Introduction
Given the unpredictability of climatic patterns with the onset of climate change it is of paramount importance to develop systems that are more resilient to drought stress. Corn silage is a major component of the forage system in western dairies, but the water use for corn silage is substantial. Additionally, if submitted to drought stress, it is very likely that corn yields will decrease notably (Payero et al, 2006). Crops that can adjust to lower seasonal supplies whilst maintaining biomass yields and nutritive quality will gain importance as water shortages begin to arise (Howitt, 2014). One of such crops is sorghum. Novel sorghum brown midrib (BMR) varieties have been shown to improve the digestibility of sorghum to the extent where it is comparable to corn (Marsalis et al, 2010). Conventional sorghum has been proven to yield considerably more than corn underwater deficit circumstances (McCuistion et al, 2010). Sorghum, however, lacks the energy component that the corn grain provides.

Objective
To examine the yield and nutritive quality of annual forage crop production under various water deficits.

Methods
- University of California, Westside Research and Experimental Station (WSEREC). The replications of each cultivar within a block x irrigation were treated as subsamples.
- Forage types tested were corn (CORN), conventional sorghum (CONV) and BMR sorghum (BMR)
- Regression analysis was used to determine response to irrigation treatments, and ANOVAs were used to determine differences between treatments.
- Quality analysis were done at the Dairylands Laboratory in Arcadia, WI by NRI.

Table 1. Seasonal environmental conditions.

<table>
<thead>
<tr>
<th>2015</th>
<th>ETo (mm)</th>
<th>% 100% Water</th>
<th>% 81% Water</th>
<th>% 63% Water</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>731</td>
<td>581</td>
<td>469</td>
<td>369</td>
</tr>
</tbody>
</table>

Table 2. Varieties used in the experiment, ID and relative maturity (RM). PPS stands for photoperiod sensitive.

<table>
<thead>
<tr>
<th>ID</th>
<th>CORN</th>
<th>RM</th>
<th>ID</th>
<th>SORGHUM</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>TMF2H919</td>
<td>123</td>
<td>V6</td>
<td>SPX 903</td>
<td>PPS</td>
</tr>
<tr>
<td>V2</td>
<td>DKC66-42RB</td>
<td>116</td>
<td>V7</td>
<td>AF 7401</td>
<td>110-115</td>
</tr>
<tr>
<td>V3</td>
<td>N75H-GTA</td>
<td>114</td>
<td>V8</td>
<td>AF 7301</td>
<td>95-105</td>
</tr>
<tr>
<td>V4</td>
<td>6400DG/VT2/P</td>
<td>112</td>
<td>V9</td>
<td>NK 300C</td>
<td>100-110</td>
</tr>
</tbody>
</table>

Conclusion
- Under circumstances of uncertain water availability sorghum might be a better option than corn.
- The ideal type of sorghum to be grown is BMR as the digestibility can compete with that of well watered corn and yields at lower irrigation levels can match that of corn.
- Sorghum requires less water, less fertilizer, seed costs less and the degree of crop management is lower than that of corn.
- Sorghum can be of adequate use by dairies as a substitute for corn silage if a supplement of grains is added to the ration.

Acknowledgments:
Katie Asai, Wenfeng Ji, WSEREC staff, Barbara Kutzner (Monsanto), Syngenta, Croplan, Mycogen, Alta Seeds, Sorghum Partners, Rick Hanshew (Reinke), Daniel Schueler (Senninger) & John Deere Fresno Equipment.