Intercropping Forage Legumes with Grain Corn for Late-Season Forage Production—2016

Gustavo Sbatella1,2 and Camby Reynolds2

Introduction
Corn stubble remaining after grain harvest is often a source of forage late in the fall. Annual legumes such as forage soybeans can be interplanted with grain corn with the objective to increase quality of late-season forage. Supplementing the amount of nutrients available for the crops through fertilization can be an option to reduce the effects of inter-specific competition.

Objectives
Objectives were to evaluate the impacts of interplanting corn for grain with forage soybeans on yield and quality when produced under different fertilization levels.

Materials and Methods
A field trial was conducted in 2016 at the Powell Research and Extension Center (PREC). Forage soybean Eagle Large Lad RR™, group VII, was drill planted at 52, 39, 26, and 14 lb/ac, and Pioneer® 8107HR hybrid corn was planted at a rate of 35,000 seeds/ac at 22-inch row spacing. The site was furrow irrigated. Plot size was 11 by 50 ft, arranged in a split plot randomized complete block design with four replications. Fertilizer levels were assigned to the main plots and corn/soybean ratios to the subplots. Fertilizer levels were low (150 nitrogen [N] units), medium (180 N units), and high (240 N units). Grain yields were estimated by harvesting 10-ft-length sections from the two middle rows on November 14. Corn stubble production was calculated by harvesting the aboveground biomass from a 10.76 ft² area. The harvested biomass was ground and a subsample weighing approximately one pound was sent for quality analysis.

Results and Discussion
Corn grain yield and stubble biomass increased with increasing levels of N fertilization, independently of the corn/soybean plant ratio (Table 1). In regard to forage quality, no differences were observed between the different corn/forage soybean ratio protein levels, but quality varied between N fertilization levels. Although protein levels were similar, differences were recorded for other components. For instance, acid digestible fiber (ADF) increased while total digestible nutrients (TDN) decreased with increasing N fertilization. Similarly, the calculated net energy for lactation (CNL), for maintenance (CNM), and for gestation (CNG) all decreased when N was applied at higher rates.

Nitrogen fertilization rates impacted grain and stubble biomass, but had no effect on the percent crude protein of the forage. Other quality factors such as ADF and TDN were negatively affected by increasing N applications. These results suggest that there may be a tradeoff between increasing grain yield and stubble biomass by adjusting the N supply and stubble quality.

Acknowledgments
The authors thank personnel from PREC and University of Wyoming grad students for their contributions during this project.

Contact information
Gustavo Sbatella at gustavo@uwyo.edu or 307-754-2223.

Keywords: corn, forage legumes, interplanting

PARP: I:3,6,9
Table 1. Corn grain yield, stubble biomass after harvest, protein content, acid digestible fiber (ADF), and total digestible nutrients (TDN) at PREC in 2016.

<table>
<thead>
<tr>
<th>Fertility</th>
<th>Grain yield</th>
<th>Stubble biomass</th>
<th>Protein</th>
<th>ADF</th>
<th>TDN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bu/ac</td>
<td>lb/ac</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Low</td>
<td>62.7</td>
<td>18,312</td>
<td>4.7</td>
<td>38</td>
<td>60</td>
</tr>
<tr>
<td>Medium</td>
<td>73.3</td>
<td>19,107</td>
<td>4.0</td>
<td>42</td>
<td>55</td>
</tr>
<tr>
<td>High</td>
<td>92.3</td>
<td>26,426</td>
<td>4.8</td>
<td>43</td>
<td>54</td>
</tr>
<tr>
<td>Least significant difference</td>
<td>15.5</td>
<td>0.6</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>