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# Summer and Fall Forage Grazing Combinations: Five-Year Summary

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# Summer and Fall Forage Grazing Combinations: Five-Year Summary


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Summer and fall forages that maximize grazing gain in growing finishing systems can reduce slaughter breakeven costs.


## Summary

*A five-year study using British-breed crossbred cattle included slaughter breakeven analysis and evaluated the effect of grazing alternative summer and fall forages on beef production systems. Grazed summer and fall forage combinations included continuous brome and combinations of brome, warm-season grasses, alfalfa, sudangrass, red clover, native Sandhills range, turnips, rye and cornstalks. The most consistent improvement in summer grazing gain and most desirable slaughter breakeven costs were observed in cattle grazing brome and warm-season grasses or brome and Sandhills range. A reduction in slaughter breakeven cost by grazing fall forages was observed in years with adequate moisture for forage growth. Forages maximizing grazing gain most greatly reduced slaughter breakeven cost.*


## Introduction

Grazing summer and fall forages is an important component of extensive beef production systems. These systems include a backgrounding period during the winter and spring and a summer and/or fall grazing period followed by a finishing period in the feedlot. Beef production systems based largely on forages are often economical because cost of gain during the grazing period is typically lower than that of a high-concentrate diet. Maximizing grazing gain while production costs will lower the slaughter price required to break-even.

In eastern Nebraska, brome is the predominant grazing forage available. Brome, however, is a cool-season plant and both the quality and quantity of brome can decline during the months of June, July and August. Furthermore, grazing a single forage for the entire grazing period may not allow for maximum gain because of quantity and quality of forage. Using alternative or complementary forages is one method available to balance the distribution of forage growth with the nutritional needs of livestock.

Previous *Nebraska Beef Cattle Reports* have provided the results of research on forage combinations for summer and fall grazing, compared with grazing only one plant species for the entire grazing period. Although these individual reports are important, yearly variation in environmental factors may influence interpretation. This article is a summary of five years of data involving the influence of grazed forage combinations on summer and fall beef cattle gains and evaluates effects of these combinations on economics of the entire growing/finishing system.

## Procedure

Data collected during five years was used to evaluate grazing alternative forages during the summer and fall of each year. In each year, British-breed calves were purchased in the fall and allowed a 28-day receiving and acclimation period. Calves were assigned to a low-input wintering period: either grazing cornstalk residue or feeding harvested forages. All calves were fed a protein supplement and allowed free access to a mineral supplement during the stalk grazing and harvested forage feeding periods. Following the winter and spring feeding periods, calves were assigned to grazing treatments.

Summer-forage cattle continuously or rotationally grazed from the first week of May to the first week of September while fall-forage cattle grazed from the first week in September to mid-November. All cattle were implanted with Compudose before summer grazing.

Following grazing, cattle were finished on a high-concentrate corn-based finishing diet formulated (DM basis) to contain 12% CP, .7% calcium, .35% phosphorus, .7% potassium, 25 g/ton monensin and 10 g/ton tylosin. Initial and final weights for each stage were the average of two weights taken on consecutive days following a three-day feeding of a 50% alfalfa hay and 50% corn silage diet (DM basis). Intakes during these periods were limited to 2% (DM) of body weight. Final weights were estimated from hot carcass weight using a 62 dressing percentage. Carcass measurements included hot carcass weight, liver abscess score, fat thickness, quality grade and yield grade.

Breakeven cost was used as the measure of success of each system and included all input costs. Feedlot pen was used as the observation unit for statistical analysis. Breakeven correlation coefficients (r) for amount of gain achieved during the winter/spring period, summer grazing, combined summer and fall grazing and finishing periods were determined to evaluate which period within each system had the most influence on breakeven cost.

## Results

In this report, data were pooled from similar grazing treatments whenever possible and analyzed across years. A summary of data for grazing treatments unique to one year, however, are presented in this report with actual data reported in previous *Nebraska Beef Cattle Reports*.

*Summer Forages*

Grazing brome, then either alfalfa, sudangrass or warm-season grasses, improved summer gains compared with cattle grazing only brome (*Nebraska Beef Cattle Report, MP 58. pp. 21).* However, cattle grazing only brome were more economical (lower slaughter breakeven cost) than cattle grazing brome and sudangrass. Grazing brome and alfalfa or sudangrass increased grazing gain compared to grazing brome alone. However, the added cost of alfalfa or sudangrass production resulted in higher breakeven costs for these systems when compared to grazing brome alone or brome and warm-season grasses. In our research, the cost of producing sudangrass and alfalfa was priced equal to the cost of cash-renting land for corn production plus planting costs. Poloxalene on alfalfa for bloat control adds to the costs. Therefore, the additional summer gain achieved by grazing alfalfa or sudangrass did not offset the additional cost of producing the forage.

Reducing forage production cost by inter-seeding red clover in oats and charging land and production costs against the oats provides an alternative forage for grazing while keeping the cost of the grazed forage to a minimum. However, grazing only red clover has a potential bloat-causing risk. Providing poloxalene to legume-grazing cattle can offset the potential bloat problem, assuming poloxalene consumption is constant.

In a subsequent year (*Nebraska Beef Cattle Report, MP 61. pp. 20),* systems including red clover grazing had the most desirable slaughter breakeven costs with grazing gains similar to other systems. However, bloat problems requiring removing the cattle from the red clover pastures and placing them back on brome pasture. So, although grazing red clover as an alternative forage improved slaughter breakeven costs, the potential cattle loss due to bloat made the system less desirable due to extra costs of poloxolene supplement and labor to treat animals experiencing bloat.

If either sudangrass or alfalfa were used in lands unsuitable for grain production, grazing costs would equal the cost of producing the forage (seed, planting, labor, etc.), which would, in turn, lower the system's slaughter breakeven cost. Grazing red clover following harvest of a grain crop appears to have potential in improving production systems. Grazing alfalfa, sudangrass or red clover monocultures in addition to brome either proved not economical or potential bloat problems made these systems less desirable.

In two successive years (*Nebraska Beef Cattle Report, MP 66. pp. 48; Nebraska Beef Cattle Report, MP 67. pp. 56),* native grass resources were utilized in the Nebraska Sandhills to provide a mix of warm-season grasses as an alternative to establishing both cool- and warm-season grass pastures at one location. Grazing a native range with a diversity of plant species allows cattle to select higher-quality forage. In both years, summer gains for cattle grazing systems utilizing Sandhills range, either alone or in combination with brome grazing, were greater (P<.05) compared with cattle grazing only brome, brome and red clover or brome and warm-season grasses (Table 1). However, slaughter breakeven costs for cattle grazing systems utilizing Sandhills range, brome and red clover or brome and warm-season grasses were similar. Cattle grazing continuous brome had the least desirable (P<.05) breakeven cost (Table 1).

Inter-seeding red clover in brome pastures was one attempt at increasing forage quality and quantity during periods when brome quality and quantity is declining. However, stands of red clover inter-seeded in brome pastures were poor in both years. Although gains were not statistically different between cattle grazing red clover/brome and continuous brome, these results indicated inter-seeding red clover in brome pastures could potentially improve grazing gains compared to cattle grazing only brome.

Data for similar grazing systems (continuous brome and brome/warm-season grass) were pooled and analyzed across years. Cattle grazing brome and warm-season grasses had greater (P<.05) daily gains during the summer compared with cattle grazing only brome (Table 2). During finishing, cattle in the continuous brome system consumed more feed (P<.05), gained

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**Table 1. Performance and economics for steers grazing brome, brome and warm-season grasses, brome and red clover, brome and Sandhills range or only Sandhills range - a two year summary.**

| Forage System: | Summer Forages | | | | |
|---|---|---|---|---|---|
| Item | Cont. brome | Brome, red clover | Brome, warm-season | Brome, Sandhills range | Sandhills range |
| Weight, lb | | | | | |
| Initial | 488 | 483 | 480 | 478 | 484 |
| Initial summer | 629 | 624 | 618 | 623 | 625 |
| End summer | 805 | 828 | 824 | 883 | 887 |
| Final | 1212 | 1247 | 1231 | 1247 | 1242 |
| Finishing performance | | | | | |
| DMI, lb/day | 29.10[a] | 29.43[a] | 28.10[b] | 29.84[a] | 29.33[a] |
| Daily gain, lb | 3.95 | 4.09 | 3.98 | 4.17 | 4.03 |
| Feed/gain[c] | 7.40 | 7.19 | 7.09 | 7.19 | 7.30 |
| Total costs, $[d] | 811.13 | 812.20 | 806.74 | 782.27 | 785.62 |
| Slaughter Breakeven, $/100 lb | 67.01[a] | 65.12[b] | 65.13[b] | 63.67[b] | 64.16[b] |

[a,b]Means in rows with unlike superscripts differ (P<.05).
[c]Feed/gain analyzed as gain/feed. Feed/gain is the reciprocal of gain/feed.
[d]Includes trucking cost to (one way) Sandhills range increasing breakeven $.912/cwt.

**Table 2. Performance data pooled across five years for cattle grazing continuous brome or brome and warm-season grasses.**

| Item Treatment: | Continuous brome 1 | Brome, warm-season 2 |
|---|---|---|
| Weight, lb | | |
| Initial | 453 | 448 |
| Initial summer | 583 | 577 |
| End summer | 771[a] | 796[b] |
| Final | 1154 | 1175 |
| Daily gain, lb | | |
| Winter | .68 | .68 |
| Summer | 1.59[a] | 1.81[b] |
| Finishing performance | | |
| DMI, lb/day | 26.76[a] | 25.76[b] |
| Daily gain, lb | 3.59 | 3.58 |
| Feed/gain[c] | 7.46[a] | 7.25[b] |
| Carcass data | | |
| Fat depth, in | .42 | .42 |
| Quality grade[d] | 18.7 | 18.7 |
| Yield grade | 2.39 | 2.34 |

[a,b]Means in rows with unlike superscripts differ (*P* < .05).

[c]Feed/gain analyzed as gain/feed. Feed/gain is reciprocal of gain/feed.

[d]20=average Choice, 19=low Choice, 18=high Select.

similarly and had lower feed efficiencies (P<.05) compared with cattle in the brome, warm-season grass system. No difference in carcass measurements were observed between treatments. Cattle grazing brome and warm-season grasses had more desirable slaughter breakeven costs compared to cattle continuously grazing brome (Table 3). Cattle from the brome and warm-season grass system entered the finishing period with heavier weights and were able to maintain this weight advantage throughout finishing.

*Fall forages*

Extending grazing past the summer has the potential for further increases in weight gain from forage, reductions in the amount of grain fed and time spent in the finishing phase and improvements in reducing overall slaughter breakeven values. However, extending the grazing season also increases interest cost charged against the animal. Therefore, it is critical fall grazing gains offset the increased interest cost.

Fall forage grazing gains were variable among years, probably due to precipitation variation among years. During years where lack of precipitation reduced fall forage quality and quantity, grazing gains were low and slaughter breakeven costs increased. Gains for cattle grazing turnips were variable among years compared with other forages. Potential yearly variations in moisture, resulting in variable forage quantity from turnips, makes the use of turnips in fall grazing systems less reliable. Grazing rye seeded in wheat stubble appears to have gain-improving potential, but the cost of herbicide to remove rye from the fields in the spring makes this system less desirable.

Quantity and quality consistency of fall forage are major considerations in fall grazing systems. If grazing gains are not sustained during the fall, the increased interest cost and lighter weight of cattle entering the finishing phase will increase slaughter breakeven costs. The most consistently available fall forage available for grazing may be cornstalks.

When cattle enter the finishing phase, following a period of forage grazing, the majority of muscle growth has already occurred. However, sufficient finishing time is still required for cattle to deposit intramuscular fat to improve quality grade. Reducing the amount of time cattle spend in the finishing period without reducing quality grade or fat thickness is one goal of fall grazing. In all years, cattle grazing fall forages were in the finishing phase 16 days less than cattle finished following summer grazing.

**Table 3. Economic data pooled across years for cattle grazing continuous brome or brome and warm-season grasses.**

| Item Treatment: | Continuous brome 1 | Brome, warm-season 2 |
|---|---|---|
| Steer cost,$[a] | 361.88 | 358.40 |
| Interest[b] | 46.10 | 45.90 |
| Health[c] | 25.00 | 25.00 |
| Winter costs,$ | | |
| Feed[d] | 78.95 | 78.95 |
| Supplement[e] | 19.42 | 19.42 |
| Summer costs,$ | | |
| Grazing[f] | 40.98 | 41.94 |
| Finishing costs,$ | | |
| Yardage[g] | 31.92 | 31.76 |
| Feed[hi] | 173.63 | 167.08 |
| Days on feed | 106.4 | 105.9 |
| Total costs, $[j] | 775.47 | 765.87 |
| Final wt, lb[k] | 1154 | 1175 |
| Slaughter Breakeven, $/100 lb | 66.99[l] | 64.99[m] |

[a]Initial weight x $80/cwt.

[b]9% interest rate.

[c]Health costs = implants, fly tags, etc.

[d]Receiving costs at $.64/d, Stalk grazing costs at $.12/d; spring feed costs at $.40/d; receiving, winter, and spring yardage costs at $.10/d.

[e]Supplement cost at $.12/d; 1.5 lb/d (as fed).

[f]Grazing costs = $.35/hd/d.

[g]Yardage cost $.30/hd/d.

[h]Average diet cost = $.0543/d (DM) and 9% interest for 1/2 of feed.

[i]Calculated using 15 year average corn price = $2.41/bu.

[j]Total costs includes 2% death loss for each system.

[k]Calculated from hot carcass weight adjusted for 62% dressing percentage.

[l,m]Means in rows with unlike superscripts differ (P<.05).

In evaluating correlation coefficients among years (Table 4), final finishing weight was negatively correlated (P<.01) with slaughter breakeven cost in all years, indicating a greater final weight lowers breakeven cost. Finishing period daily gain influenced (P<.01) slaughter breakeven cost in two years only, while the amount of summer gain or total grazing gain influenced (P<.10) breakeven cost in four of five years. The influence of the amount of weight gain achieved during the fall grazing period reduced breakeven cost in one year but increased it in another.

The influence of total grazing gain was negatively correlated (P<.03) with days on feed in the finishing period in all years (Table 5) indicating that maximizing forage gain can reduce time spent in the finishing period. The influence of total grazing gain on finishing period daily gain, dry matter intake and feed efficiency was variable among years.

In conclusion, grazing forages that maximized grazing gain, while cost of gain is fixed, reduced overall breakeven cost of production. The most consistent forage combinations in increasing grazing gain and reducing breakeven cost were combinations of brome, warm-season grasses and native range grasses. Grazing forages during the fall may

**Table 4. Correlation coefficients (r) for winter, summer, fall, total grazing and finishing gains, and final weight effects on slaughter breakeven cost.**

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | r | *P*= | r | *P*= | r | *P*= | r | *P*= | r | *P*= |
| Winter gain | -.24 | .379 | -.37 | .128 | -.34 | .236 | -.09 | .750 | -.24 | .337 |
| Summer gain | -.16 | .544 | -.46 | .056 | -.85 | .001 | -.74 | .001 | -.81 | .001 |
| Grazing gain | .61 | .013 | -.44 | .067 | -.69 | .007 | -.39 | .140 | -.54 | .021 |
| Fall gain | .70 | .003 | -.31 | .215 | -.47 | .092 | .28 | .287 | -.08 | .757 |
| Finishing gain | -.73 | .002 | -.31 | .210 | .13 | .669 | -.72 | .002 | .23 | .343 |
| Final weight | -.73 | .002 | -.89 | .001 | -.85 | .001 | -.78 | .001 | -.66 | .003 |

**Table 5. Correlation coefficients (r) for total grazing gain affecting days on feed, daily gain, feed efficiency, and dry matter intake in the finishing period.**

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | r | *P*= | r | *P*= | r | *P*= | r | *P*= | r | *P*= |
| | ------------------------------------Total grazing gain----------------------------------- | | | | | | | | | |
| Days on feed | -.97 | .001 | -.88 | .001 | -.86 | .001 | -.56 | .026 | -.93 | .001 |
| Daily gain | -.86 | .001 | .15 | .559 | -.37 | .199 | .11 | .683 | -.75 | .003 |
| G/F | -.87 | .001 | -.22 | .386 | -.56 | .038 | -.39 | .140 | -.79 | .001 |
| DMI | .15 | .575 | .70 | .002 | .35 | .220 | .70 | .003 | .35 | .158 |

potentially reduce breakeven cost compared with grazing only summer forages. However, variable moisture for fall forages results in unpredictable grazing gains and subsequent breakeven costs in fall grazing systems.

A beef production system must be able to withstand yearly environmental differences, such as moisture and temperature which influence quality and quantity of available forage. Although summer gains during this study were different among years, differences among grazing systems should reflect the systems ability to maximize grazing gain.

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