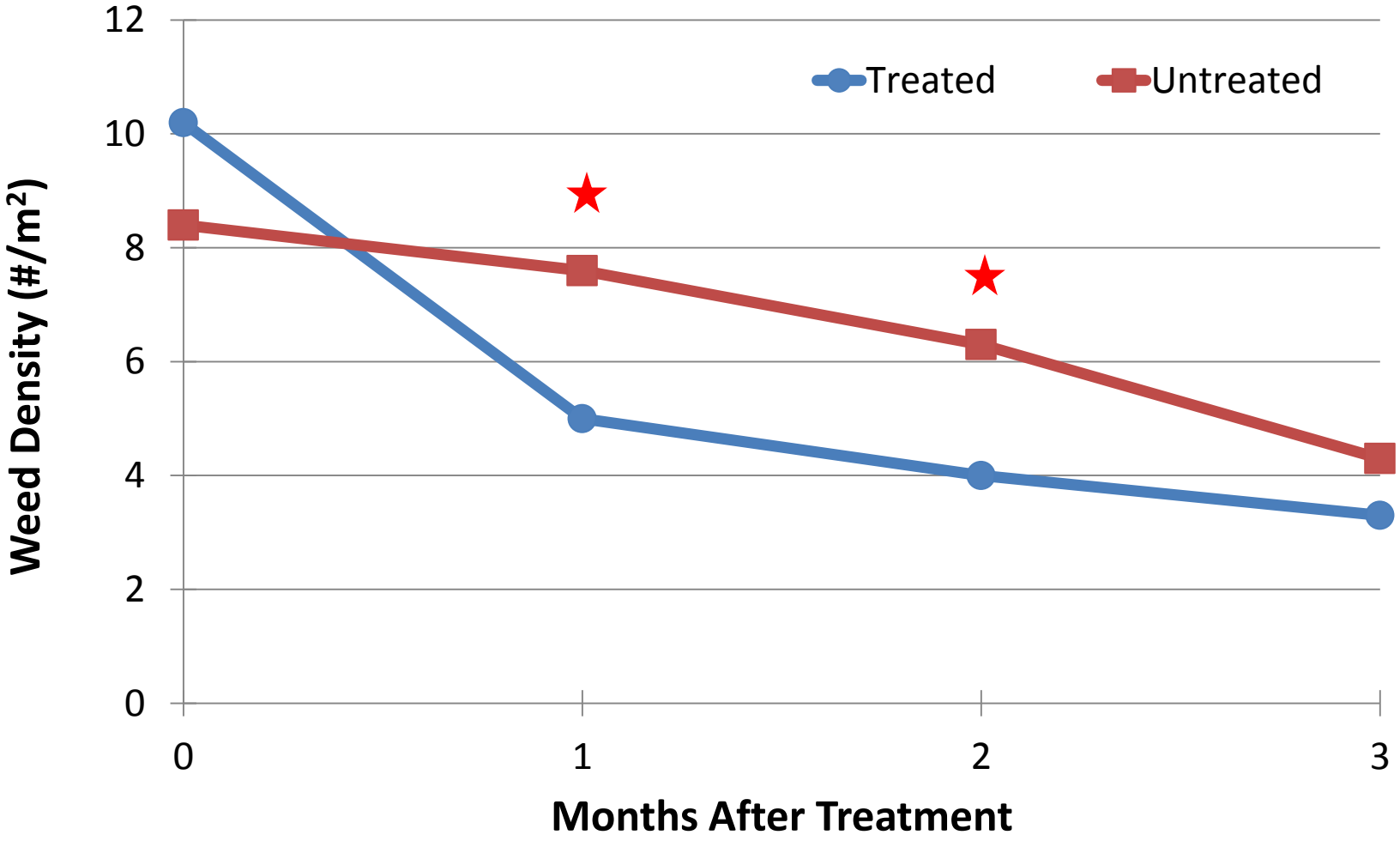
Results: Forage Response

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)



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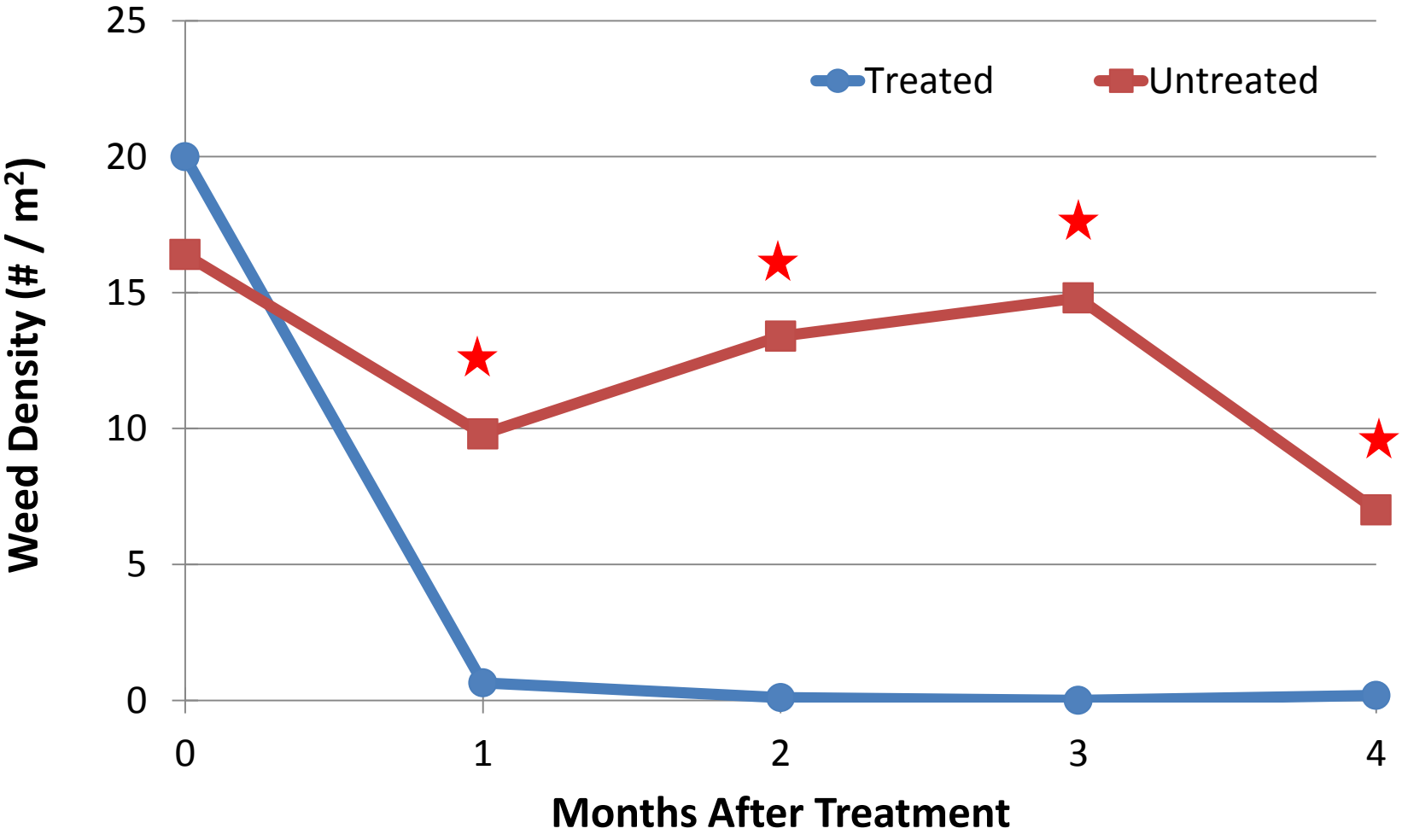
Influence of Pasture Herbicide Treatment on Weed Density over Time (Shelbina, MO 2010)



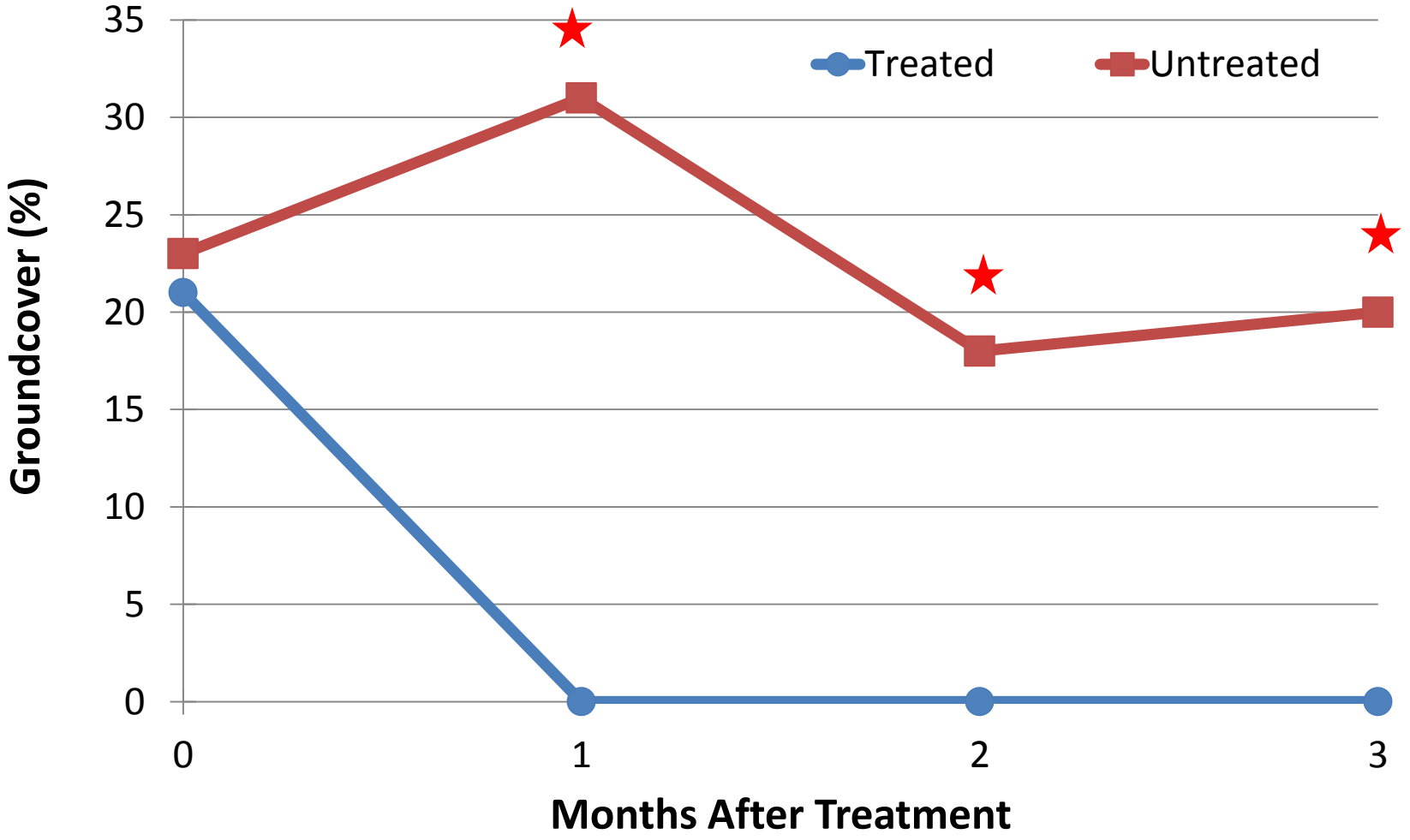
★ Indicates a significant difference between herbicide-treated and untreated weed density, LSD=0.05.

Albany, Missouri 2009


Shelbina, MO 2010
Treated
Untreated


Galena, Missouri 2009
Treated
Untreated

Influence of Pasture Herbicide Treatment on Clover Groundcover over Time (Albany, MO 2009)



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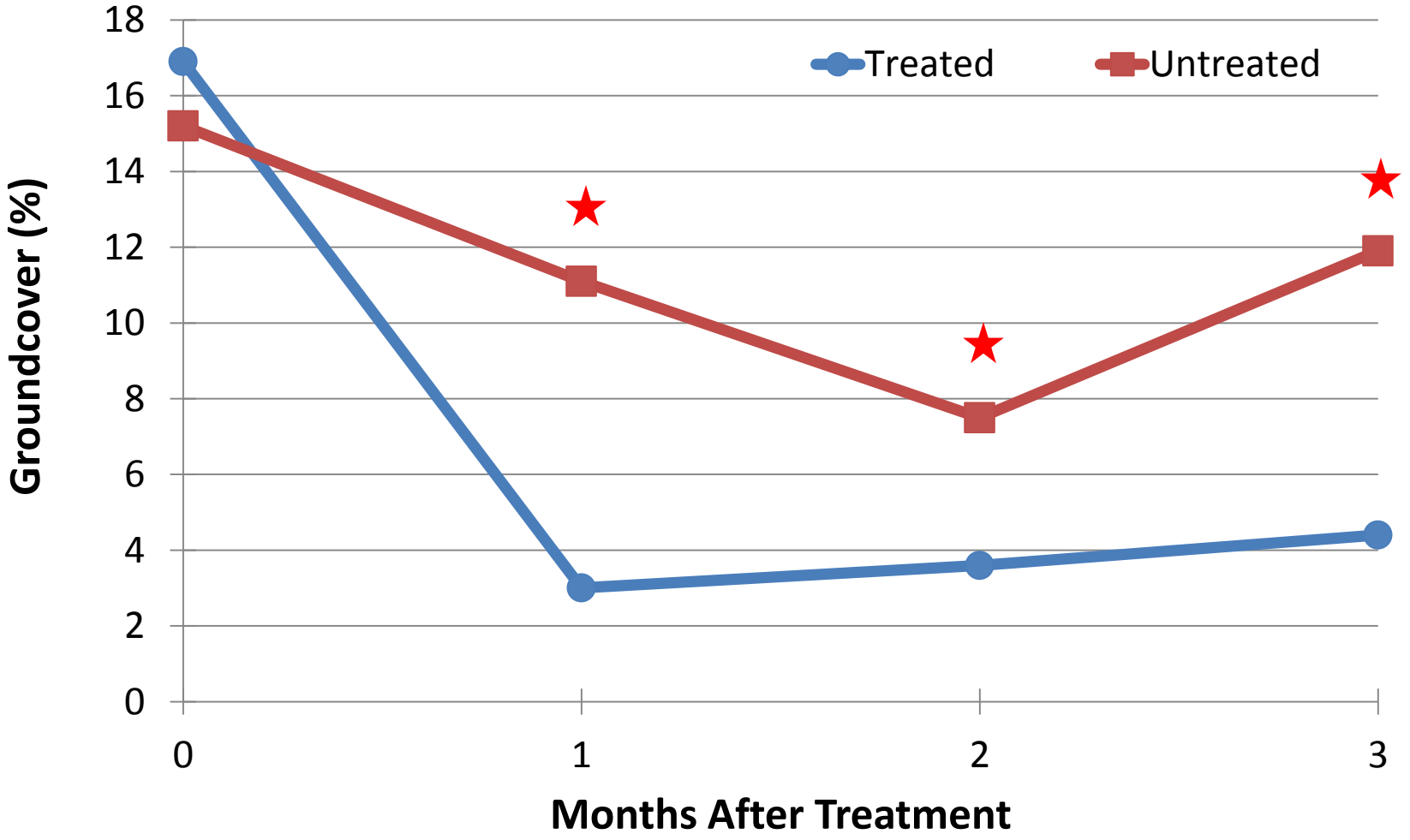
Influence of Pasture Herbicide Treatment on Clover Groundcover over Time (Galena, MO 2009)



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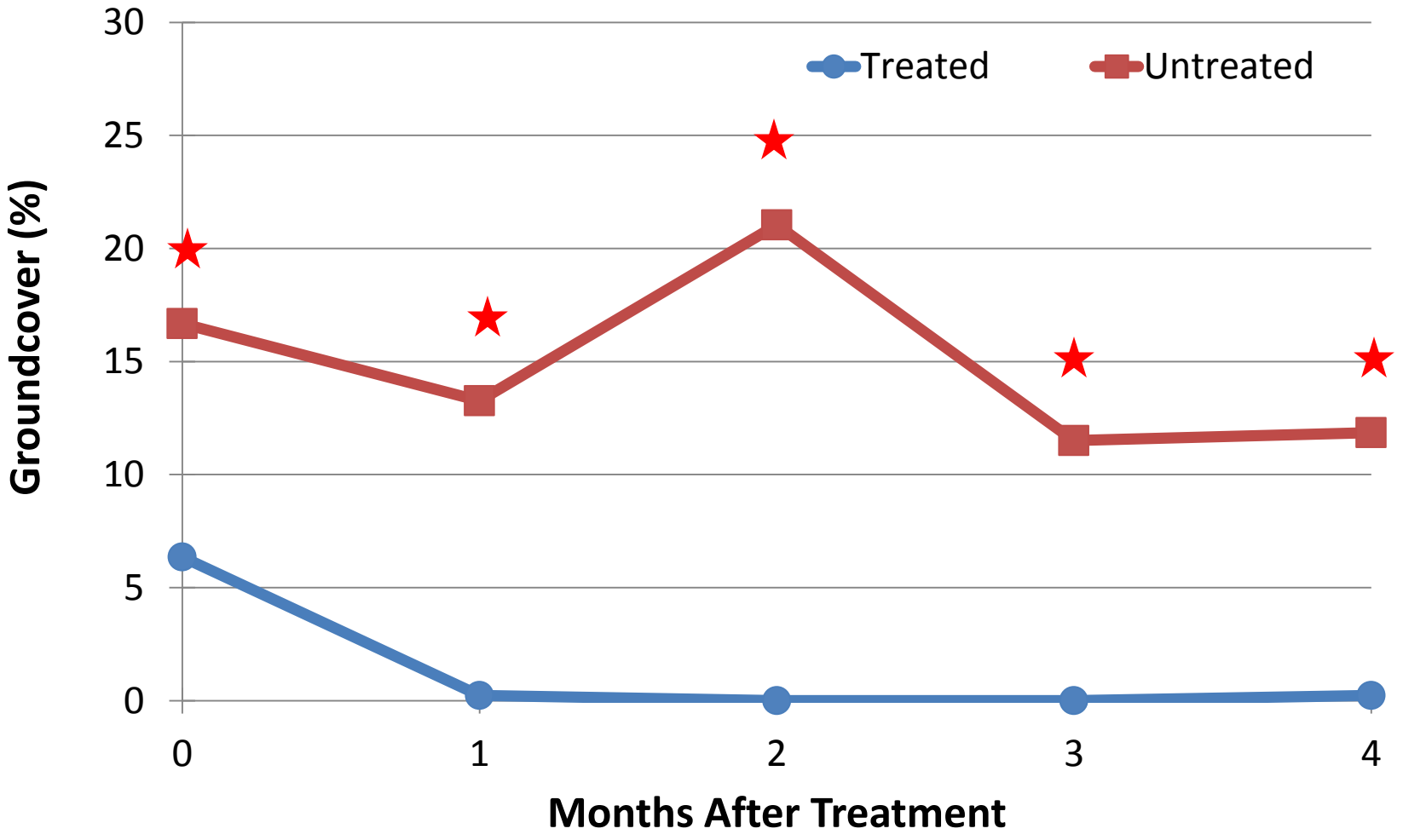
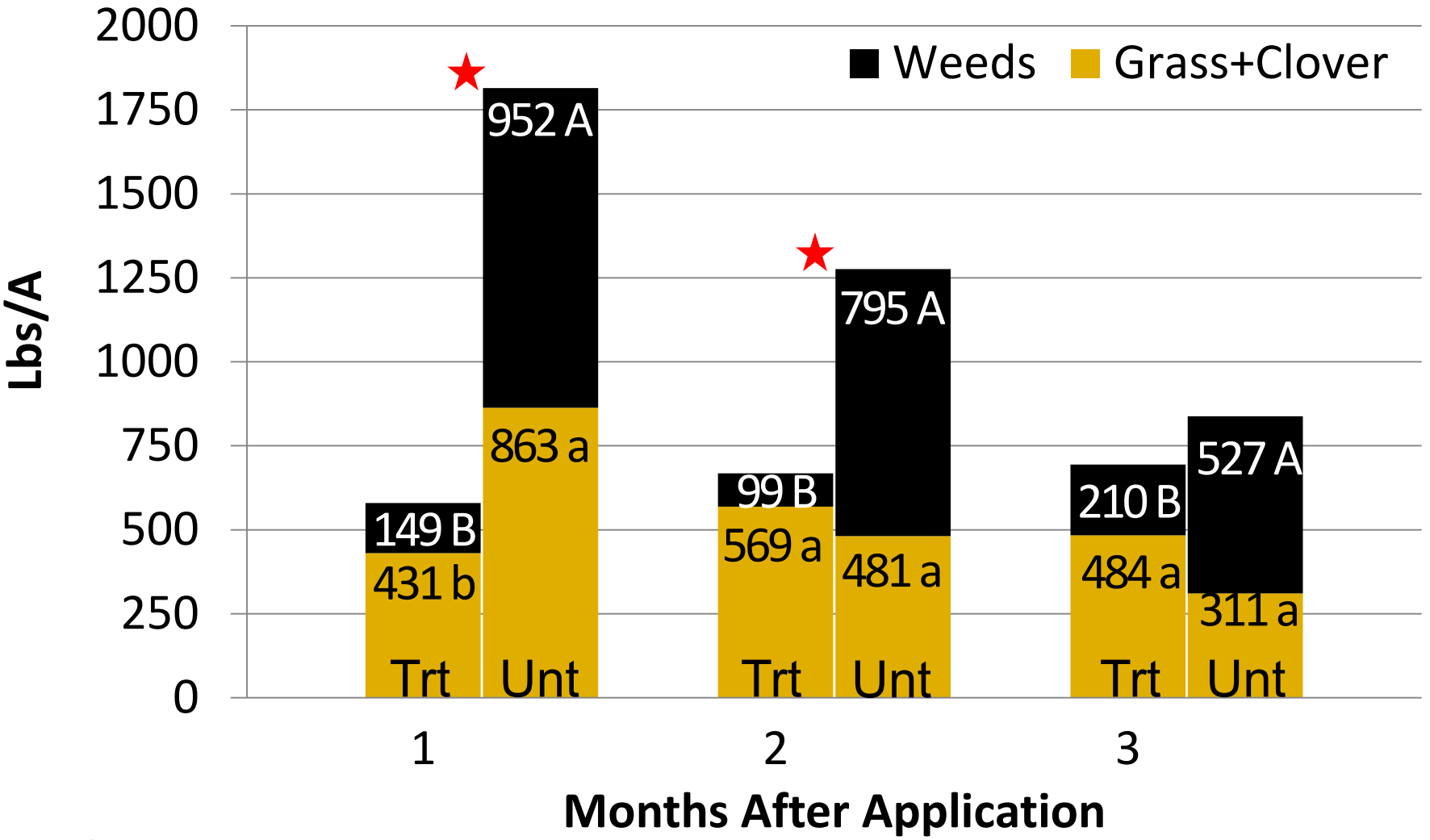
Influence of Pasture Herbicide Treatment on Clover Groundcover over Time (Shelbina, MO 2010)



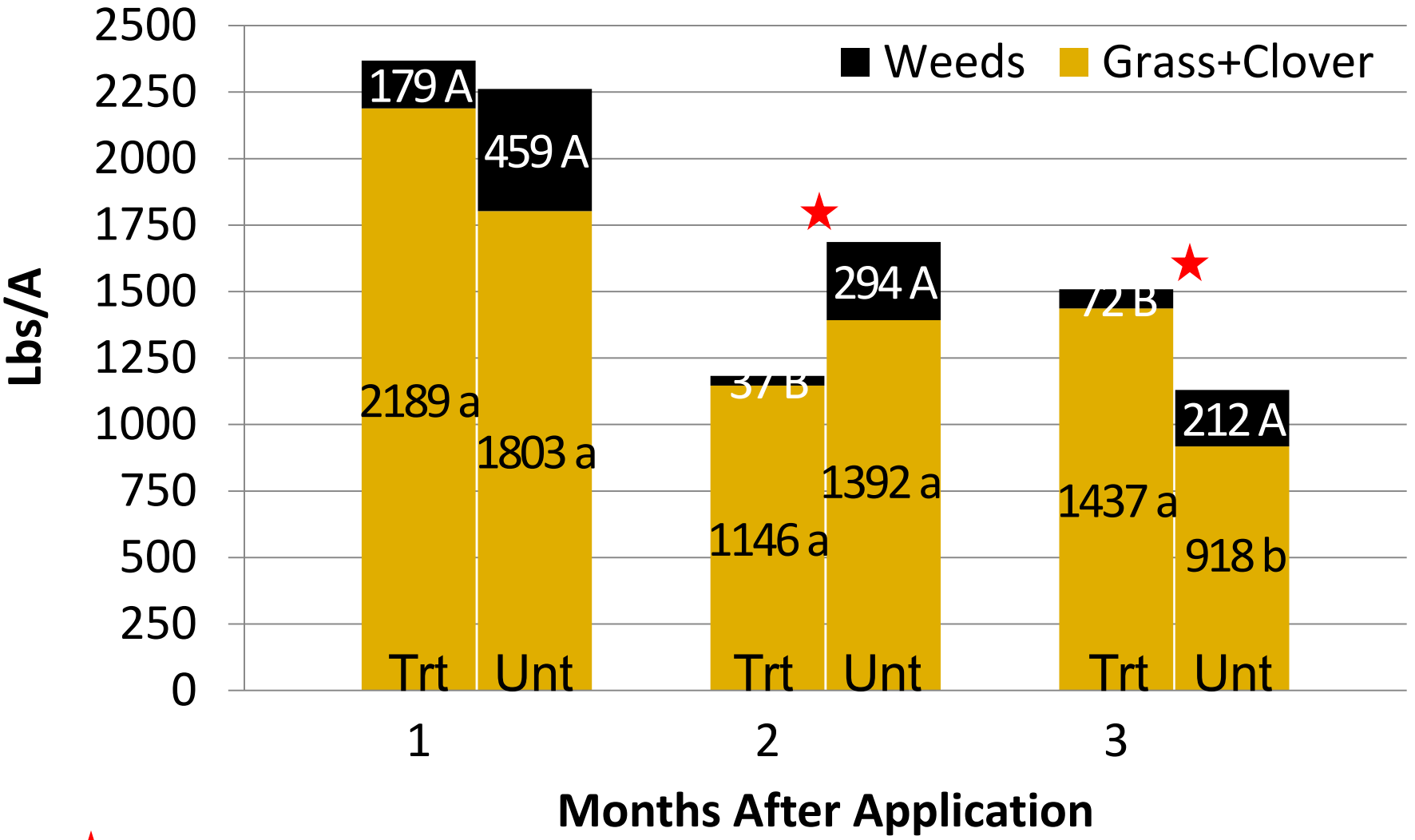
★ Indicates a significant difference between herbicide-treated and untreated weed density, LSD=0.05.

Comparisons of Forage Yield Components Between Herbicide-treated and Untreated Portions of a Pasture for 3 Months Following Application (Albany, MO 2009)



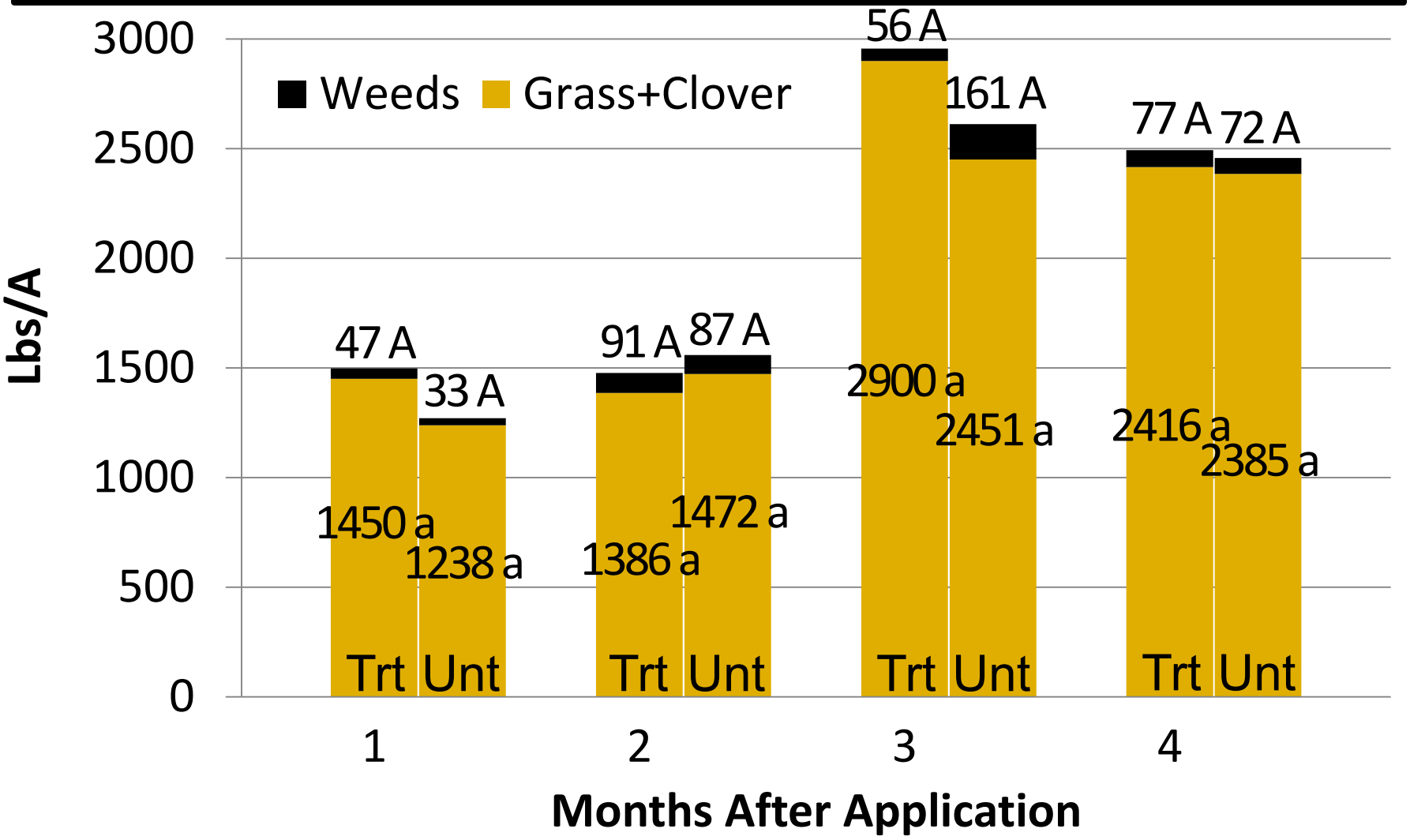
★ Indicates a significant difference between herbicide-treated and untreated total forage yields, LSD=0.05.

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)

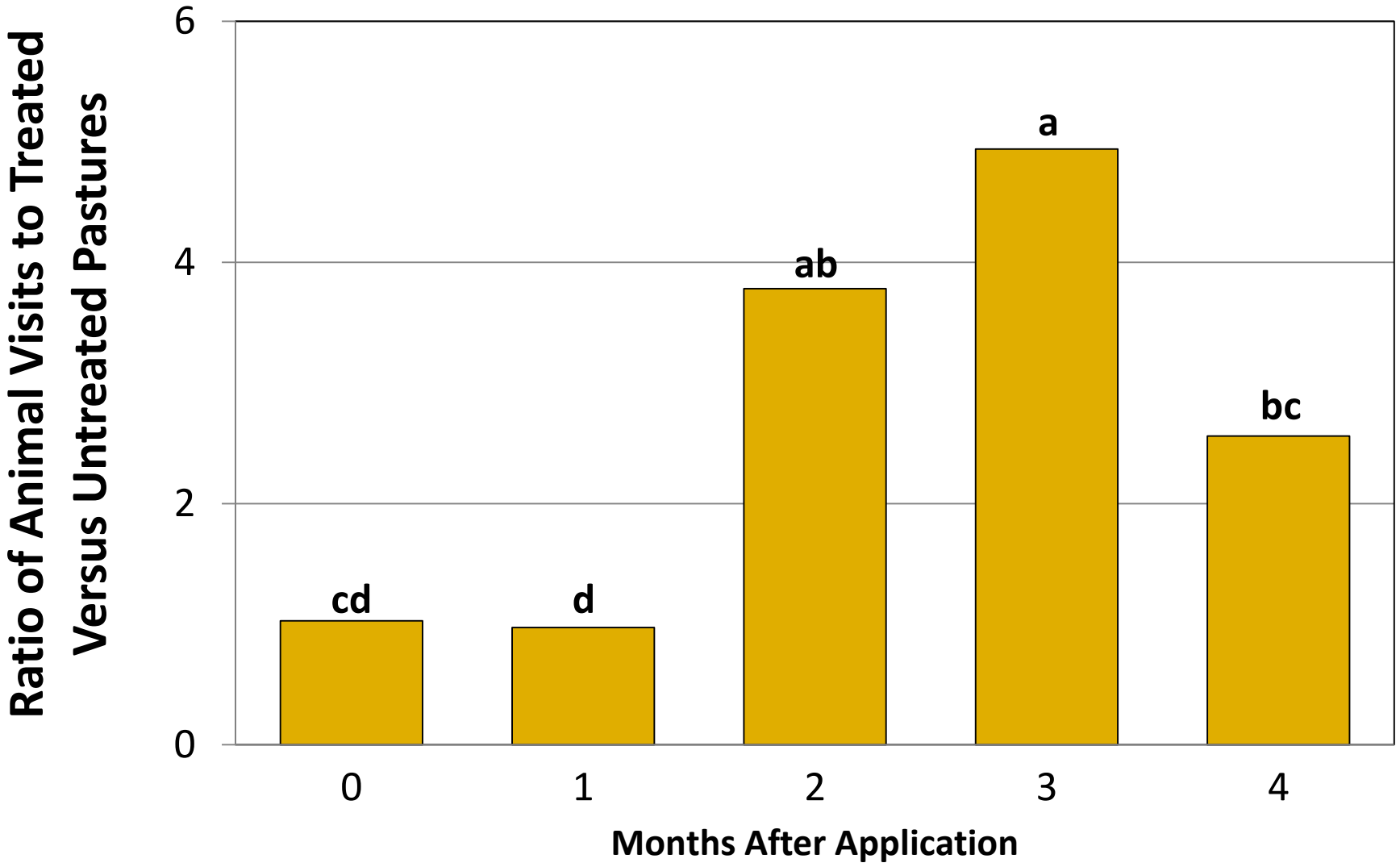


There were no differences between herbicide-treated and untreated total forage yields, LSD=0.05.

Results:

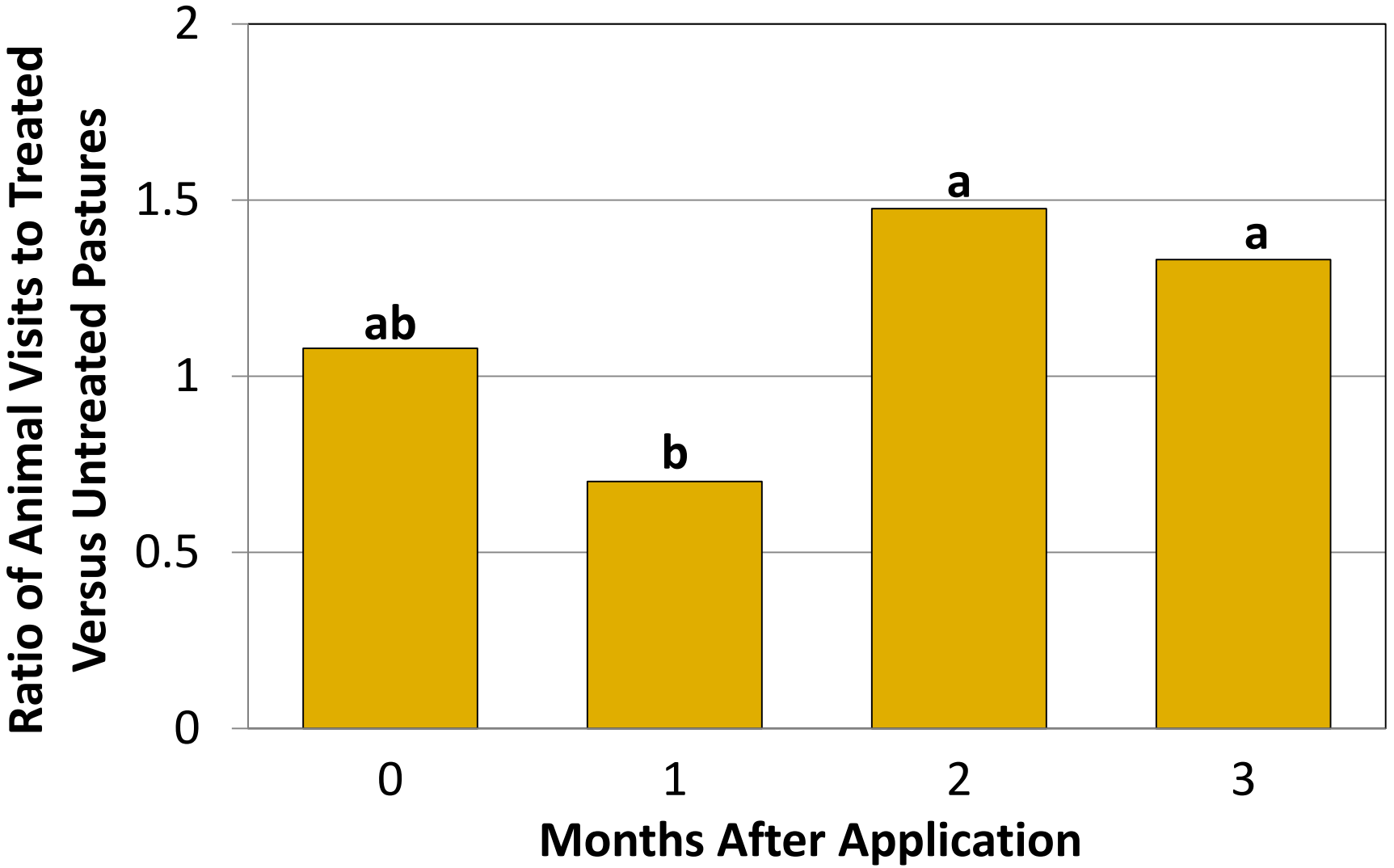
Cattle Grazing Response

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)



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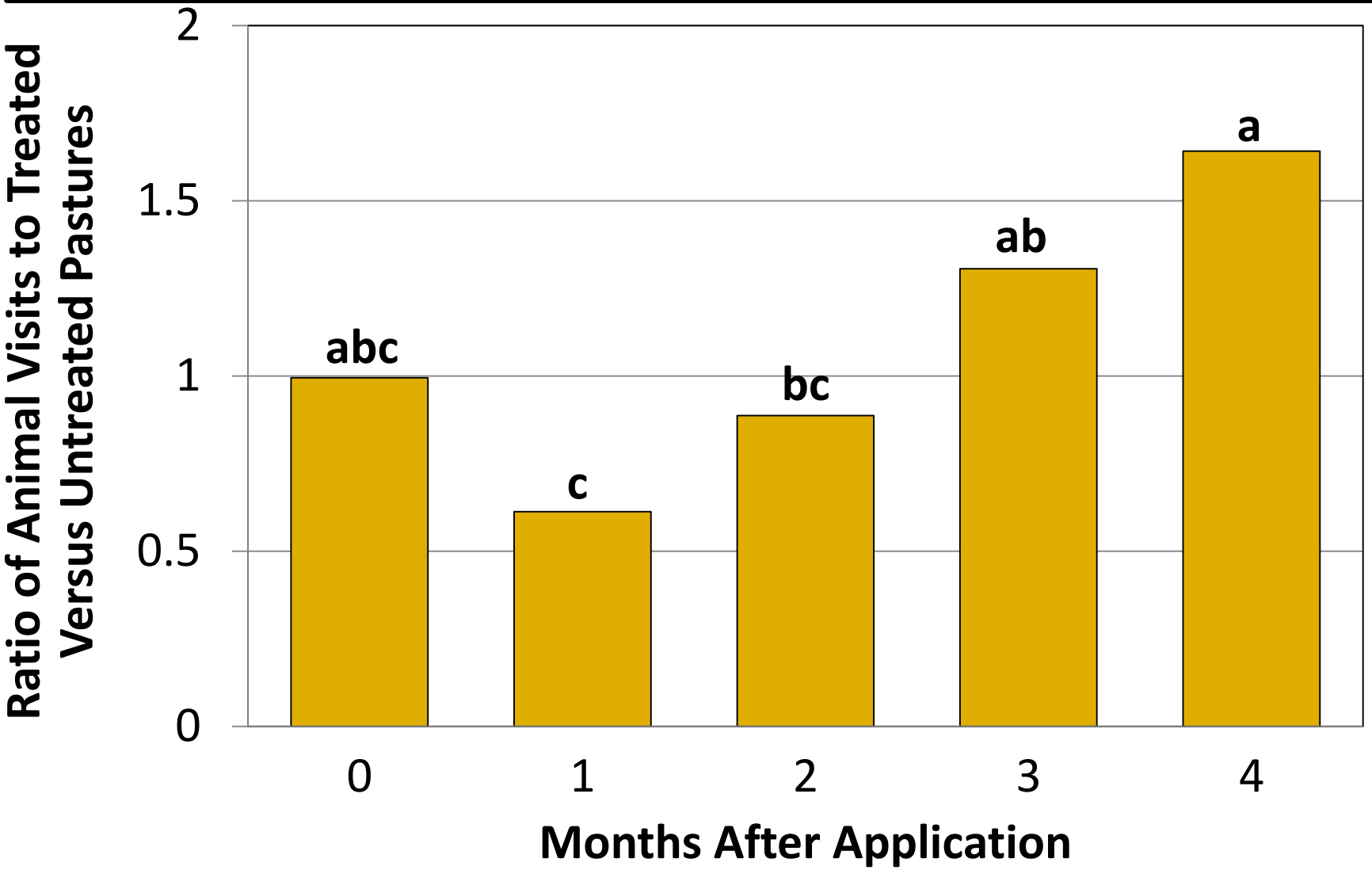
Change in Cattle Distribution on Herbicide-treated and Untreated Portions of a Pasture for 4 Months Following Application (Shelbina, MO 2010)

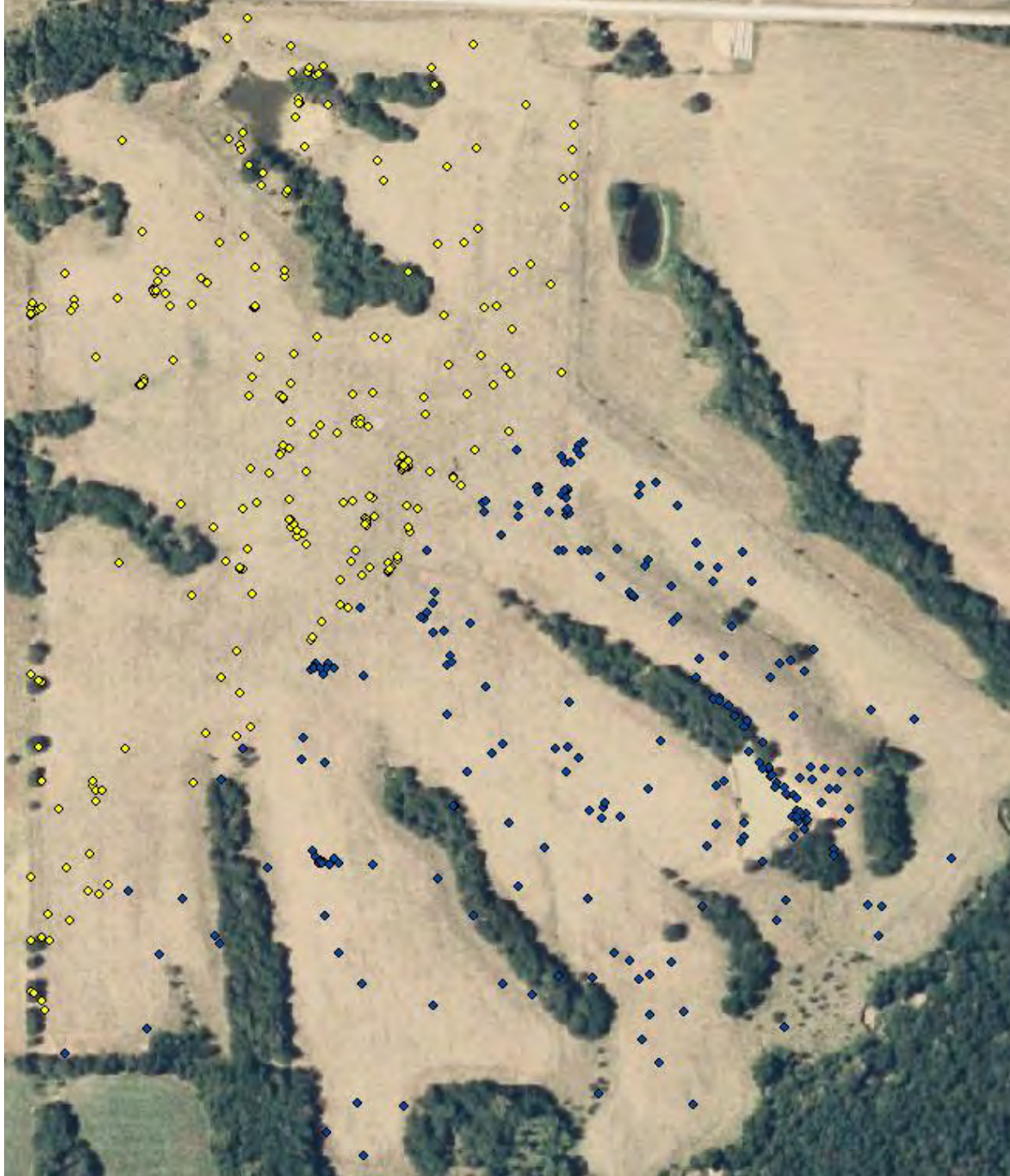


Means followed by the same letter are not different, LSD=0.05.

Albany

Fix Points Prior to Application (7/8-7/29)

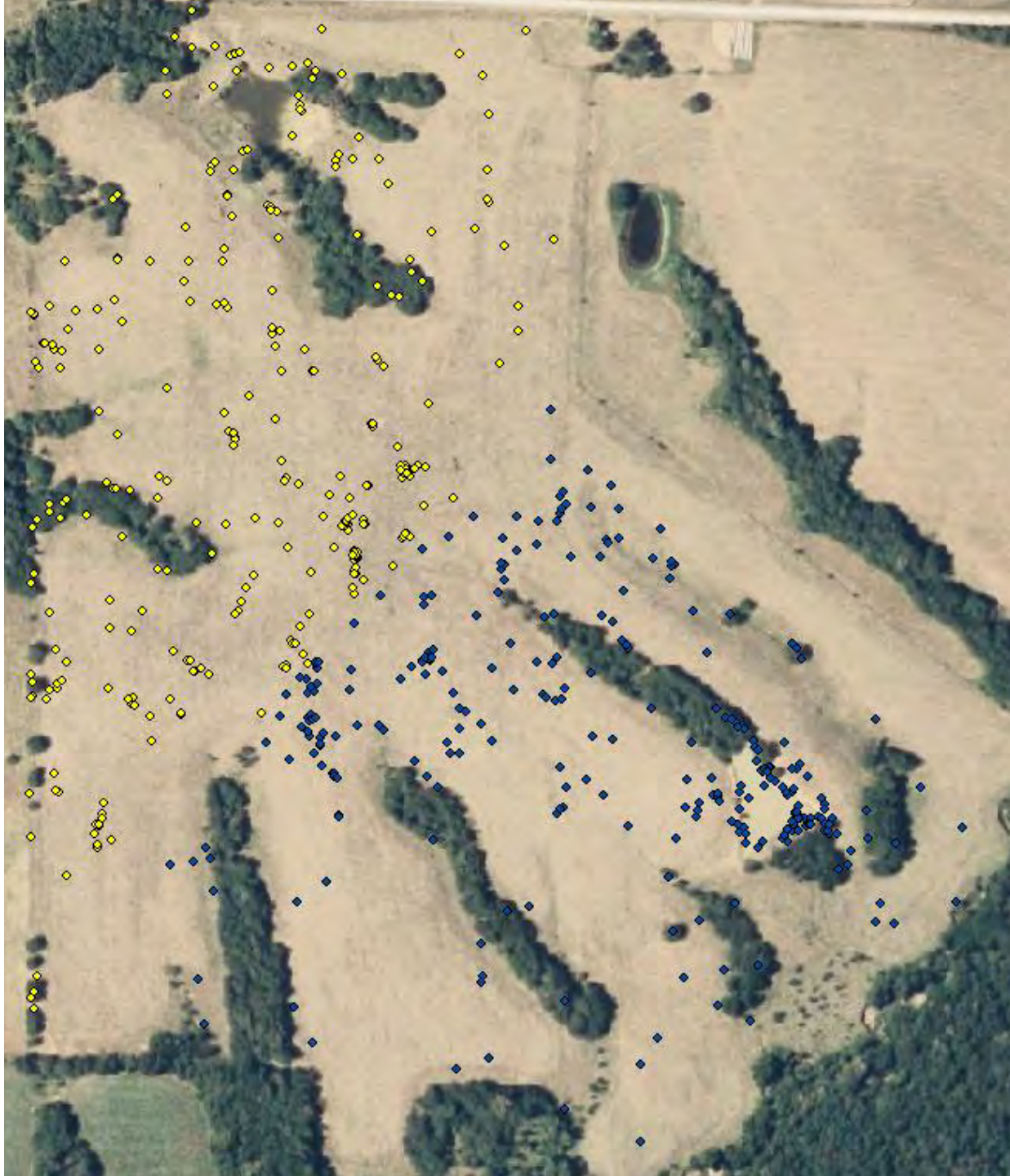
- Treated – 53% (250 fixes)
- Untreated – 47% (225 fixes)



Albany

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

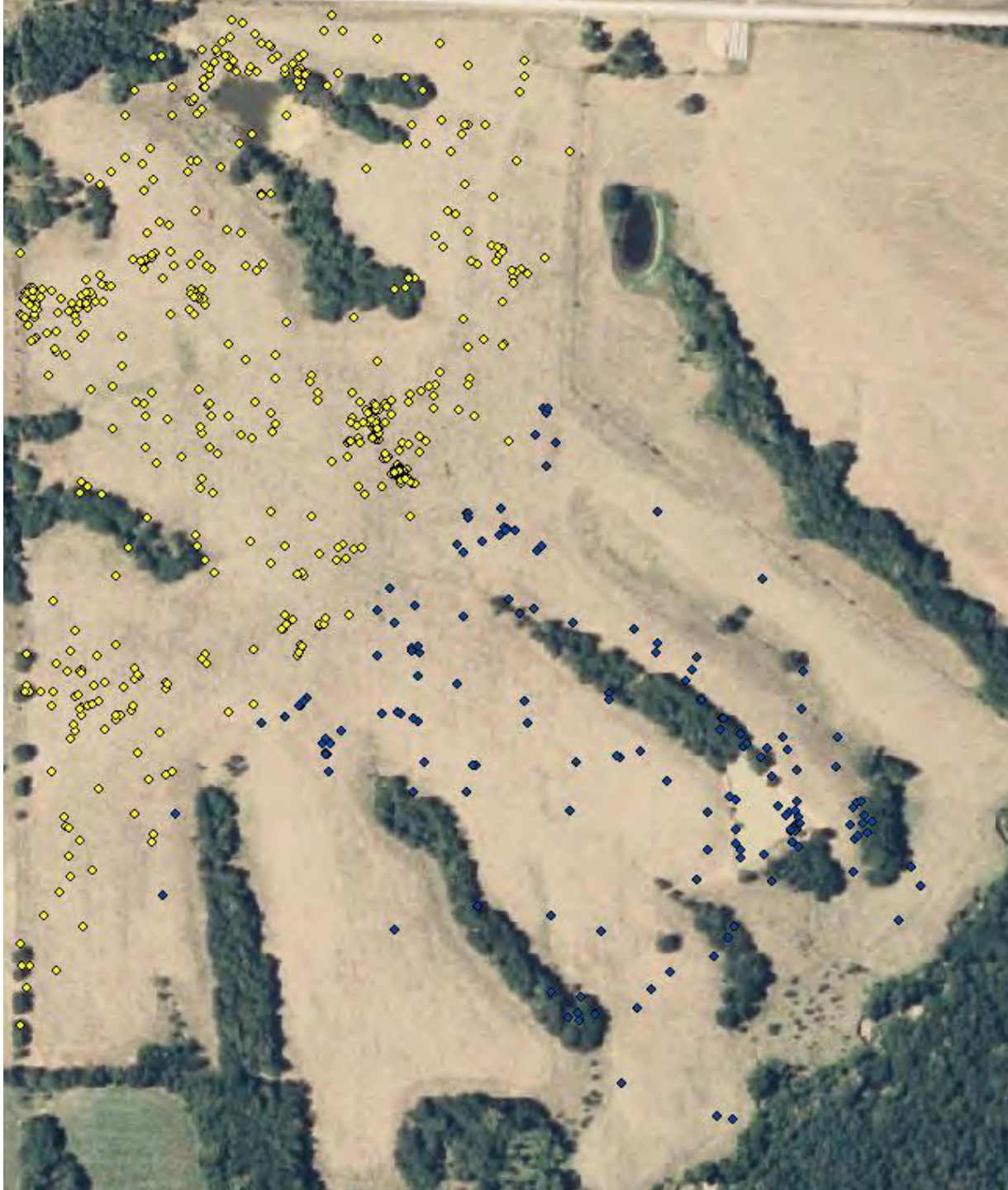
- Treated – 51% (295 fixes)
- Untreated – 49% (283 fixes)



Albany

Fix Points 2 Months After Application (8/26-9/29)

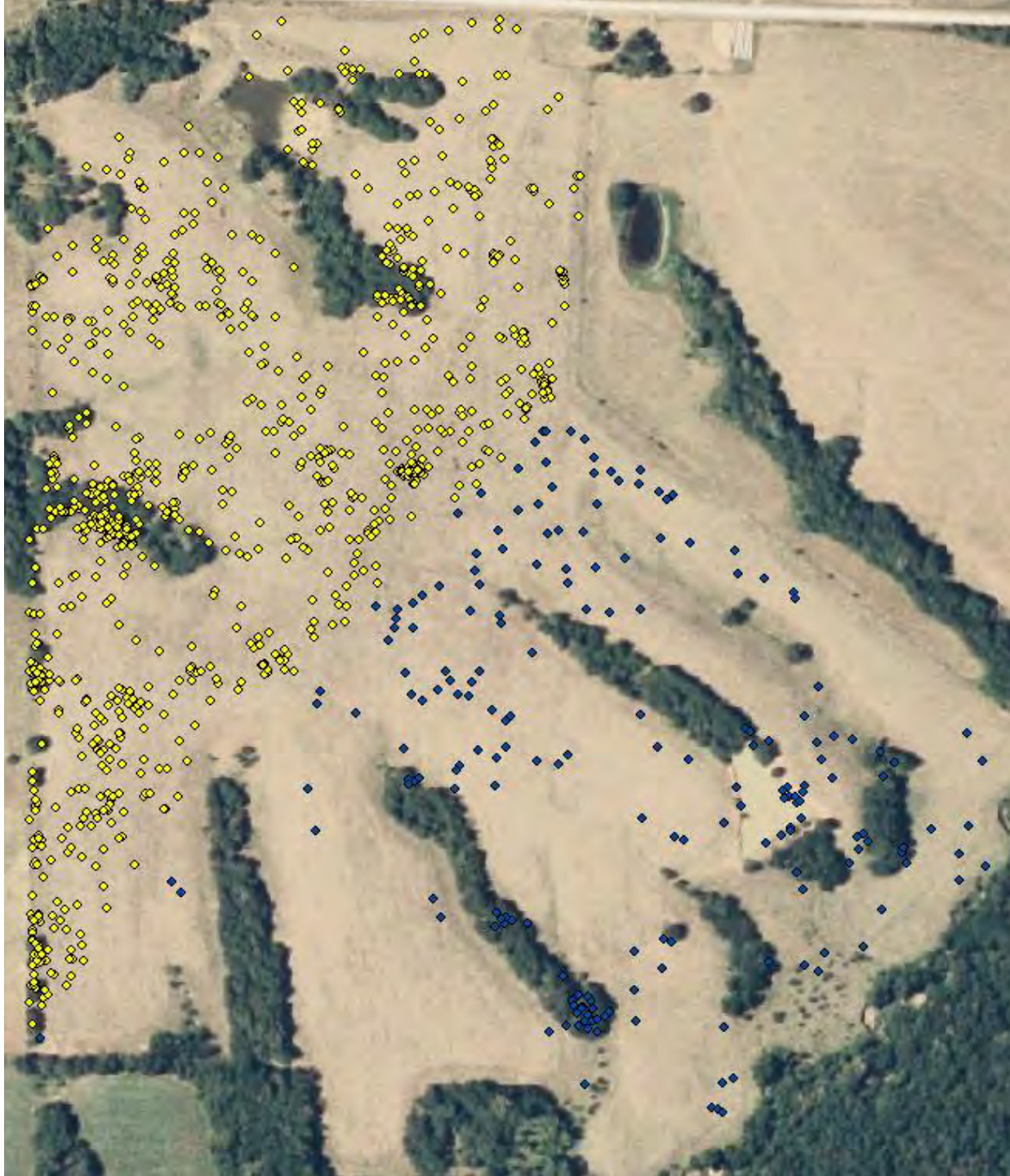
- Treated – 77% (511 fixes)
- Untreated – 23% (156 fixes)



Albany

Fix Points 3 Months After Application (9/30-10/27)

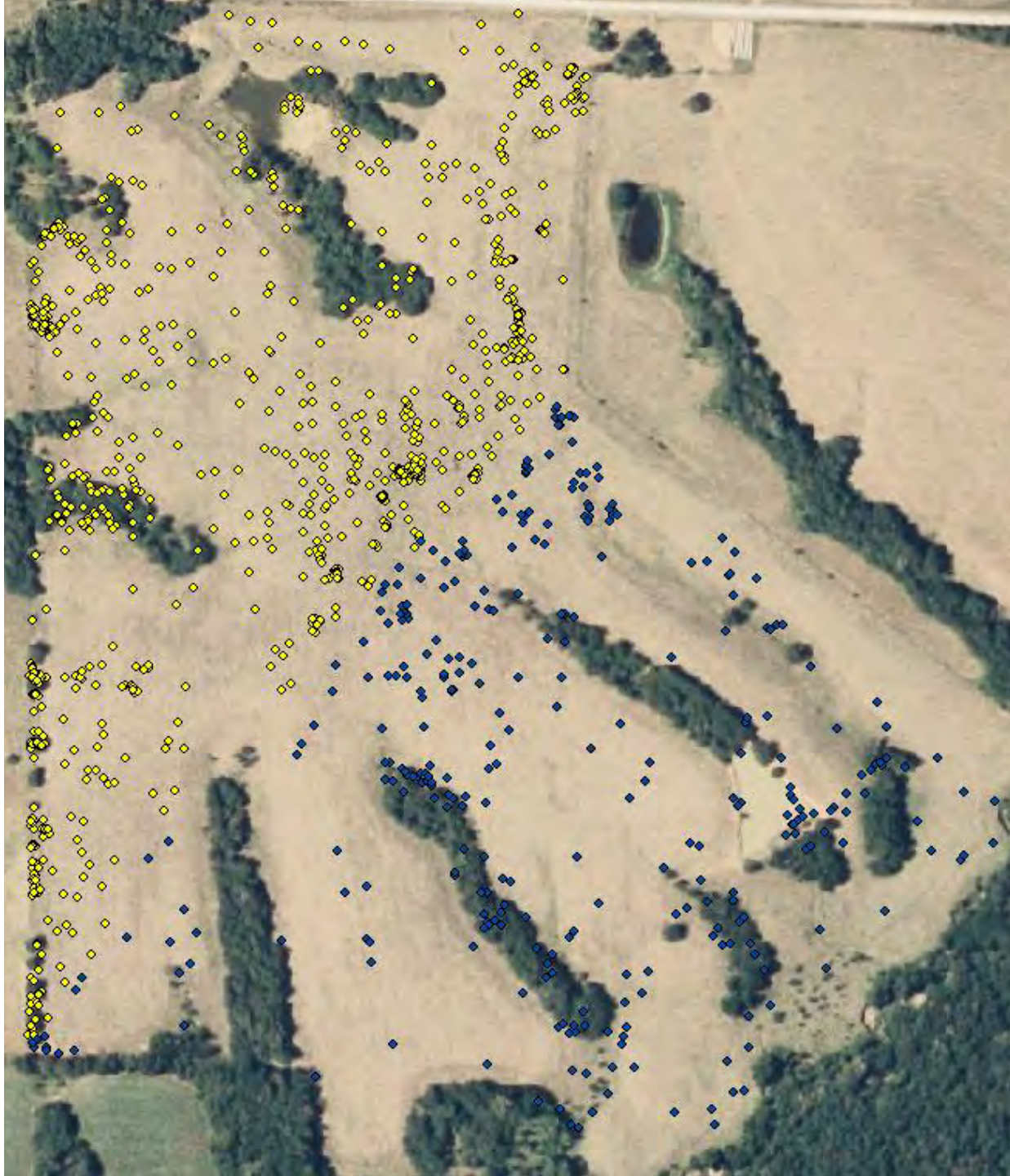
- Treated – 84% (1043 fixes)
- Untreated – 16% (202 fixes)



Albany

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

- Treated – 77% (869 fixes)
- Untreated – 23% (328 fixes)

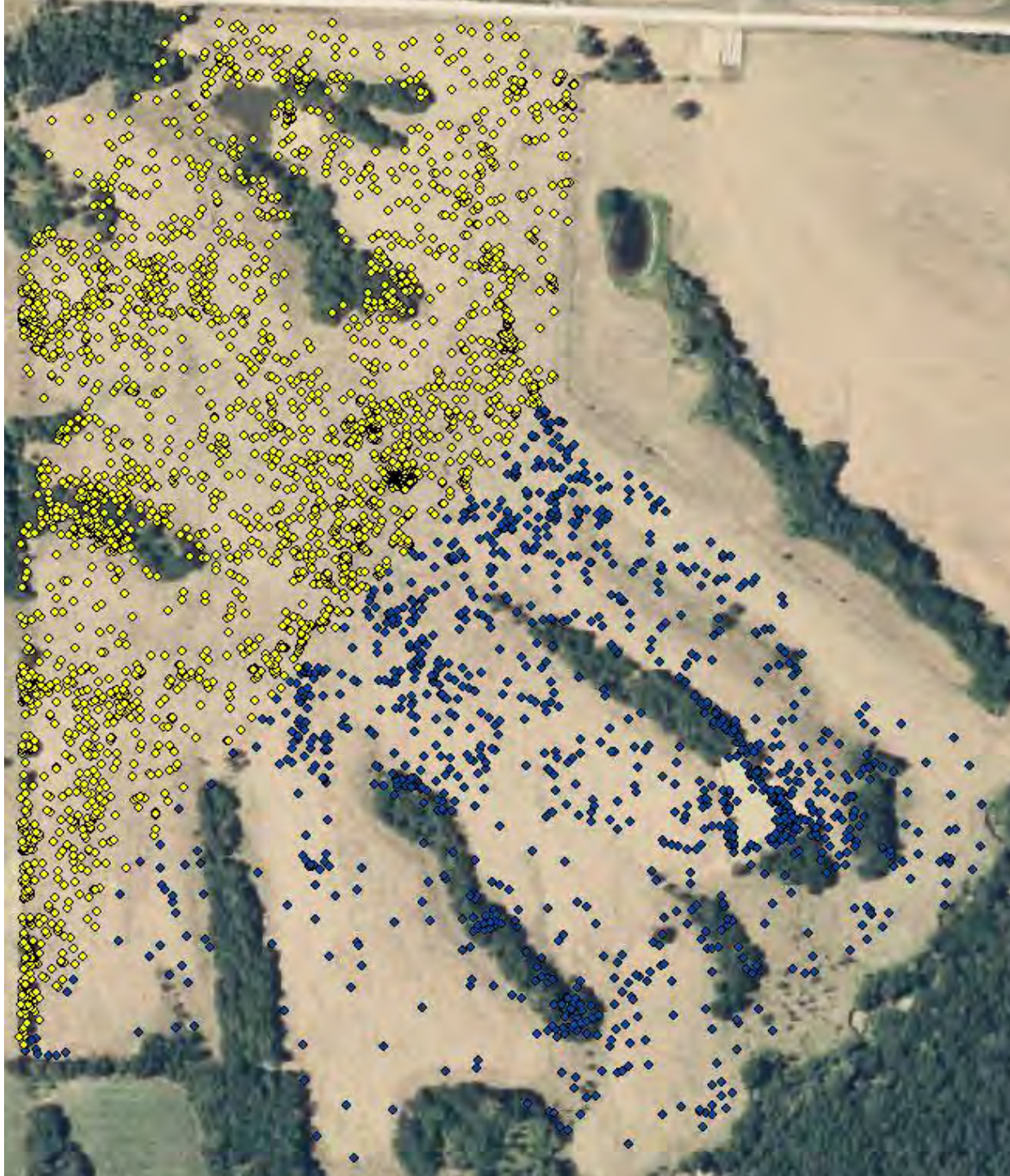


Albany

Fix Points for All 4 Months After Application

Treated -72% (2,718 fixes)

Untreated -28% 969 fixes)



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/m^2, 5x distribution increase
  - Shelbina = 18 weeds/m^2, 1.6x distribution increase
  - Galena = 9 weeds/m^2, 1.5x distribution increase

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