Range or meadow regrowth and weaning effects on 2-year-old cows

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Eighty 2-year-old spring calving primiparous cows were assigned to 2 weaning and 2 grazing treatments (20 cows/treatment) from 7 September to 7 November in 1991, 1992, and 1993. Grazing treatments were native sandhills range or subirrigated meadow regrowth. Weaning treatments were weaning on 7 September or 7 November. Calves weaned on 7 September grazed subirrigated meadow regrowth after weaning. Crude protein of diets from esophagally fistulated cows averaged 7.6% on range and 61.1% on subirrigated meadow. No year X grazing treatment or weaning X grazing treatment interactions were detected (P>0.10) for any traits measured. Forage organic matter consumed by cows differed between years: 7.7 kg day\(^{-1}\) in 1991 and 10.5 kg day\(^{-1}\) in 1992; but was similar (P<0.10) for all grazing and weaning treatments. Cows grazing meadow gained more body weight and body condition than cows grazing range. Dry cows gained more weight and body condition (P<0.01) than lactating cows. Lactating cows grazing meadow maintained body weight and body condition, while lactating cows grazing range lost body weight and body condition. Calves nursing cows on meadow gained 28.8 kg more (P<0.01) than calves nursing cows on range and 34.4 kg more than weaned calves grazing meadow. Body weight gains of weaned calves grazing meadow and calves nursing cows on range were similar (P>0.10). We concluded that dry cows and cows that grazed subirrigated meadow regrowth during September and October increased body condition score over lactating cows and cows grazing range, respectively. Calf body weight gains were greatest for nursing calves on subirrigated meadow, but grazing weaned calves on subirrigated meadow was an effective alternative for calf growth to calves nursing cows on range.

Key Words: subirrigated meadow, intake, digestibility, body condition, beef cattle

Ochenta y dos vacas primerizas de dos años de edad fueron utilizadas en dos tratamientos de destete y dos tratamientos de pastoreo (20 vacas/tratamiento), del 7 de Septiembre al 7 de Noviembre durante tres años (1991, 1992 y 1993). Los tratamientos de pastoreo fueron: a) Pastizal nativo y b) Humedales subirrigados. Por su parte los tratamientos de destete fueron: 1) Destete en Septiembre y 2) Destete en Noviembre. Muestras esofágicas de la dieta (con vacas fistuladas), promediaron 7.6% de proteína cruda en el tratamiento a) y 12.3% en el tratamiento b). Los valores de digestibilidad en vitro de la dieta, fueron 55.1% y 61.1%, para los tratamientos a) y b), respectivamente. No se detectaron interacciones entre tratamientos. El consumo diario de materia orgánica difirió entre años: 7.7 kg/d en 1991 y 10.5 kg/d en 1992, más fue similar (P>0.10) en todos los tratamientos. Las vacas en los humedales ganaron significativamente (P<0.01) más peso (28.8kg) mientras que las vacas en pastizal nativo perdieron peso y condición. No hubo diferencias (P>0.10) en los pesos al destete de los tratamientos de pastoreo, más los becerros del destete de Noviembre fueron 34.4kg. Más pesados que los destetados en Septiembre.
Materials and Methods

The study was conducted on native range and subirrigated meadow at the University of Nebraska-Lincoln Gudmundsen Sandhills Laboratory near Whitman, Neb. Eighty 2-year-old crossbred (1/4 Hereford, 1/4 Angus, 1/4 Simmental, and 1/4 Gelbvieh) primiparous beef cows and their calves were assigned to 2 weaning and 2 grazing treatments from 7 September to 7 November in 1991, 1992, and 1993. Grazing treatments were native sandhills range or subirrigated meadow regrowth after July haying. Weaning treatments were weaning on 7 September or on 7 November. Calves weaned on 7 September grazed subirrigated meadow regrowth after weaning in 1992 and 1993.

The range site (82 ha) was classified as sandy loam (course-loamy mixed mesic Typic Hapludalf). Dominant vegetation on the 45 ha subirrigated meadows site was smooth bromegrass (Bromus inermis Leyss.), redtop (Agrostis stolonifera L.), timothy (Phleum pratense L.), slender wheatgrass (Elymus trachycaulus (Link) Gould ex shinn.), quackgrass (Elytrigia repens (L.) Nevski.), Kentucky bluegrass (Poa pratensis L.), prairie cordgrass (Spurtina pectinata Link), and several species of sedges (Carex spp.), and rushes (Juncus spp.). Common forbs and shrubs include western ragweed (Ambrosia psilostachya DC.) and leadplant (Amorpha canescens (Nutt.) Pursh).

The subirrigated meadow soils were classified as Gannett-Loup fine sandy loam (course-loamy mixed mesic Typic Hapludalf). Dominant vegetation on the 45 ha subirrigated meadows site was smooth bromegrass (Bromus inermis Leyss.), redtop (Agrostis stolonifera L.), timothy (Phleum pratense L.), slender wheatgrass (Elymus trachycaulus (Link) Gould ex shinn.), quackgrass (Elytrigia repens (L.) Nevski.), Kentucky bluegrass (Poa pratensis L.), prairie cordgrass (Spurtina pectinata Link), and several species of sedges (Carex spp.), and rushes (Juncus spp.). Less abundant grass species were big bluestem (Andropogon gerardii Vitman), indiangrass (Sorghastrum nutans), and switchgrass. Forbs were a minor vegetation component.

Individual cows and calves were weighed and cows scored for body condition after 16 hours without feed or water on 7 September and 7 November. Body condition scores were based on a palpated determination of fleshting over the ribs and thoracic vertebrae. Body condition was scored from 1 (thinnest) to 9 ( fattest) according to the system described by Richards et al. (1986).

Fecal output by 40 cows (10 cows/treatment) was determined on 7 through 12 October 1991 and 14 through 19 October 1992. Each cow on the intake trial was orally dosed with an intraruminally continuous chromium-releasing device 5 days before a 5-day collection period. Three to five hundred g of feces were obtained from the rectum of each cow daily at about 0800.

Twelve esophageally-fistulated cows (6 cows/grazing treatment, avg. body weight = 500 kg) were used to obtain diet samples from range and meadow during 1991 and 1992. Diets were separated using non-orthogonal contrasts. Contrasts were: 1) range vs subirrigated meadow, 2) September vs November weaning. 3) September vs November weaning on subirrigated meadow, and 4) September vs November weaning on range. All differences mentioned in this paper are significant at the P<0.01 probability level unless otherwise noted.

Results and Discussion

During 1991 and 1992, CP concentration and IVOMD were higher, and ADF and NDF concentrations were lower in fistula forage samples from subirrigated meadow than from range (Table 1). Forage organic matter intake was similar (P>0.10) for all grazing and weaning treatments; pasture X weaning and pasture X year interactions were not significant (P>0.10).

Cow body weights and body condition scores differed (P<0.05) between range and meadow and between September and October. CP, % of OM 7.6** 12.3 0.6
ADF, % of OM 47.8** 42.9 0.8
NDF, % of OM 79.6** 64.9 1.0
IVOMD, % of OM 55.1** 61.1 0.01

Table 1. Crude protein (CP), neutral-detergent-fiber (NDF), and acid-detergent-fiber (ADF) concentrations and in vitro organic matter digestibility (IVOMD) of diets collected from esophageally-fistulated cows grazing on native range or subirrigated meadow.

<table>
<thead>
<tr>
<th>Item</th>
<th>Range</th>
<th>Meadow</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP, % of OM2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADF, % of OM</td>
<td>7.6**</td>
<td>12.3</td>
<td>0.6</td>
</tr>
<tr>
<td>NDF, % of OM</td>
<td>47.8**</td>
<td>42.9</td>
<td>0.8</td>
</tr>
<tr>
<td>IVOMD, % of OM</td>
<td>79.6**</td>
<td>64.9</td>
<td>1.0</td>
</tr>
<tr>
<td>SE</td>
<td>55.1**</td>
<td>61.1</td>
<td>0.01</td>
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1Captec Chrome manufactured by Captec Pty. Ltd., Australia, distributed internationally by Nufarm Limited, Manu Street, P.O. Box 22-407, Otahuhu, Auckland 6, New Zealand.

**The year X forage type interaction was not significant P>0.10 for all nutrient items.

1OM = Organic matter.
2SE = Standard error of mean.
3**Range and meadow were different P<0.01.

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Table 2. Organic matter (OM) intake, body weight, body weight gain, body condition score, and body condition score gain of dry (D) and lactating (L) cows grazing range (R) or subirrigated meadow (M) regrowth from September to November.

<table>
<thead>
<tr>
<th>Item</th>
<th>Treatments</th>
<th>Contrasts</th>
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<tbody>
<tr>
<td></td>
<td>R</td>
<td>M</td>
</tr>
<tr>
<td>Intake kg/day</td>
<td>9.1</td>
<td>9.0</td>
</tr>
<tr>
<td>Intake, kg/100 kg</td>
<td>2.0</td>
<td>2.1</td>
</tr>
<tr>
<td>body wt.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final body wt., kg.</td>
<td>460.0</td>
<td>434.9</td>
</tr>
<tr>
<td>Body wt. gain, kg.</td>
<td>41.9</td>
<td>-12.9</td>
</tr>
<tr>
<td>Body condition score gain</td>
<td>0.0</td>
<td>-0.4</td>
</tr>
</tbody>
</table>

1. D calves weaned 7 September; L, calves weaned 7 November.
2. NS, Contrast was not significant P>0.10.
3. *, Contrast was significant P<0.05.
4. **, Contrast was significant P<0.01.

November weaning (Table 2). Cows grazing subirrigated meadow regrowth gained more body weight and were heavier at the end of the trial than cows grazing on range (P<0.05). Dry cows gained more body weight and were heavier at the end of the trial than lactating cows. Year X grazing treatment and grazing treatment X weaning treatment interactions were not significant.

Lactating cows grazing range had lower body weights and condition scores than dry cows grazing range. Dry cows grazing subirrigated meadow gained more body condition scores and body weight (P<0.05) than lactating cows grazing subirrigated meadow. Loss of body weight and body condition scores of lactating cows on range have been reported during the late summer-early fall (Adams et al. 1989, Adams et al. 1993).

Importance of weaning and/or forage effects on a production system would be affected by amount of milk produced, growth as with 2-year old cows, late summer body condition score, and available feed resources for the winter. Cows with higher levels of milk production have greater nutrient requirements (NRC 1984) and are more likely to lose body weight and body condition during the late summer-early fall (Adams et al. 1993). If cows are thin in late summer, weaning in September or grazing subirrigated meadow could be important. Thin cows grazing range during winter will likely be thin at spring calving (Adams et al. 1987). During winter thinner cows have a greater energy requirement than fatter cows and meadow forage, especially crude protein. The protein content and possibly the amount of milk produced by the cow and consumed by the calf. The improved body weight gain of nursing calves grazing meadow over weaned calves grazing on subirrigated meadow is best explained by more rumen escape protein provided by the milk to the intestines. Milk protein escapes ruminal digestion via the esophageal groove (Ruckebusch 1988). Hollingsworth-Jenkins (1994) found that, in calves grazing vegetative range, escape protein was limiting before energy or rumen degradable protein.

Table 3. Body weight and body weight gains of nursing calves grazing range or subirrigated meadow and weaned calves grazing subirrigated meadow from September to November.

<table>
<thead>
<tr>
<th>Item</th>
<th>Range</th>
<th>Meadow</th>
<th>Range</th>
<th>Meadow</th>
<th>Weaned</th>
</tr>
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<tr>
<td>Finals body wt., kg.</td>
<td>242.4</td>
<td>289.9</td>
<td>280.5</td>
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<tr>
<td>Body wt. gain, kg.</td>
<td>29.7</td>
<td>64.7</td>
<td>33.6</td>
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1. Unweaned, calves weaned on 7 November; weaned, calves weaned on 7 September.
2. Least squares means in same row with different letters differ P<0.01.
Conclusion

For production systems where cows are wintered on low-quality forages, maintenance, or increased body condition during the summer or fall could be a benefit. Gain in body condition score during winter would not be expected.

We concluded that weaning in September or grazing subirrigated meadow regrowth during September and October maintain or improve body condition of the cow. Weaning and grazing the calf on meadow or comparable forage and grazing a dry cow on range offers potential to maintain calf gains while maintaining or improving body condition of the cow.

Literature Cited


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1 certify that the statements made by me above are correct and complete

Charles E. Rumburg, Managing Editor.

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