Effects of Drought on Cow-Calf Production at Two UW Research Stations from 2011–2014

J.D. Scasta¹, J.L. Windh¹, T. Smith², and B. Baumgartner³

Drought is a constant challenge to livestock production on Western rangelands. The early 2000s resembled the extreme droughts of the 1930s “Dust Bowl” and 1950s. The most common way that drought impacts livestock production is the reduction of forage quantity and the carrying capacity relative to animal demand, an effect that typically leads to herd reduction and even complete liquidation. While the reduction of forage quantity leading to reduced animal numbers is well understood and problematic, what may be less understood are the negative effects on forage quality and subsequent livestock performance. Even when ranches are stocked to handle the variation in precipitation and reduction in forage quantity, ranchers may not fully recognize and quantify the potential negative effects of low-quality forage relative to livestock nutrient requirements and potential reductions in growth potential.

Objectives
Our primary objective was to correlate weaning weight losses with precipitation variability. These data should help ranchers predict production losses caused by drought, quantify and predict potential economic consequences of escalating drought events, and document these negative consequences.

Materials and Methods
Our study was conducted at the James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC) ranch northwest of

![](image-url)

Figure 1. Weaning weight (WW) and gain per head per day (GPD) correlation with drought. Points on line with different letters differ significantly ($p<0.05$).

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Lingle and the Laramie R&E Center’s McGuire Ranch northeast of Laramie. The SAREC ranch is composed of 1,880 acres of native rangeland dominated by native cool-season species and some warm-season species. The McGuire Ranch is composed of 5,550 acres of native rangeland dominated by native cool-season species and a minor component of planted forages. From 2011 to 2014, a period with very dry and very wet years, we assessed an adjusted 210-day weaning weight (WW) and gain per day (GPD) for a total of 869 calves on both ranches. We compared WW and GPD to cumulative precipitation from January 1 to October 1 by year, calf sex, and ranch locations separately. We calculated the coefficient of determination (adjusted $r^2$) to understand how the trend line explained the variation and assessed $p$-values for significance. We assessed linear equation slopes for each scenario to predict pounds of adjusted total calf gain and gain per day that may be lost for each inch of precipitation reduction.

**Results and Discussion**

WWs were up to 99 pounds lower and GPD was up to 0.47 pounds lower between the driest (2012) and wettest (2014) years. The range of WWs between the driest and wettest years ranged from 74 to 99 lbs for steer calves and 89 to 82 lbs for heifer calves at the SAREC and McGuire ranches, respectively (Figure 1). For each one-inch reduction in precipitation, WWs are predicted to be 7 to 8 pounds lower at SAREC and 12 to 14 pounds lower at the McGuire Ranch (Table 1). For each one-inch reduction in precipitation, pounds of gain per head per day are expected to be 0.03 to 0.04 pounds lower at SAREC and 0.06 to 0.07 pounds lower at McGuire (Table 1). Although we did not measure forage quality, other studies report a 2 to 3% reduction in forage crude protein for every one-inch reduction in monthly precipitation. If drought occurs, or continues to escalate, WW, GPD, and value-per-head reductions can be expected and documented for strategic planning and compensation programs. A manuscript from this study is under review at a scientific journal—when published it will provide additional information that should be useful to producers.

**Acknowledgments:** Appreciation is extended to Wyoming Agricultural Experiment Station staff members who managed the beef cattle herds from 2011 to 2014.

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**Keywords:** cattle, drought, rangeland

**PARP:** I:1, V:5,7, VI:3, X:1,2

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<table>
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<th>Ranch</th>
<th>Calf sex</th>
<th>WW Slope*</th>
<th>WW Intercept</th>
<th>GPD Slope*</th>
<th>GPD Intercept</th>
<th>Adjusted $r^2$</th>
<th>$p$-value</th>
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<tbody>
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<tr>
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*x indicates cumulative precipitation from January 1 to October 1 in inches, and slope/intercept are in pounds for WW and GPD.