



Utilization of Sprouted Grains as an Alternative Source of Energy in the Dairy Cow Ration

B.M. Roque, C.R. Phillips, and C.A. Daley- College of Agriculture, California State University, Chico



INTRODUCTION

California's drought has severely impacted the state's \$8 billion dairy industry. Over 200 dairies went out of business in the last 2 years alone because of the disparity between cost of production and milk prices. Producers are interested in sprouted barley or triticale, as an alternative energy source that can be grown on-farm and used as a replacement for the concentrate component of the ration, which tends to be the most expensive. Producers using sprouts have reported significant cost savings without loss in milk production suggesting fodder can be used as a replacement for grain in the dairy cow ration. Due to the unknown effects of sprouted grains on a dairy cow ration, *we hypothesize because sprouted grains are able to break down so quickly in the rumen, it will provide available energy for rumen microbial replication and digestion; thus improving the rate of degradation of all feeds.*

OBJECTIVES

To better understand the utility of fodder as an energy source for the dairy cow, two studies were conducted to determine the overall digestibility of fodder in the rumen microenvironment and to establish changes in feed degradation rates when fodder is present in the rumen.

MATERIALS & METHODS

In-Situ Degradation

1. Rations

- 2 weeks prior to bag placement, two cannulated heifers were each preconditioned with appropriate rations: sprouted grains and traditional corn grain TMR
- Opposite diets were given during replicate trial

2. In-Situ Bag Placement

- 12 Time Point Intervals were used during the 5 day trial
- Corn, Alfalfa, and Sprouted Grains were placed in individual bags for degradation
 - 2 replicate bags were used for each of the three feed samples

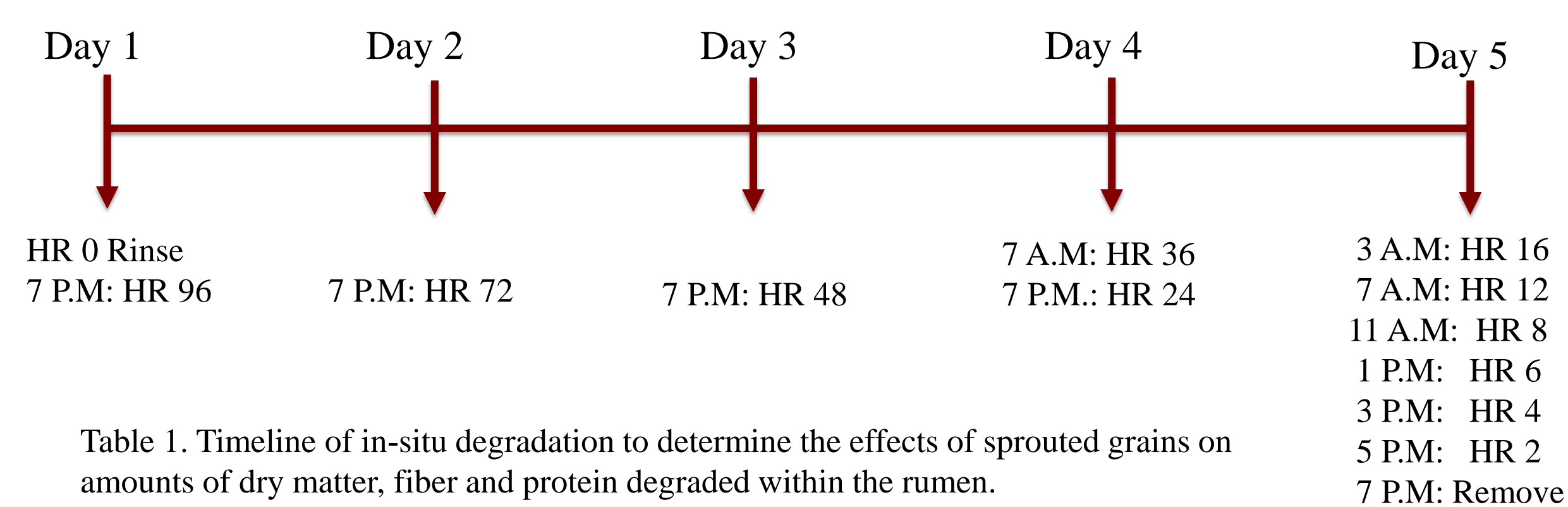


Table 1. Timeline of in-situ degradation to determine the effects of sprouted grains on amounts of dry matter, fiber and protein degraded within the rumen.

MATERIALS & METHODS

3. In-Situ Bag Removal

- All bags were removed at the end of day 5, rinsed, spun and dried
 - 1 minute rinse, 2 minute spin for 30 minutes
 - Dried for 48 hours at 55 degrees Celsius

4. Data Collection

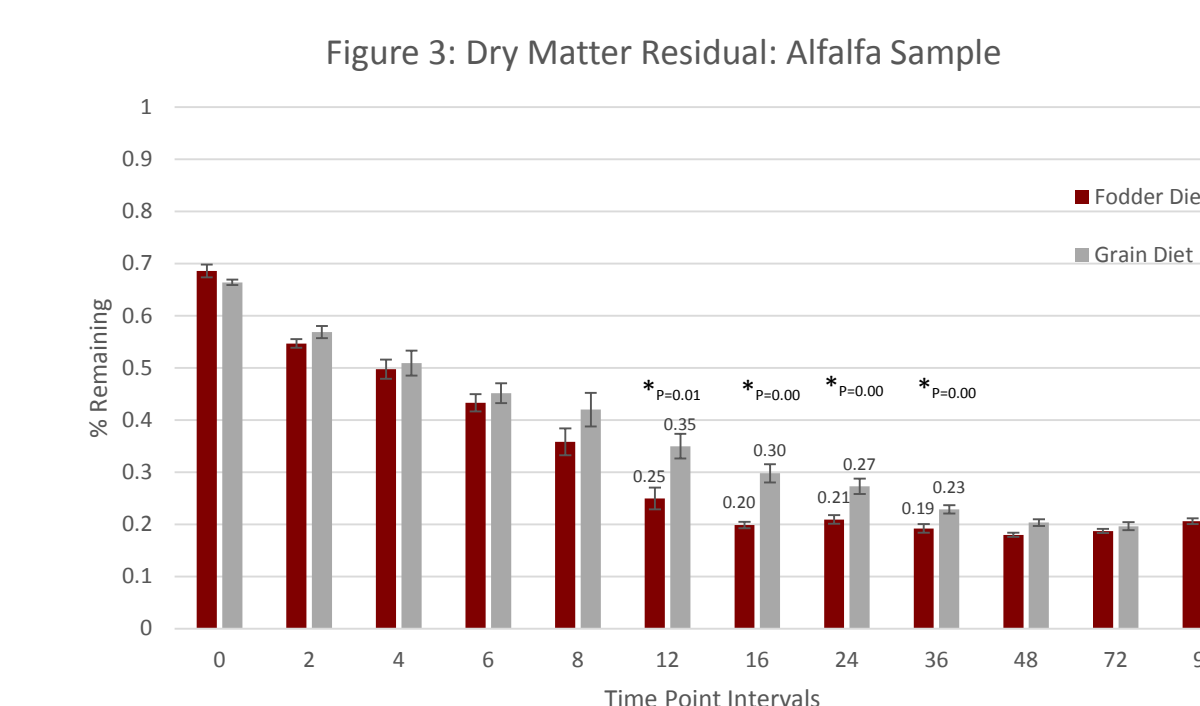
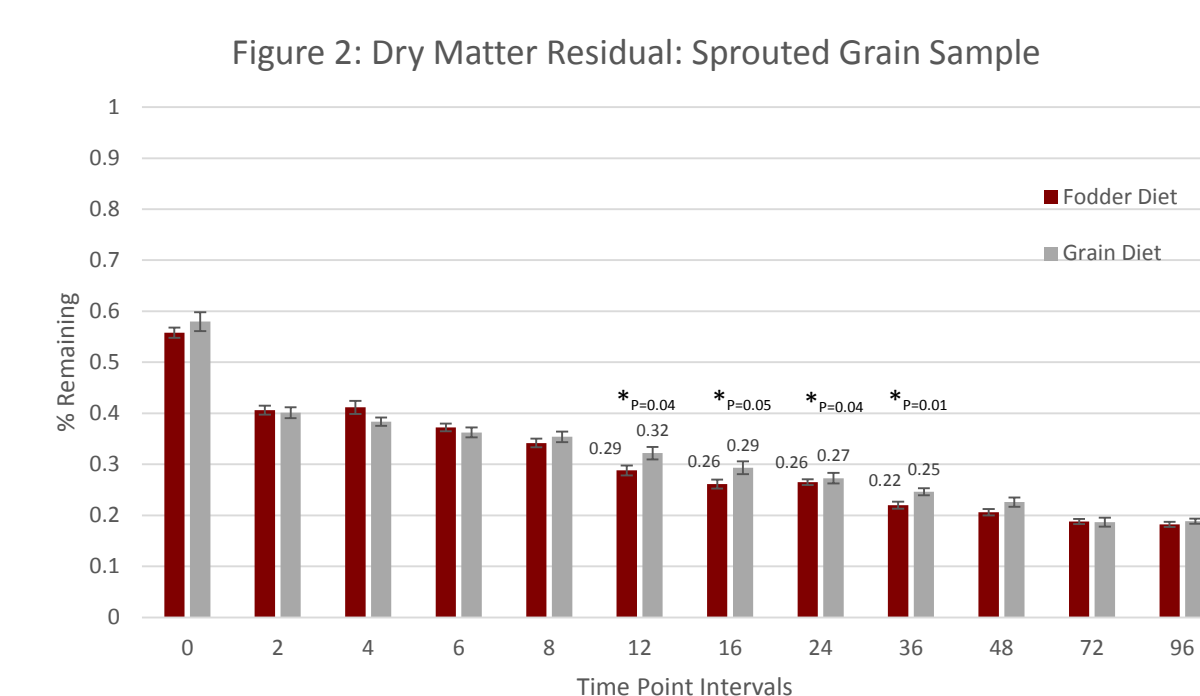
- Data was collected for dry matter percentage, fiber, and protein analyses.
- Dry matter and fiber percentages were analyzed through ANOVA (SPSS Analytical Software)
- Protein analyses are underway



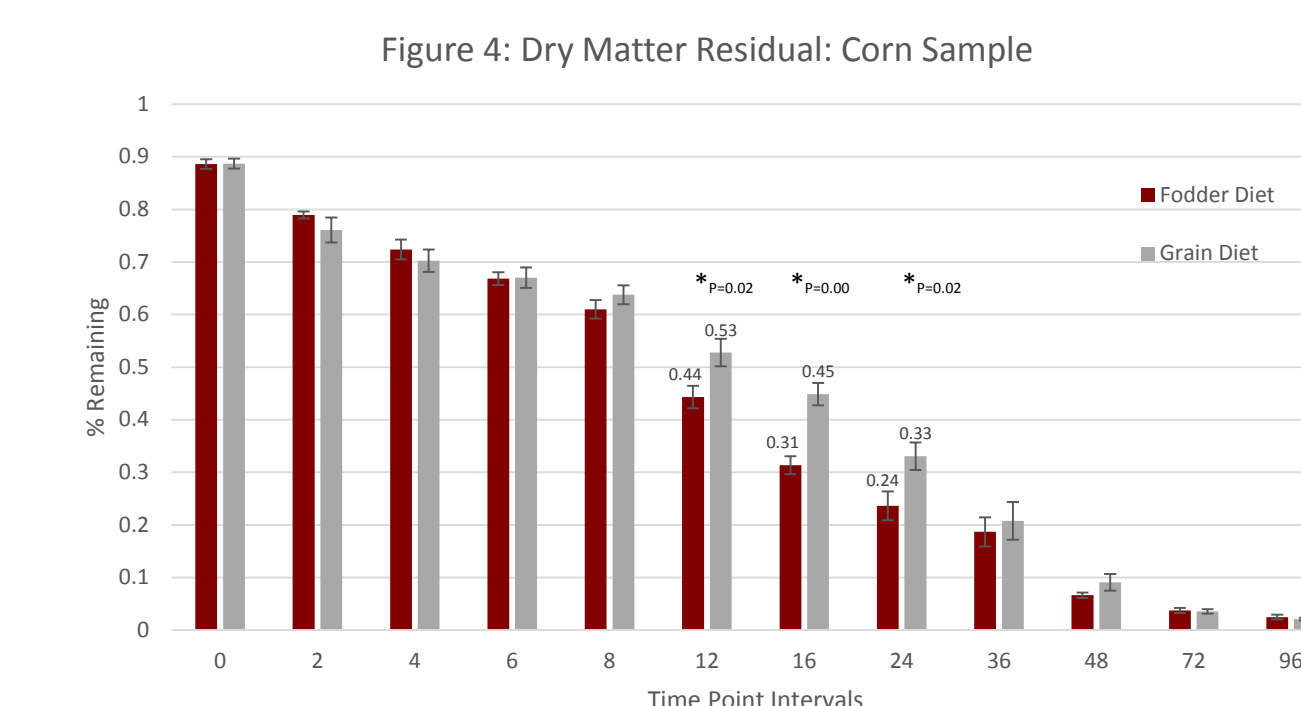
RESULTS

In-Situ Degradation:

1. Dry Matter Residual Analysis



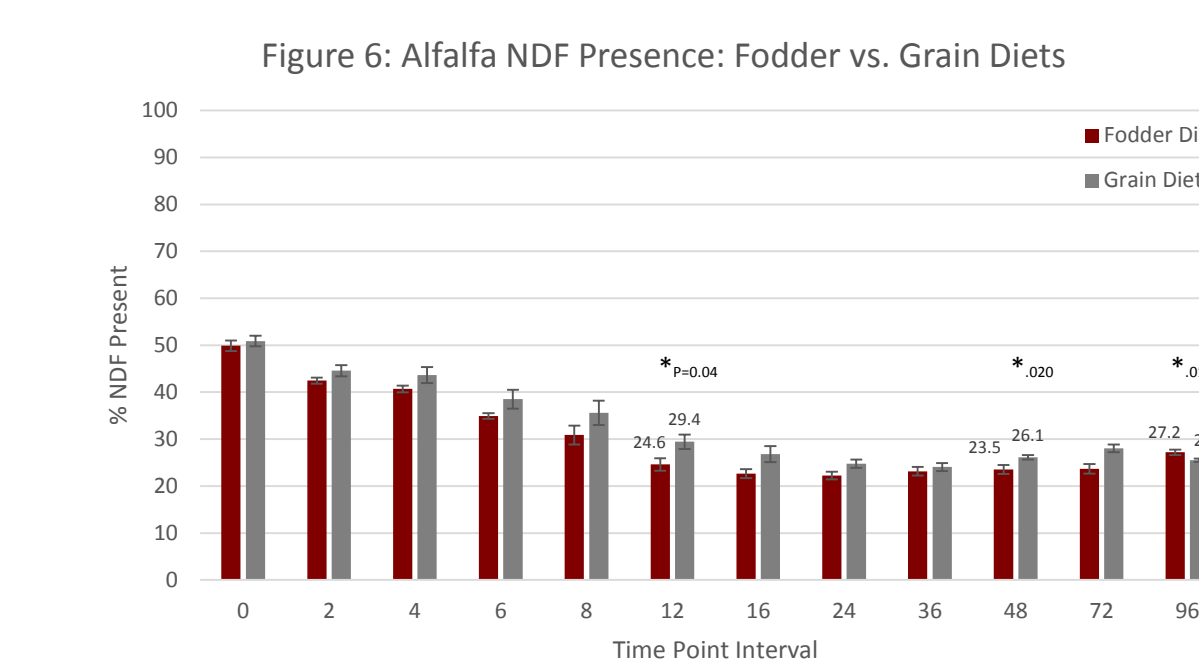
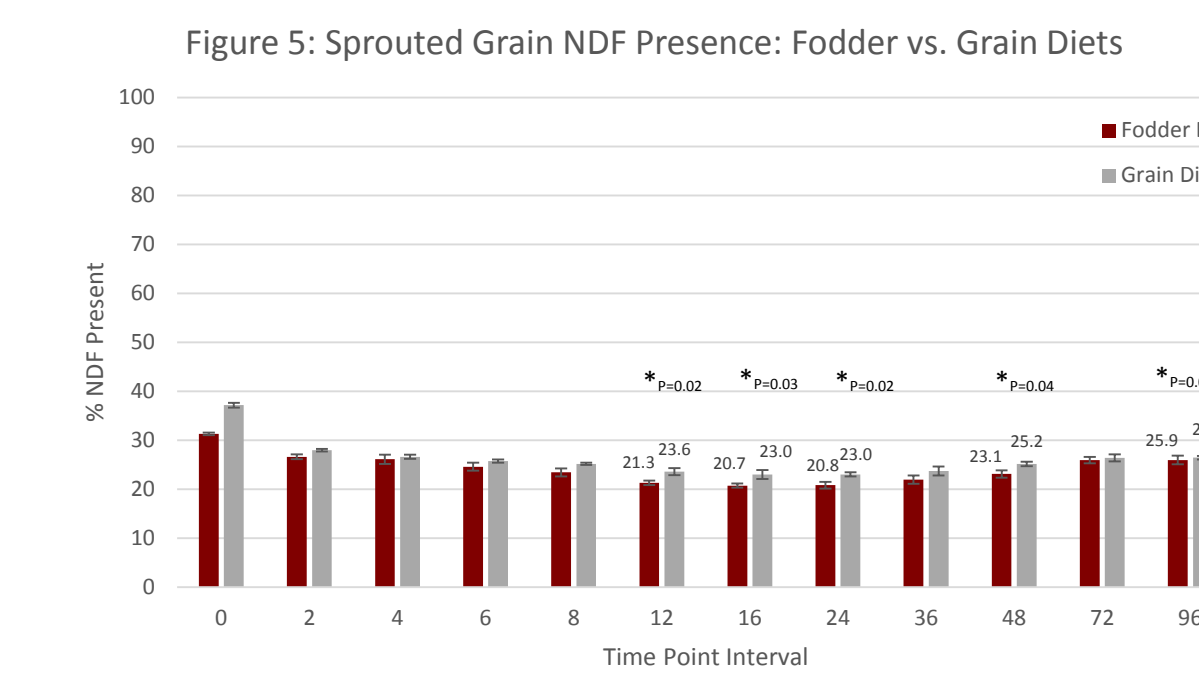
Dry Matter Residual % Per Diet:			
"Fodder Diet"	HR 0	HR 16	HR 96
Alfalfa	68.5%	19.9%	20.6%
Corn	88.6%	31.4%	2.5%
Sprouted Grain	55.8%	26.1%	18.2%
"Grain Diet"	HR 0	HR 16	HR 96
Alfalfa	66.4%	29.8%	19.6%
Corn	88.7%	44.6%	2.1%
Sprouted Grain	57.6%	29.3%	18.8%



Figures 2, 3, and 4 provides means and standard errors of the percentage of remaining dry matter from all twelve time point intervals recorded for sprouted grains, alfalfa, and corn samples. Time point intervals marked with an asterisk (*) were found to be statistically different, P-Value <0.05.

RESULTS

2. Fiber Residual Analysis



Fiber Residual % Per Diet:			
"Fodder Diet"	HR 0	HR 16	HR 96
Alfalfa	49.9%	22.6%	27.2%
Sprouted Grain	31.3%	20.7%	25.9%
"Grain Diet"	HR 0	HR 16	HR 96
Alfalfa	50.9%	26.8%	25.5%
Sprouted Grain	37.1%	23.0%	26.4%

Figures 5 and 6 provides means and standard errors of the percentage of fiber remaining in alfalfa and sprouted grains per timepoint per diet. Corn fiber analysis was conducted however was found to be too variable to analyze. Time point intervals marked with an asterisk (*) were found to be statistically different, P-Value <0.05.

3. Protein Residual Analysis

- Currently being determined in lab. Results expected soon.

CONCLUSION & IMPLICATIONS

Feed degradation analysis showed an advantage to fodder-fed heifers between 12 and 36 hours of feed deposition, suggesting that a fodder-based TMR provides a more favorable rumen micro-climate for a more rapid break-down of feeds. All feeds tested (sprouted grains, corn and alfalfa) showed a more rapid dry matter degradation rate under a fodder-fed rumen environment. Fiber residual analyses suggests higher fiber breakdown in sprouted grain samples while exhibiting more comparable results in the alfalfa samples. Determining fiber breakdown within the corn sample was too variable to analyze. Additional data analysis is currently underway to assess percentage of protein breakdown within each sample as well as VFA concentration in rumen fluid. Collectively, results from these experiments should provide some indication for the mechanism of action and the overall utility of fodder as a replacement for grain in the dairy cow ration.

Acknowledgements

Authors wish to acknowledge Simply Country Fodder Solutions and the Agricultural Research Institute (Project # 59200) for funding.

