

Understanding the Impact of Weed Diversity & Biomass on Alfalfa Forage Yield, Forage Nutritive Value, Animal Performance, & Production Economics

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Background

Weeds in alfalfa can reduce forage yield and nutritive value, with downstream effects on animal performance and farm economics. This multi-state project quantifies how weed diversity and biomass affect alfalfa forage systems across the western and central United States, and develop tools and outreach to help farmers manage weed impacts on their operations.

1 Weed Impacts on Forage Yield & Nutritive Value

- Evaluate the impact of weed diversity and biomass on forage dry matter yield and nutritive value of established and newly seeded alfalfa:
- Quantify how weed control in newly seeded alfalfa affects weed diversity, forage yield, and alfalfa nutritive value.
 - Estimate the relationship between the proportion of individual weed species and forage nutritive value using artificial mixtures (0, 25, 50, 75, 100% weed biomass by weight).
 - Assess weed diversity, forage yield, and nutritive value of randomly sampled, established alfalfa.

2 Animal Performance & Economics

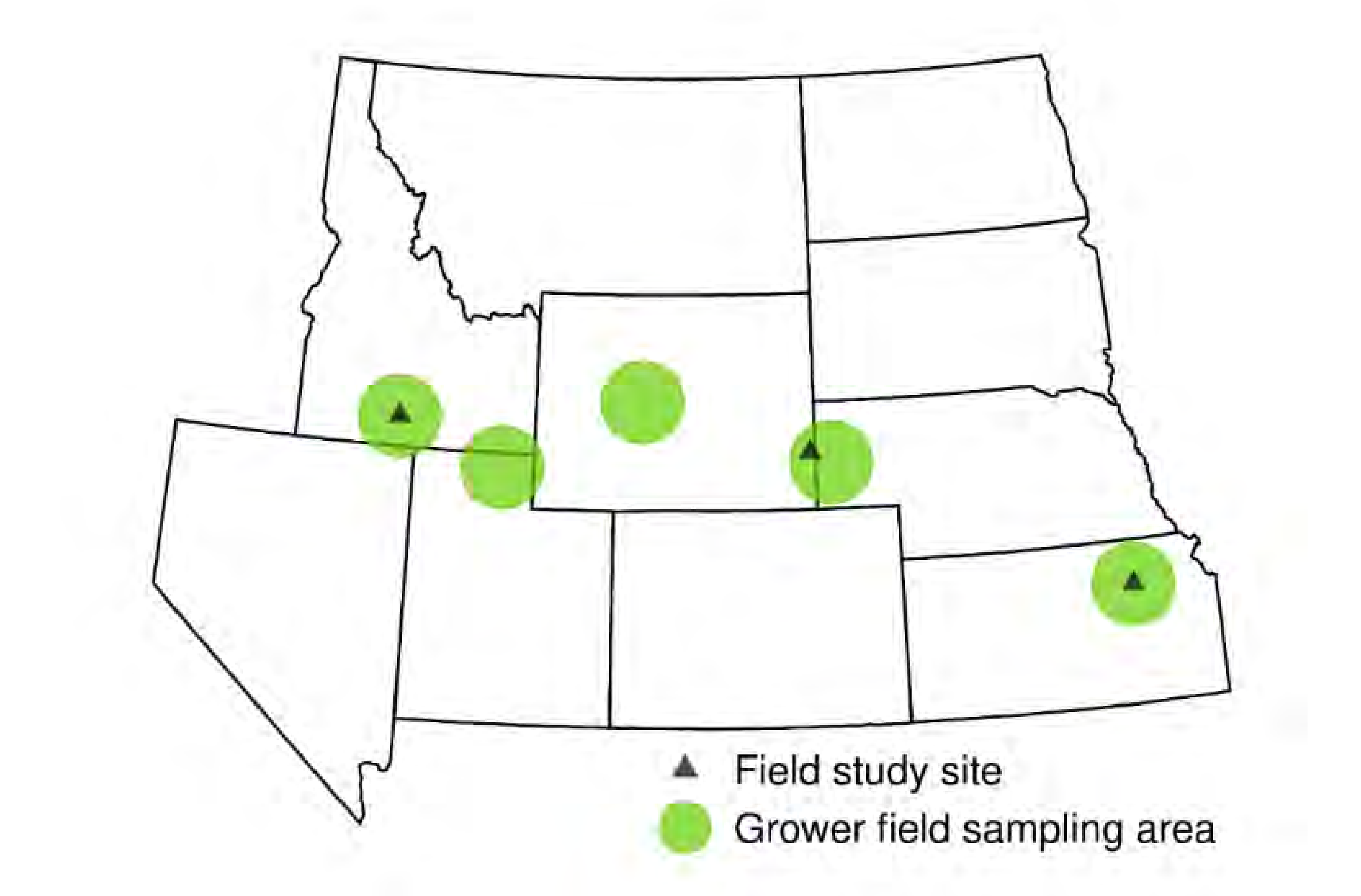
- Quantify the impact of weed biomass on animal performance and production economics:
- Estimate the impact of weeds on milk production.
 - Conduct economic analysis of weed impacts on alfalfa forage production and milk production.

3 Stakeholder Engagement

- Engage stakeholders through multiple approaches to communicate weed impacts on alfalfa yield, nutritive value, milk production, and economics:
- Use interviews and survey questionnaires to understand farmer approaches to weed management in alfalfa.
 - Develop an interactive web-based decision aid illustrating weed impacts on alfalfa forage yield and nutritive value using regional data.
 - Deliver extension presentations and publications to educate stakeholders on best management practices that reduce weed impacts on alfalfa forage yield and nutritive value.

Institutions & Study Sites

- Field research spans five institutions across the western and central United States:
- University of Idaho
 - University of Wyoming
 - Utah State University
 - Kansas State University
 - University of Nebraska–Lincoln



On-going Field Studies

Field studies in Idaho, Kansas, and Wyoming apply a gradient of herbicide treatments designed to generate a range of weed biomass and species composition.

Treatment*	Timing	Rate (g al/ha)
nontreated	–	–
EPTC	PRE	2940
acetochlor	Early POST	1260
imazamox	POST	44
bromoxynil	POST	420
imazamox + bromoxynil	POST	44 + 420
EPTC fb imazamox	PRE fb POST	2940 fb 44
EPTC fb imazamox + bromoxynil	PRE fb POST	2940 fb 44 + 420
acetochlor fb imazamox	POST	1260 fb 44
acetochlor fb imazamox + bromoxynil	POST	1260 fb 44 + 420

*Herbicide treatments were selected to create a weed biomass and species gradient.

Sample plot photos — Kimberly, ID site



Expected Results/Outcomes

Preliminary data generated by Dr. Adjesiwor are informing two key project outputs:

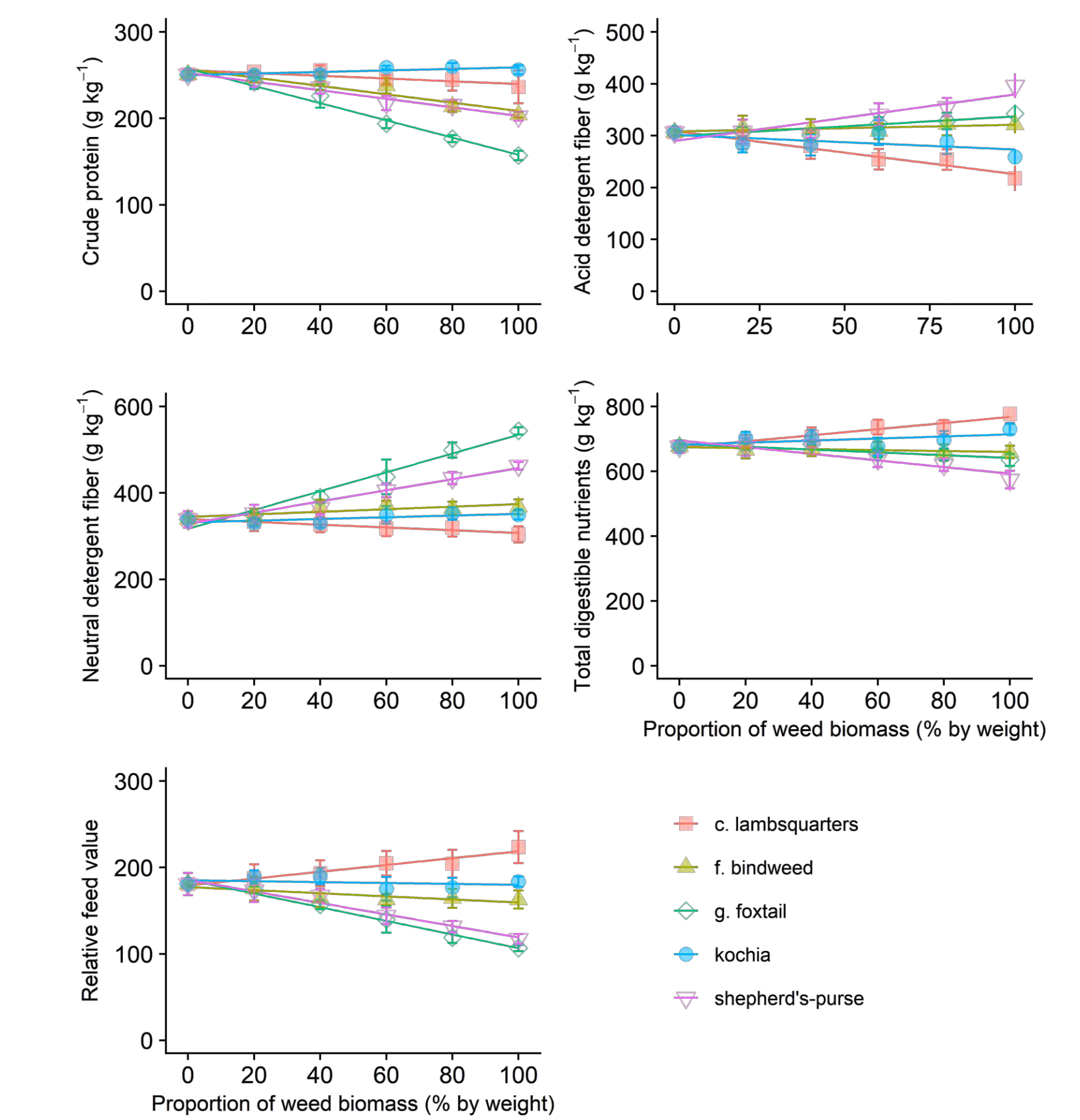


Figure 1. Sample weed biomass threshold developed from preliminary data.

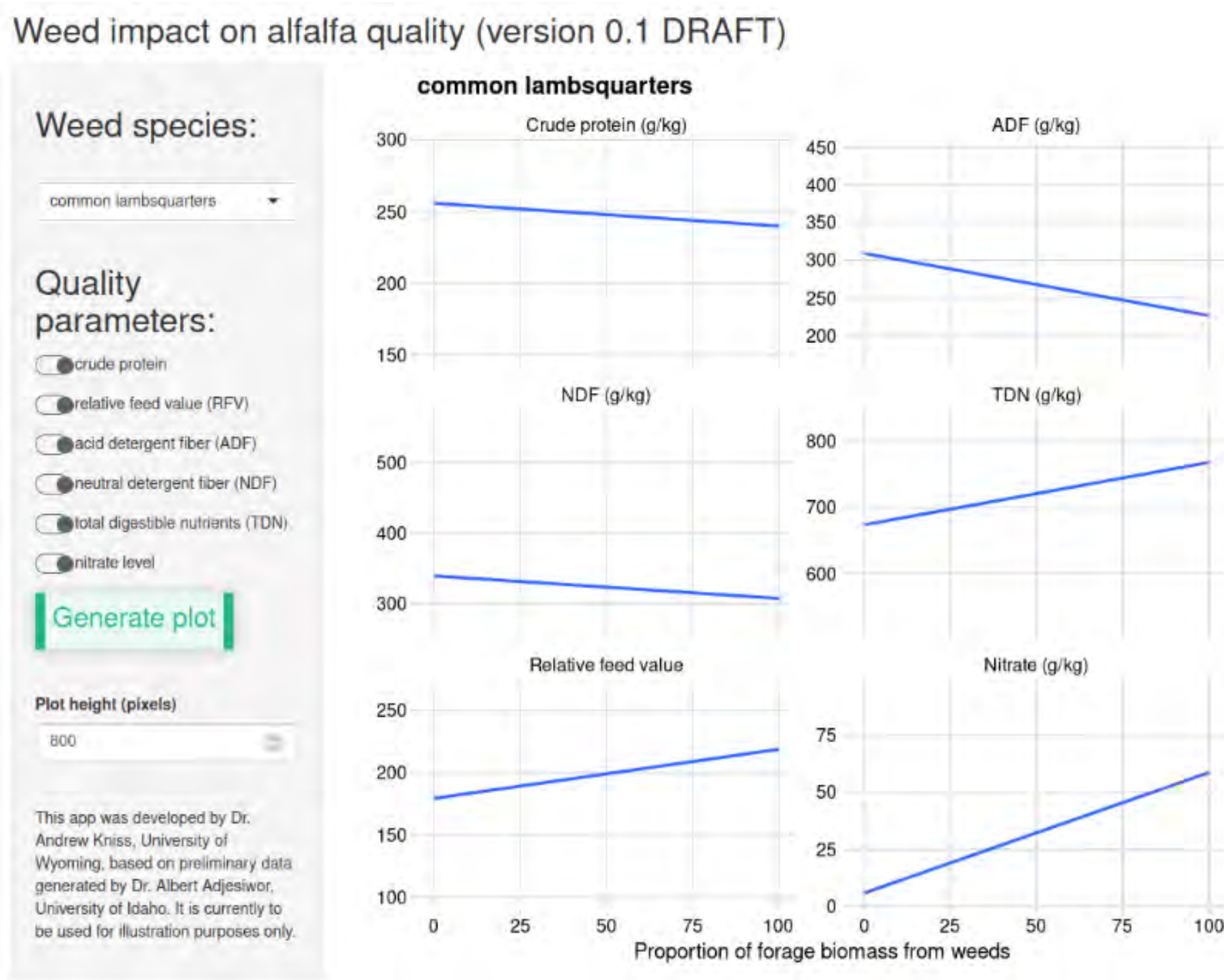


Figure 2. Interactive web app (Dr. Kniss) illustrating weed impacts on alfalfa forage quality. Draft: wyoweeds.shinyapps.io/AlfalfaQuality/

This project will provide a greater understanding of how individual broadleaf and grassy weed species and biomass affect alfalfa forage accumulation, nutritive value, milk production, and economic returns.

Acknowledgment



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