The influence of beef cow weaning weight ratio and cow size on winter grazing distribution, feed and supplement intake behavior, and milk production


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Objectives
- Assess how cow weaning weight ratio (WWR) and cow weight (BW) effect:
  - winter grazing behavior
  - winter supplement intake
  - winter rangeland resource use
  - feed intake
  - milk production

Reasoning
- The ideal cow would convert forage consumed to greater pounds calf weaned and optimize grazing distribution (Stewart and Martin, 1983; Scasta et al., 2015)
- Metrics that accurately identify cattle efficiency in extensive rangeland systems are needed (Dinkel and Brown, 1978; Beck et al., 2016)
- The ratio of calf weight weaned to cow weight is an accurate estimate of cow efficiency (Dinkel and Brown, 1978; Scasta et al., 2015)
- According to NRC Beef Cattle Nutrition Guidelines, small cattle eat less than large cattle (Walker et al., 2015; NASEM, 2016)
- Milk yield and constituents influence calf pre-weaning ADG (Totusek et al., 1973; Mondragon et al., 1983; Beal et al., 1990)

Methods
- Four classification groups with 10 cows per group
  1. High WWR (56%) – light BW (1107 lbs)
  2. Low WWR (42%) – light BW (1107 lbs)
  3. Low WWR (42%) – heavy BW (1415 lbs)
  4. Classification groups determined by individual cow lifetime average weaning weight ratio and lifetime average body weight
- All cows had weaned at least 3 calves prior
- Winter grazing trial (Dec 1, 2016 to Jan 15, 2017 and Nov 1 to Dec 31, 2017)
  - Grazing distribution
    - Lotek 3300LR GPS collars
  - Supplement intake
    - SmartFeedPro electronic feed bunks
    - CHS 30% protein, fully-fortified, pellet
  - Spring feedlot trial (May 2 to 23, 2017 and May 1 to 22, 2018)
  - Feed intake
    - SmartFeedPro electronic feed bunks
    - CHS 15% protein, fully-fortified, grass/alfalfa pellet
  - Milk yield and constituents
  - Weigh-suckle-weigh protocol
  - 100 ml milk sample collections

Future Analyses
- Resource use models for each classification group
  - Habitat selection preference between groups
  - Resource attributes that best describes areas of use

Conclusions
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Implications
- Heavy cows ate 6.7 lbs daily (P <0.01) and 0.4% of BW more than light cows (P <0.06)
- High WWR cows ate 0.4% of BW more than low WWR cows (P <0.02)
- High WWR cows produced 0.15% of BW more milk than low WWR cows (P <0.01)
- High WWR cows consumed 0.08% of BW more supplement per day than low WWR cows in year 2 (P <0.05)
- High WWR cows consumed more feed when compared on a percent of body weight basis, however, when calf weight weaned was considered the ratio between calf weight and feed consumed was better than for low WWR cows
- Smaller cows may wean smaller calves but they consume much less feed than large cows
- Provide additional knowledge for the discussion of what type of cow is more suited to western rangeland production systems

Table 1. Feed intake and milk performance trial results from year 1

<table>
<thead>
<tr>
<th>Item</th>
<th>Light Heavy</th>
<th>Light Light</th>
<th>Low Heavy</th>
<th>Low Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily lb</td>
<td>40.1</td>
<td>45.9</td>
<td>38.8</td>
<td>46.5</td>
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<tr>
<td>Daily % of BW</td>
<td>3.4</td>
<td>3.6</td>
<td>2.8</td>
<td>3.3</td>
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<tr>
<td>SE</td>
<td>0.16</td>
<td>0.16</td>
<td>0.02</td>
<td>0.06</td>
</tr>
<tr>
<td>P</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Figure 1. Percent of a 24-h period spent at distances of 0-0.25, 0.25-0.5, 0.5-0.75, and 0.75-1 mile from supplement locations between two cows from each classification group for year 1 (45-d study).

Figure 2. Supplement intake between the four classification groups for year 1 (45-d study) and year 2 (60-d study) represented in pounds with standard error bars.