# Effects of Stocking Rate and Corn Gluten Feed Supplementation on Growth and Intake of Bred Heifers Grazing Stockpiled Tall Fescue-Red Clover Forages During Winter

## A.S. Leaflet R1879

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**Summary and Implications**

Two 30-acre fields at the Iowa State University Beef Nutrition Farm were seeded with 'Fawn' endophyte-free tall fescue and red clover in 2000. In 2001 (yr 1) and 2002 (yr 2), forage was harvested from these fields as hay in two cuttings and stockpiled for winter grazing beginning in early August. Each field was divided into four pastures of 6.25 or 8.75 acres subdivided into 8 paddocks. On November 7 and October 23 of yr 1 and 2, 24 Angus and Angus x Simmental heifers in mid-gestation were allotted to the eight pastures to strip-graze stockpiled forage and 8 similar heifers were placed in a dry lot to be fed hay. Corn gluten feed was supplemented to heifers in pastures at each stocking rate and in the two dry lots at levels to meet the target weight gains for pregnancy and growth while heifers in the remaining pastures were supplemented at levels to meet the target weight gains for pregnancy only. Mean seasonal concentrations of in vitro digestible dry matter (IVDMD) were greater ($P < 0.05$) and concentrations of neutral detergent fiber (NDF), acid detergent fiber (ADF), and acid detergent insoluble nitrogen (ADIN) were lower ($P < 0.05$) in stockpiled forage than hay. Average daily gains and body condition score increases of heifers grazing stockpiled forage were greater ($P < 0.05$) than heifers fed hay in a dry lot even though heifers grazing stockpiled forage required 49 and 90% less corn gluten feed at the high and low stocking rates in yr 1 and required no corn supplementation while heifers in the dry lot required 1.8 lb/day in yr 2. Mean production costs were $0.86, $0.87, $0.64, $0.65, and $1.17 /heifer/day for heifers grazing stockpiled forage at the low stocking rate at the low or high level of corn gluten feed, grazing stockpiled forage at the high stocking rate at the low or high level of corn gluten feed, or fed hay and corn gluten feed at the high level.

**Introduction**

Iowa Beef Cow Business Records have shown that the major factor separating high and low profit beef cow-calf producers is the cost of feeding stored feeds over winter. To reduce these costs, winter grazing systems using corn crop residues and/or stockpiled grass-legume forages have been developed and evaluated for pregnant mature beef cows. These systems have reduced the amounts of hay fed by as much as 60 to 93% compared to management in dry lots. Although winter grazing systems have reduced the amounts of stored feeds required for mature cows, it has been shown that weathering of corn crop residues and stockpiled forages reduced the digestibility of dry matter and protein over winter.

In addition to the nutrient requirements for maintenance and fetal growth, pregnant heifers have further requirements for body growth. Also, forage intakes of heifers tend to be lower than those of mature cows, particularly as they near parturition. As a result, heifers require diets with higher concentrations of nutrients than mature cows, particularly in late gestation when the nutritional value of stockpiled forages may be reduced. Consequently, it has been uncertain how effective winter grazing systems would be for heifers.

Therefore, an experiment was conducted to evaluate the effects of stocking rate and corn gluten feed supplementation on the performance and forage intake of pregnant heifers grazing stockpiled tall fescue-red clover pastures.

**Materials and Methods**

Two 30-acre fields at the Iowa State University Beef Nutrition Farm were seeded with 'Fawn' endophyte-free tall fescue at 15 lb/acre in the spring of 2000 by drilling and again through broadcast-seeding at 4 lb/acre the following fall. To establish and maintain red clover in the pastures, common red clover was frost-seeded into the pastures at 8 and 4 lb/acre in the last week of February in yr 1 (2001) and 2 (2002). Forage from the pastures was harvested as hay in large round bales in early June and August and stored as a 3-bale high pyramid covered with a tarp. After the August hay harvest, forage was allowed to stockpile. Stockpiling and grazing were initiated on August 6 and November 7 in yr 1 and August 8 and October 23 in yr 2. Urea was applied at 45 lb N/acre in early September in each year.

Each field was divided into two 6.25- and 8.75-acre pastures and stocked with three Angus (average body weight, 1018 lb; average body condition score, 5.1) and Angus x Simmental (average body weight, 972 lb; average body condition score, 4.5) in mid-gestation in yr 1 and 2 for high (0.48 heifers/acre) and low (0.34 heifers/acre) stocking rates. Simultaneously, four similar heifers were allotted to each for two dry lots. Forage samples were hand-clipped, dried and weighed to determine forage mass. At average initial forage masses of 2226 and 2968 lb forage dry matter

(DM)/acre in yr 1 and 2, forage utilization rates of 70 and 50% at the high and low stocking rates, and estimated DM intakes of 2.5% of body weight, the potential grazing days were 127 and 178 days for heifers grazing stockpiled forage in yr 1 and 2. Because of early calving dates, heifers grazing stockpiled forage in yr 2 were removed after 154 days of grazing. Heifers in the dry lots were fed tall fescue-red clover hay at an ad libitum level as large round bales.

Corn gluten feed was supplemented to heifers in two pastures at each stocking rate and fed hay in the two dry lots at a rate to meet the target weight for both heifer and fetal growth (High target weight). Heifers in the remaining two pastures at each stocking rate were supplemented with corn gluten feed to a target weight based on fetal growth only (Low target weight) or if severe weather limited availability of pasture forage. Heifers also received water and a mineral and vitamin premix free-choice.

At the initiation and termination of the experiment, all heifers were fed tall fescue-red clover hay ad libitum for 3 days prior to weigh to adjust for gut fill. Heifer body weights were also measured biweekly to adjust the diet for target weights. Simultaneous to weighing, body condition was scored on a 9-point scale. At calving, birth weights and calving ease (1=no assistance, 2=assistance without mechanical help, 3=assistance with mechanical help, and 4=mechanical help resulting in calf loss). Stillborn or other calf deaths, not a direct result of calving difficulty, were not included in the calving ease score.

Composition of forage selected by one ruminally fistulated steer per pasture was determined by ruminal evacuation on two consecutive days in November and March in each year. Simultaneous to the determination of grazing selection, forage DM intake was estimated from the fecal output determined by the passage kinetics of a pulse-dose of chromium-mordanted fiber (2% Cr) in two cows per pasture and the in vitro digestible dry matter (IVDMD) content of forage selected by the grazing steers.

Pasture forage samples were hand-clipped at two 0.25-$m^2$ locations in each grazed or non-grazed paddock and composited by pasture every 28 days. In addition, to determine the effects of weathering of forage composition, forage samples were hand-clipped from a 0.25-$m^2$ location in one 0.5-$m^2$ grazing exclosure in each paddock. Large round bales were core-sampled to a depth of 12 inches at four locations around the outside of each bale prior to feeding. Samples of forage selected during grazing, hand-clipped from the pastures and core-sampled from large round bales were analyzed for DM, IVDMD, crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), and acid detergent insoluble nitrogen (ADIN). Additional pasture samples collected before the initiation of grazing were hand-sorted into live grass, legume, and broadleaf weed, and dead forage fractions that were dried and weighed.

An economic analysis of the systems was conducted based on the stocking rates and amounts of supplemental feed that was required by each treatment group. Prices were assumed to be $55/ton for corn gluten feed, $60/acre for annual pasture rent, and $0.20/head/day for dry lot rent. Costs of initial pasture establishment, perimeter and cross fencing, and watering systems were estimated from extension publications. Allocation of annual rental rate and pasture establishment costs to grazing of stockpiled forages was based on the proportion of total annual forage production stockpiled for winter grazing and the pasture life expectancy. The cost of hay fed to heifers in the dry lot were $41/ton totaling $116.53 and $141.30 in yr 1 and 2 based on the actual hay yields from the experimental pastures, costs of custom harvest, and the proportion of the rental and pasture establishment costs attributed to hay production. Other costs such as veterinarian, medication, and labor were assumed to be equal across treatments.

## Results and Discussion

Average proportions of tall fescue, red clover, and broadleaf weeds in the live DM of the stockpiled pastures at the initiation of grazing were 83.5, 12.5, and 4.0% in yr 1 and 76.0, 12.3, and 11.5% in yr 2 and did not differ between stocking rates. Similarly, proportions of dead forage in the total plant DM were 19.8 and 4.3% in yr 1 and 2 and did not differ between stocking rates.

Masses of stockpiled forage at the initiation of grazing were 2226 and 2968 lb/acre in yr 1 and 2 (Table 1). The lower stockpiled forage yield in yr 1 was likely caused by the age of these pastures and the precipitation level in August and September that was 3.8 inches less than yr 2. In yr 1, the rate of forage loss was greater ($P < 0.05$) from grazed paddocks than non-grazed paddocks. In yr 2, however, weathering losses of forage DM did not differ from grazing losses, possibly because snowfall from November to March was 4 inches greater in yr 2 than yr 1. There were no effects of stocking rate or supplementation on the rates of loss of stockpiled forage over winter. Although stocking rates were designed to utilize 70 and 50% from pastures at the high and low stocking rates, forage removal rates over the grazing seasons were 51 and 48% in yr 1 and 64 and 52% in yr 2. Concentrations of CP and IVDMD in stockpiled forage decreased and those of ADIN (a measure of protein indigestibility) increased over the grazing season, but the rates of change did not differ between grazed and non-grazed paddocks in either year.

Compared to non-grazed stockpiled forage, tall fescue-red clover hay had lower concentrations of CP ($P = 0.08$ and $P < 0.01$ in yr 1 and 2) and IVDMD ($P < 0.01$) at the initiation of grazing (Table 2). While the concentrations of CP and IVDMD in stockpiled forage decreased over winter, concentrations of CP (Forage x Month, $P < 0.01$ in yr 1 and $P = 0.04$ in yr 2) and IVDMD (Forage x Month, $P < 0.01$) in hay changed little. In both years, the proportion of N as ADIN was greater ($P < 0.01$) in hay than stockpiled forage at the initiation of grazing and increased more (Forage x Month, $P < 0.01$ in yr 1 and $P = 0.02$ in yr 2) in hay than

stockpiled forage over the grazing period. This implies that the digestibility of the protein in tall fescue-red clover hay was lower than that of the stockpiled forage.

In November and March of both years, the IVDMD and CP concentrations were greater ($P < 0.04$) and the proportions of N as ADIN were lower ($P < 0.04$) in forage selected by steers grazing stockpiled forage than forage selected by steers fed hay (Table 3). The concentrations of IVDMD in forage selected by steers grazing stockpiled forage at the high stocking rate were lower ($P = 0.02$) than the low stocking rate in March of yr 2 and tended ($P \leq 0.14$) to be lower than the low stocking rate in all other periods. Similarly, concentrations of CP tended ($P \leq 0.10$) to be lower and ADIN tended ($P < 0.10$) to be greater in forage selected by steers grazing at the high stocking rate than the low stocking rate in November of both years. These results seem to imply that the high stocking rate was adequate to reduce grazing selectivity compared to the low stocking rate.

During measurement of forage intake in November and March of yr 1, heifers grazing stockpiled forage with corn gluten feed supplementation to the high target weight received 1 and 2 lb/heifer/day of corn gluten feed, while heifers in the dry lots received 1 and 6.1 lb/heifer/day. In yr 2, only heifers fed hay in the dry lot received corn gluten feed during forage intake measurements at 1 and 2 lb/heifer/day in November and March. Although there was supplementation of corn gluten feed, there were no significant effects of supplementation on forage or total (forage plus corn gluten feed) intake. Forage intake, expressed as lb/day, did not differ between forage types or stocking rates in either month or year (Table 4). However, as percentages of body weight, forage intakes of heifers grazing stockpiled forage at either stocking rate were lower ($P = 0.04$) than heifers fed hay in the dry lots of March of yr 2. Because of the greater amounts of corn gluten feed fed to heifers in the dry lots, corn gluten feed supplementation resulted in even greater differences in total DM intake, as percentages of body weight, between heifers grazing stockpiled forage or fed hay in March of yr 1 and 2 ($P < 0.02$). From November to March, mean forage intakes of heifers on all treatments, as percentages of body weight, decreased in both years ($P < 0.05$).

In both yr 1 and 2, mean daily gains of heifers grazing stockpiled forage (1.9 and 2.1 lb/day) were greater ($P < 0.10$) than heifers fed hay in dry lots (1.0 and 1.1 lb/day; Figure 1 and 2). Similarly, in both years, mean daily gains of heifers grazing stockpiled forage at the low stocking rate (2.0 and 2.2 lb/day in yr 1 and 2) were greater ($P < 0.05$) than those grazing at the high stocking rate (1.7 and 2.0 lb/day in yr 1 and 2). In both years, corn gluten feed supplementation to either target weight of heifers grazing stockpiled forages did not affect heifer body weight gains. Similar to body weight, body condition score increased more ($P < 0.10$) in heifers grazing stockpiled forage than in those fed hay and increased more ($P < 0.10$) in heifers grazing at the low stocking rate than those grazing at the high stocking rate (Table 5).

The total amounts of hay that were fed to heifers in the dry lot were 28.7 and 31.4 lb/heifer/day or 3645 and 4836 lb/heifer/season in yr 1 and 2. Because of the high body weight gains of heifers grazing stockpiled forage, heifers supplemented to the low and high target weights were fed 9.7 and 50.6% as much corn gluten feed as heifers in the dry lot (185 lb corn gluten feed/heifer/season) in yr 1. All of the corn gluten feed fed to heifers at low target weight was fed as a result of a heavy snowstorm that limited the availability of forage to graze. In yr 2, heifers grazing stockpiled forage required no supplemental corn gluten feed to meet their target weights. However, heifers fed hay in the dry lots required 1.8 lb corn gluten feed/heifer/day or 286 lb corn gluten feed/heifer/season. The low amounts of corn gluten feed supplementation needed by heifers grazing stockpiled forage was likely related to the higher nutritional value of stockpiled forage and weather conditions. Average temperatures were 3.2 and 0.4°F greater than average, but total precipitation and snowfall were 0.6 and 4.3 inches lower than average in yr 1 and 0.9 and 3.5 inches lower than average in yr 2.

The greater body weight gains of heifers grazing stockpiled forage than heifers fed hay resulted in heavier ($P < 0.10$) calf birth weights in both years. However, calving ease scores did not differ between treatments.

Daily production costs of heifers grazing stockpiled forage were 23 to 48% lower than heifers fed hay and corn gluten feed in the dry lots in the two years (Table 6). Because the major costs associated with grazing stockpiled forage were pasture rental and establishment costs, production costs per head per day decreased as the stocking rate increased. Sensitivity analyses showed that feeding hay and corn gluten feed to heifers in the dry lots was more sensitive to a 20% increase or decrease in hay price than a 20% increase or decrease in pasture rental was on heifers grazing stockpiled forage.

## Conclusion

In two years in which ambient temperatures were near normal, but snowfall was less than normal, heifers grazing stockpiled forage had greater body weight gains with less corn gluten feed supplementation than heifers fed hay in dry lots. As a result, at prices of $60/acre for pasture rental, $41/ton of hay, and $55/ton of corn gluten feed, production costs of heifers grazing stockpiled forage were 23 to 48% less than heifers fed hay in a dry lot, depending on stocking rate. Because pasture forage utilization rates were lower than designed and the body weight gains of heifers grazing at the high stocking rate were only slightly lower than those grazing at the low stocking rate and well above the target weights for body and fetal growth, a stocking rate greater than 0.48 heifers/acre for 127 to 154 days may be possible, reducing costs of grazing even more.

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**Table 1. Initial and changes in the mass and composition of stockpiled tall fescue-red clover forage in grazed and ungrazed paddocks.**

| | | Daily change | | |
|---|---|---|---|---|
| | Initial | Grazed | Non-grazed | Significance |
| | | Year 1 | | |
| Forage mass, lb/ac | 2226 | -7.2 | 1.5 | <0.01 |
| % DM | | | | |
| CP | 13.5 | -0.02 | -0.02 | 0.85 |
| IVDMD | 63.6 | -0.11 | -0.13 | 0.83 |
| NDF | 45.6 | 0.11 | 0.10 | 0.03 |
| ADF | 29.5 | 0.07 | 0.06 | 0.08 |
| %N | | | | |
| ADIN | 9.3 | 0.01 | 0.02 | 0.65 |
| | | Year 2 | | |
| Forage mass, lb/ac | 2968 | -11.4 | -10.4 | 0.58 |
| %DM | | | | |
| CP | 14.0 | -0.01 | -0.01 | 0.63 |
| IVDMD | 57.0 | -0.05 | -0.04 | 0.39 |
| NDF | 50.3 | 0.08 | 0.07 | 0.61 |
| ADF | 31.4 | 0.06 | 0.05 | 0.32 |
| %N | | | | |
| ADIN | 8.3 | 0.05 | 0.05 | 0.72 |

**Table 2. Composition of non-grazed stockpiled tall fescue-red clover forage and hay.**

| | Forage and month[a] | | | | | | | | | | Significance | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stockpiled forage | | | | | Hay | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | Forage | Month | F x M |
| | Year 1 | | | | | | | | | | | | |
| %DM | | | | | | | | | | | | | |
| CP | 13.5 | 11.6 | 10.1 | 11.0 | 9.6 | 12.5 | 12.9 | 11.2 | 10.4 | 11.7 | 0.08 | < 0.01 | 0.01 |
| IVDMD | 63.6 | 59.7 | 58.6 | 50.3 | 46.1 | 44.1 | 41.8 | 41.3 | 42.5 | 43.6 | < 0.01 | < 0.01 | < 0.01 |
| NDF | 45.6 | 51.1 | 50.0 | 54.1 | 60.3 | 65.1 | 62.7 | 64.5 | 67.4 | 59.8 | < 0.01 | < 0.01 | < 0.01 |
| ADF | 29.5 | 32.3 | 32.3 | 34.7 | 38.1 | 40.4 | 40.4 | 40.5 | 49.3 | 38.3 | < 0.01 | <0.01 | < 0.01 |
| %N | | | | | | | | | | | | | |
| ADIN | 9.3 | 11.3 | 12.2 | 10.5 | 12.3 | 14.9 | 12.4 | 20.9 | 26.4 | 27.2 | <0.01 | <0.01 | <0.01 |
| | Year 2 | | | | | | | | | | | | |
| %DM | | | | | | | | | | | | | |
| CP | 14.0 | 10.3 | 11.0 | 11.0 | 11.2 | 9.5 | 9.1 | 11.2 | 9.5 | 10.4 | < 0.01 | 0.08 | 0.04 |
| IVDMD | 57.0 | 52.1 | 45.3 | 52.0 | 53.9 | 46.5 | 43.7 | 41.3 | 50.2 | 47.4 | < 0.01 | < 0.01 | 0.43 |
| NDF | 50.3 | 49.5 | 49.5 | 51.0 | 54.6 | 69.3 | 67.3 | 64.5 | 68.8 | 68.6 | < 0.01 | 0.3 | 0.36 |
| ADF | 31.4 | 29.7 | 30.2 | 30.5 | 31.5 | 45.5 | 43.4 | 40.5 | 43.8 | 44.8 | < 0.01 | 0.08 | 0.53 |
| %N | | | | | | | | | | | | | |
| ADIN | 8.3 | 7.5 | 7.9 | 7.2 | 7.1 | 13.7 | 15.5 | 20.9 | 12.9 | 13.7 | < 0.01 | < 0.01 | 0.02 |

[a]Month correspond to 28 day intervals beginning on November 7, 2001 and October 23, 2002.

**Table 3. Composition of forage selected by steers grazing stockpiled forage or consuming hay in November and March of each year.**

| | Selected forage | | | Contrasts | |
|---|---|---|---|---|---|
| | Stockpiled forage[a] | | | | |
| | Low stocking rate | High stocking rate | Hay | Low vs high stocking rate | Stockpile vs hay |
| | | Year 1 | | | |
| | | November | | | |
| IVDMD, %DM | 57.9 | 54.4 | 49.9 | 0.12 | 0.04 |
| CP, %DM | 12.0 | 10.7 | 7.5 | 0.10 | < 0.01 |
| ADIN, %N | 7.1 | 9.0 | 17.6 | 0.09 | < 0.01 |
| | | March | | | |
| IVDMD, %DM | 58.0 | 55.2 | 50.3 | 0.14 | < 0.01 |
| CP, %DM | 10.9 | 10.5 | 8.6 | 0.41 | < 0.01 |
| ADIN, %N | 7.8 | 8.8 | 18.7 | 0.62 | < 0.01 |
| | | Year 2 | | | |
| | | November | | | |
| IVDMD, %DM | 57.7 | 55.9 | 50.4 | 0.13 | < 0.01 |
| CP, %DM | 12.2 | 11.0 | 8.9 | 0.08 | < 0.01 |
| ADIN, %N | 6.0 | 7.1 | 9.2 | 0.08 | < 0.01 |
| | | March | | | |
| IVDMD, %DM | 57.9 | 54.1 | 45.3 | 0.02 | < 0.01 |
| CP, %DM | 11.5 | 12.0 | 9.7 | 0.45 | 0.03 |
| ADIN, %N | 6.3 | 7.7 | 8.9 | 0.1 | 0.04 |

[a]Low and high stocking rates were 0.34 and 0.48 heifers/acre.

**Table 4. Forage and total dry matter intakes of heifers grazing stockpiled forage or fed hay with supplemental corn gluten feed**

| | Selected forage | | | Contrasts | |
|---|---|---|---|---|---|
| | Stockpiled forage[a] | | | | |
| | Low stocking rate | High stocking rate | Hay | Low vs high stocking rate | Stockpile vs hay |
| | | Year 1 | | | |
| Forage intake, lb/day | | | | | |
| November | 23.5 | 22.4 | 22.7 | NS | NS |
| March | 20.5 | 18.7 | 16.1 | NS | NS |
| Forage intake, %BW | | | | | |
| November | 2.2 | 2.1 | 2.1 | NS | NS |
| March | 1.6 | 1.5 | 1.4 | NS | NS |
| Total DM intake, lb/day | | | | | |
| November | 24.7 | 23.3 | 13.5 | NS | NS |
| March | 20.5 | 19.8 | 22.0 | NS | NS |
| Total DM intake, %BW | | | | | |
| November | 2.3 | 2.2 | 2.2 | NS | NS |
| March | 1.6 | 1.6 | 1.9 | NS | 0.02 |
| | | Year 2 | | | |
| Forage intake, lb/day | | | | | |
| November | 28.2 | 26.0 | 31.5 | NS | NS |
| March | 25.9 | 25.1 | 26.4 | NS | NS |
| Forage intake, %BW | | | | | |
| November | 2.6 | 2.3 | 2.7 | NS | NS |
| March | 2.0 | 2.0 | 2.4 | NS | 0.04 |
| Total DM intake, lb/day | | | | | |
| November | 28.2 | 26.0 | 32.3 | NS | NS |
| March | 25.9 | 25.1 | 28.4 | NS | NS |
| Total DM intake, %BW | | | | | |
| November | 2.6 | 2.3 | 2.8 | NS | NS |
| March | 2.0 | 2.0 | 2.5 | NS | < 0.01 |

[a]Low and high stocking rates were 0.34 and 0.48 heifers/acre.

**Table 5. Body condition score change, corn gluten feed intake, calf birth weight and calving ease of heifers grazing stockpiled forage or fed hay with supplemental corn gluten feed.**

| | Forage, stocking rate, and supplementation level | | | | |
|---|---|---|---|---|---|
| | Stockpiled forage | | | | |
| | Low stocking rate[a] | | High stocking rate | | Hay |
| | Low target weight[b] | High target weight | Low target weight | High target weight | High target weight |
| Body condition score change | | | | | |
| Year 1[c] | 0.44[e] | 0.21[e] | -0.03[f] | 0.0[f] | -0.22[g] |
| Year 2[d] | 0.96[e] | 0.94[e] | 0.89[e] | 0.50[f] | -0.12[g] |
| Corn gluten feed, lb/season | | | | | |
| Year 1 | 18.0 | 93.7 | 18.0 | 93.7 | 185.5 |
| Year 2 | 0 | 0 | 0 | 0 | 186.5 |
| Calf birth weight, lb | | | | | |
| Year 1 | 84.7[e] | 83.2[e] | 75.2[ef] | 85.1[e] | 69.3[f] |
| Year 2 | 80.0[e] | 88.7[e] | 83.8[e] | 87.1[e] | 70.2[f] |
| Calving ease | | | | | |
| Year 1 | 1.3 | 1.1 | 1.3 | 1.0 | 1.0 |
| Year 2 | 1.3 | 1.8 | 1.7 | 1.3 | 1.3 |

[a]Low and high stocking rates were 0.34 and 0.48 heifers/acre.
[b]Low and high target weights were the weight gains for fetal growth only and the weight gains for body and fetal growth.
[c]Average initial body condition score was 5.1.
[d]Average initial body condition score was 4.5.
[ef]Means with different superscripts in the same row are different.

**Table 6. Estimated costs for developing heifers grazing stockpiled forage or fed hay with corn gluten feed supplementation.**

| | Forage, stocking rate, and supplementation level | | | | |
|---|---|---|---|---|---|
| | Stockpiled forage | | | | |
| | Low stocking rate[a] | | High stocking rate | | Hay |
| | Low target weight[b] | High target weight | Low target weight | High target weight | High target weight |
| | | | Year 1 | | |
| Cost, $/hd/day | | | | | |
| Dry lot yardage | 0.00 | 0.00 | 0.00 | 0.00 | 0.20 |
| Pasture rent | 0.37 | 0.37 | 0.27 | 0.27 | 0.00 |
| Pasture establishment | 0.51 | 0.51 | 0.39 | 0.39 | 0.00 |
| Corn gluten feed | 0.01 | 0.02 | 0.01 | 0.02 | 0.04 |
| Hay | 0.00 | 0.00 | 0.00 | 0.00 | 0.92 |
| Total | 0.89 | 0.90 | 0.67 | 0.68 | 1.16 |
| Sensitivity analysis | | | | | |
| Pasture rent | | | | | |
| 20% increase | 0.96 | 0.98 | 0.71 | 0.73 | 1.16 |
| 20% decrease | 0.81 | 0.83 | 0.60 | 0.62 | 1.16 |
| Hay cost | | | | | |
| 20% increase | 0.89 | 0.91 | 0.66 | 0.68 | 1.35 |
| 20% decrease | 0.89 | 0.91 | 0.66 | 0.68 | 0.98 |
| | | | Year 2 | | |
| Cost, $/hd/day | | | | | |
| Dry lot yardage | 0.00 | 0.00 | 0.00 | 0.00 | 0.20 |
| Pasture rent | 0.35 | 0.35 | 0.25 | 0.25 | 0.00 |
| Pasture establishment | 0.48 | 0.48 | 0.36 | 0.36 | 0.00 |
| Corn gluten feed | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 |
| Hay | 0.00 | 0.00 | 0.00 | 0.00 | 0.92 |
| Total | 0.83 | 0.83 | 0.61 | 0.61 | 1.18 |
| Sensitivity analysis | | | | | |
| Pasture rent | | | | | |
| 20% increase | 0.90 | 0.90 | 0.66 | 0.6 | 1.18 |
| 20% decrease | 0.76 | 0.76 | 0.56 | 0.56 | 1.18 |
| Hay cost | | | | | |
| 20% increase | 0.83 | 0.83 | 0.61 | 0.6 | 1.36 |
| 20% decrease | 0.83 | 0.83 | 0.61 | 0.61 | 0.99 |

[a]Low and high stocking rates were 0.34 and 0.48 heifers/acre.

[b]Low and high target weights were the weight gains for fetal growth only and the weight gains for body and fetal growth.

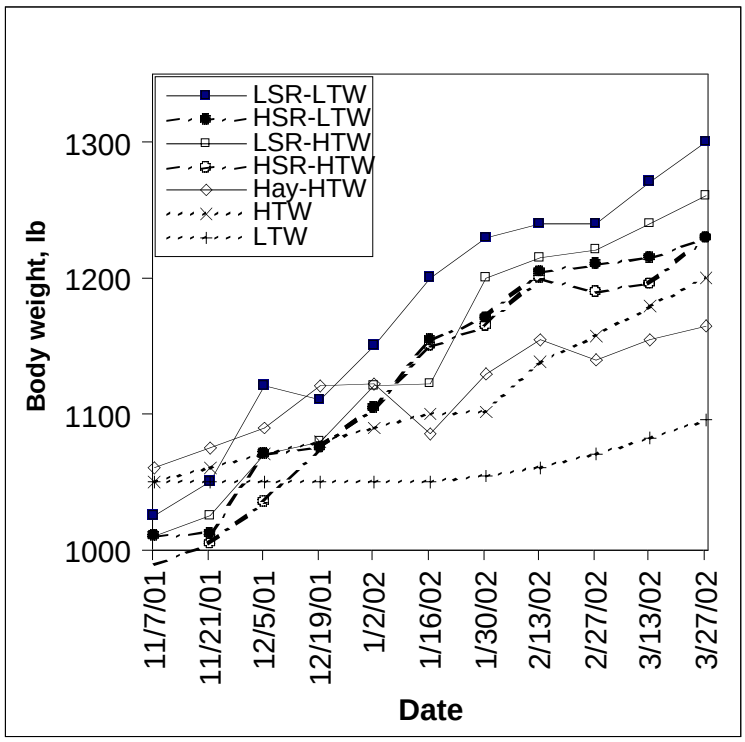


**Figure 1. Body weights of heifers grazing stockpiled forage at low (LSR) and high (HSR) stocking rates or fed hay with corn gluten feed supplemented to a low (LTW) or high (HTW) target weight in year 1.**

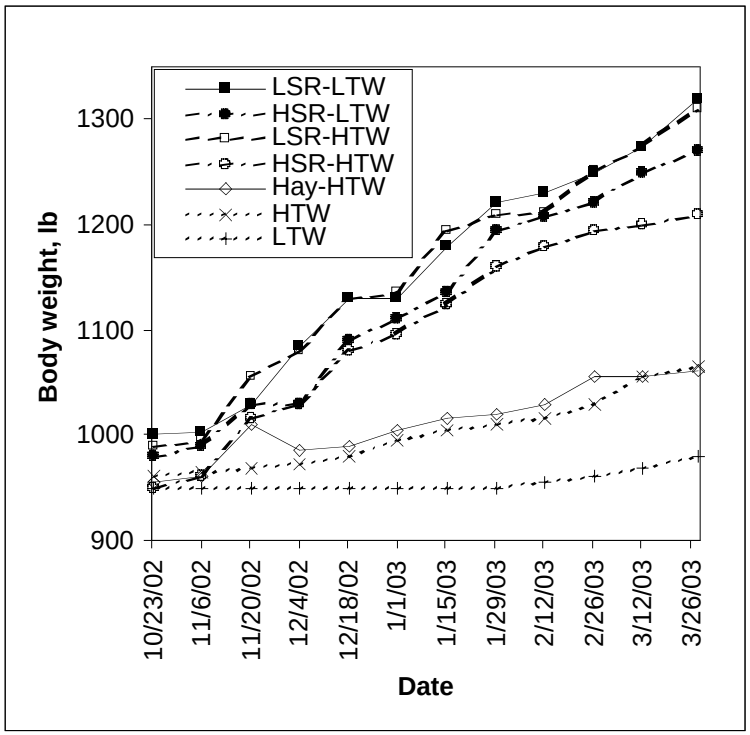


**Figure 2. Body weights of heifers grazing stockpiled forage at low (LSR) and high (HSR) stocking rates or fed hay with corn gluten feed supplemented to a low (LTW) or high (HTW) target weight in year 2.**