# Forage-Livestock Research Progress Report

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**ECONOMIC PERSPECTIVE OF STOCKING RATES AND SUPPLEMENTATION FOR STOCKER STEERS AND HEIFERS GRAZING RYE AND RYEGRASS PASTURES**

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**Summary**

Stocker steer and heifer performance on rye and ryegrass pastures stocked at three rates of 1.5, 2.1 and 3.0 hd/ac and receiving a corn-based daily supplement of 0, 0.4%, and 0.8% BW provided the database for economic assessments. Increasing fertilizer nitrogen costs from $340/ton ($0.50/lb N) to $476/ton ($0.70/lb N) showed only a gradual decline in returns per acre. Increasing supplement costs from $125/ton to $400/ton had a more dramatic impact on return/ac. The supplement cost effects were more profound at high stocking rates and at the 0.8% BW level. These assumptions include efficiencies of supplement:extra gain; however, numerous commercially-available supplements are less efficient than the corn-based ration used in our experiment. As overall value of cattle declined from more than $1.15/lb to $0.85/lb, the opportunities for positive returns declined on most all stocking rate x supplement scenarios. The magnitude of negative margin had the most effect on positive returns/ac; thus purchase-sale prices structures usually require more management attention compared to rising commodity prices.

**Introduction**

With a majority of the cattle industry having fall-weaned calves, the use of cool-season annual pastures such as rye, wheat, oats, and/or ryegrass has long been a method of choice for backgrounding-developing cattle for the feedlot. Winter pasture costs have increased dramatically in direct proportion to energy-related costs associated with fuel, fertilizer, and feed grains. Depending upon fertilizer input, costs of small grain-ryegrass pastures planted on low to moderate-fertile soils of East Texas, may range from $100 to more than $225/ac. With moderate to high-priced cattle and low to moderate feed costs, use of supplementation to intentionally substitute for high-value forage offers management options to increase stocking rates and gain per acre. The objectives of this economic evaluation were to assess costs and returns per animal and per acre from rye and ryegrass pastures stocked at three rates with steers and heifers that received three levels of a corn-based supplement. Budgeting objectives were to assess the impact of increasing costs of fertilizer and supplement as well as changes in value of cattle and purchase-sell margins.

**Experimental Procedures**

Performance of steers and heifers on ‘Maton’ rye (Secale cereale L) and ‘TAM-90’ annual ryegrass (Lolium multiflorum L) stocked at three rates (1.5, 2.1 and 3.0 hd/ac) and receiving three daily corn-based supplements containing Rumensin (0, 0.4% and 0.8% BW) was quantified at the Texas A&M University Agricultural Research and Extension Center at Overton (Rouquette et al, 2007). An array of economic budget scenarios were prepared, to evaluate potential profit-loss statements using variable input costs for fertilizer, supplements, and purchase – sell prices and margins. Some of the animal input costs included supplement, hay that was offered during initial grazing period, 8-way vaccine, ear implant (Revelor-G), vaccine for VAC-45 program, two separate injectable dewormer applications, salt and minerals, and interest cost at 10%. Some of the pasture input costs included ‘Maton’ rye seed at 100 lbs/ac, ‘TAM-90’ annual ryegrass seed at 25 lbs/ac, ammonium nitrate fertilizer (34-0-0) split applied for a total of 450 lbs/ac (153 lbs N/ac), 21-8-17 fertilizer at 250 lbs/ac, and interest at 10%. Purchase price of approximate 575-lb steers and heifers was set initially at $1.26/lb for steers and $1.15/lb for heifers. Some variations in both purchase price and margin were used to illustrate both positive and negative returns.

Selected budget scenarios based on purchase price were prepared with all items fixed in price except for fertilizer or for supplement. These two input items are uniquely associated with energy costs, and they also present the most questioned pre-grazing management options. Purchase-sale negative margins traditional with the stocker industry were used to project returns (Table 1). In addition, zero margins were explored in the case of substantially reduced purchase prices of cattle. Gross revenues and gross operating expenses allowed for estimates of net returns per head and per acre, as well as value of gain, costs, and returns per pound of gain.

## Results and Discussions

Based on costs of ammonium nitrate at $340/ton ($0.50/lb N), 21-8-17 at $380/ton, supplement at $125/ton ($0.625/lb), and hay at $80/ton, cost-returns were estimated using purchase price of $1.26/lb for steers and $1.15 for heifers. The sale prices were weight and calf sex dependent, and are shown in Table 1 and Sale Price I. A base-line budget summary of animal performance, costs, and returns from stockers grazing rye-ryegrass pastures at three stocking rates and three levels of supplement is presented in Table 2. Costs per head include purchase price and all animal input costs. Costs per acre include cost per head x stocking rate, and all pasture input costs. For cool-season, annual grass pastures grown on relatively low fertile soils in East Texas, seasonal fertilizer nitrogen requirements may be 200 lbs/ac N, or nearly 600 lbs/ac of 34-0-0 or equivalent. Thus, pasture input costs, exclusive of animal costs, may vary from $150 to more than $225/ac depending upon fertilizer rate, ratio, and costs. Returns ranged from a loss of $80/ac when stocked at 3.0 hd/ac and non-supplementation to a positive $215/ac from pastures stocked at 2.2 hd/ac and cattle receiving 0.8% BW supplement. Thus, using these budget assumptions, the 0.8% BW supplement level that acted as a substitution for forage returned the most per acre. Responsible for those returns was the relatively low cost of supplement, moderate to high priced cattle, and ADG of more than 3 lbs/da. The cost per pound of gain from high stocked (3 hd/ac) pastures, non-supplemented cattle at $0.69/lb gain was nearly twice that of pastures stocked at 1.5 hd/ac. A comparison among stocking rates x supplementation showed the differential returns per acre for all treatments (Table 3). In this comparison, the influence of increasing stocking rate from 1.5 hd/ac to 3.0 hd/ac without supplementation resulted in a $215/ac reduction in returns per acre. In contrast, an additional $294/ac return was possible by reducing the stocking rate from 3.0 to 2.2 hd/ac and daily supplementing with 0.8% BW of corn ration.

Cool-season annual forages often contain excess nutritive value parameters for young, growing stocker cattle requirements; thus, these rye-ryegrass, wheat, and/or oats pastures have long-been used for backgrounding and developing cattle prior to feedlot residence. Management decisions pertaining to fertilizers and supplements have been re-assessed due to increasing energy costs. From 2003 to 2007, price of N fertilizer more than doubled from about $0.25/lb N to $0.50/lb N or more. Table 4 shows ranges in costs for both 34-0-0 and corn. In an effort to portray the effect of increasing nitrogen costs on returns per acre from these treatments, N costs were varied from $340/ton ($0.50/lb N) to $476/ton ($0.70/lb N) with all other costs fixed. The assumptions used showed that all stocking rate x supplement levels had decreasing, but positive returns/ac with increasing N cost except at the high stocked (3 hd/ac), non-supplemented treatment (Table 5). Thus, with these levels of animal performance, increasing costs of N was not destructive to management. Utilization of forage is a major factor that influences returns with increasing N costs. With supplement cost held constant at $125/ton ($0.625/lb), maximum return/ac was projected for the medium-stocking rate plus 0.8% BW daily supplementation.

With ammonium nitrate cost fixed at $340/ton and varying supplement costs from $125/ton to $400/ton, the projected return/ac showed several stocking rate x supplementation scenarios with negative returns/ac (Table 6). Assuming the same conversion of supplement:extra gain achieved in this experiment, it was interesting to note that all returns/ac were positive with 0.4% BW supplementation when using either low (1.5) or medium (2.1) stocking rates. Use of 0.8% BW supplementation did not yield positive returns/ac at any stocking rate with supplement costs of $400/ton. These two scenarios of variable N costs (Table 5) and variable supplement costs (Table 6) would reveal more negative returns/ac if both commodities were increasing concurrently.

The impact of increasing input costs is magnified with associated declining value of cattle. Using negative margin scenarios incorporated in the previous budgets, and reducing value of cattle to either $.90 and $.95 or $0.80 and $0.85, respectively, for heifers and steers, there were only four profitable scenarios with initial $.90 and $.95 cattle and no positive return scenarios with $.80 and $.85 cattle (Table 7). It is therefore prudent to remember that profitable stocking rate x supplementation strategies become more difficult and often impossible with declining cattle prices. As successful, and some opportunistic, managers know, the degree and extent of negative margin between purchase price and sale price is usually the most important factor contributing to profit or loss in a cattle venture. For example, regardless of value of cattle at time of purchase, with a zero margin (sale price/lb = purchase price/lb), all of the stocking rate x supplementation strategies yielded substantial, profitable returns/acre (Table 7).

Budget projections should be considered as a guideline due to variations in climatic conditions, forage growth rate, animal performance, and marketing uncertainties. As a base-line budget projection for short-term future considerations, prices for fertilizer ammonium nitrate at $374/ton ($0.55/lb N), $200/ton supplement, initial purchase prices of $1.10/lb for heifers and $1.15/lb for steers, and negative margins presented in Table 1 (Sale Price II), budget summaries and returns/hd and per acre are shown in Table 8. Returns per acre were optimized at low (1.5 hd/ac) and medium (2.1 hd/ac) under both supplemented and non-supplementation levels. The high stocking rate of 3 hd/ac was not a profitable venture for the pasture phase using these budget assumptions. The differential returns/ac further illustrated these stocking rate x supplementation comparisons (Table 9). High stocking rates in which there is a lack of forage available for ad libitum consumption creates reduced ADG potential which affects to profitable returns. These reduced gains and potential economic losses on pasture may mandate that stocker operators maintain ownership of cattle through the feedlot phase.

## Implications

Baseline comparative data provide the structure for forage-animal management decisions and budget projections of cost-returns. The animal and pasture performance data of this grazing experiment, the input costs, and purchase-sell prices suggested that neither increasing fertilizer prices or supplement prices would be financially-devastating under moderate stocking rates. Reduced fertilizer applications are common and expected management reactions to increasing costs. However, management concerns should be directed equally toward forage utilization by using an appropriate stocking rate. Price of supplement has similar effects on management decisions as that of fertilizer costs. However, supplements are not all created equal with respect to enhanced animal performance pertaining to efficient supplement:extra gain ratios. One of the most profound impacts on extent of profit or loss is directly related to the magnitude of purchase-sell margin. Some of the budget scenarios presented confirm the philosophy that making money in the stocker business is heavily dependent on the art, skill, and good fortune of buying and selling cattle.

## Literature Cited

1. Rouquette, F.M., Jr., J.L. Kerby, G.H. Nimr, and J.M. Vendramini. 2007. Effect of stocking rates and level of daily supplement on performance of stockers grazing rye-ryegrass pastures. Beef Cattle Research in Texas.

Table 1. Purchase and sale price assumptions based on final weight and sex of calf from stocking rate (SR) and supplementation (SUP) experimentation

| Treatments SR | SUP | Final Steer Weight (lbs) | Sale[1] Price I ($/lb) | Sale[2] Price II ($/lb) | Sale[3] Price III ($/lb) | Sale[3] Price IV ($/lb) | Sale[4] Price V ($/lb) |
|---|---|---|---|---|---|---|---|
| 3.0 | 0 | 755 | 1.06 | 1.05 | .85 | .95 | .85 |
| 3.1 | 0.4 | 904 | .99 | 0.95 | .75 | .95 | .85 |
| 2.1 | 0 | 914 | .99 | 0.95 | .75 | .95 | .85 |
| 3.0 | 0.8 | 945 | .99 | 0.95 | .75 | .95 | .85 |
| 1.5 | 0.4 | 1018 | .95 | 0.93 | .73 | .95 | .85 |
| 1.5 | 0 | 1046 | .95 | 0.93 | .73 | .95 | .85 |
| 2.1 | 0.4 | 1051 | .95 | 0.93 | .73 | .95 | .85 |
| 2.2 | 0.8 | 1103 | .95 | 0.93 | .73 | .95 | .85 |
| 1.5 | 0.8 | 1119 | .95 | 0.93 | .73 | .95 | .85 |

| Treatments SR | SUP | Final Heifer Weight (lbs) | Sale[1] Price I ($/lb) | Sale[2] Price II ($/lb) | Sale[3] Price III ($/lb) | Sale[3] Price IV ($/lb) | Sale[4] Price V ($/lb) |
|---|---|---|---|---|---|---|---|
| 3.0 | 0 | 726 | 1.05 | 1.00 | .80 | .90 | .80 |
| 3.0 | 0.8 | 836 | .99 | .94 | .74 | .90 | .80 |
| 3.1 | 0.4 | 845 | .99 | .94 | .74 | .90 | .80 |
| 2.1 | 0 | 871 | .96 | .91 | .71 | .90 | .80 |
| 1.5 | 0 | 937 | .93 | .88 | .68 | .90 | .80 |
| 2.1 | 0.4 | 961 | .93 | .88 | .68 | .90 | .80 |
| 2.2 | 0.8 | 981 | .93 | .88 | .68 | .90 | .80 |
| 1.5 | 0.8 | 1008 | .93 | .88 | .68 | .90 | .80 |
| 1.5 | 0.4 | 1039 | .93 | .88 | .68 | .90 | .80 |

[1]Purchase price of steers = $1.26 and heifers = $1.15/lb.
[2]Purchase price of steers = $1.15 and heifers = $1.10/lb.
[3]Purchase price of steers = $.95 and heifers = $.90/lb.
[4]Purchase price of steers = $.85 and heifers = $.80/lb.

Table 2. Budget summaries of performance, costs, and returns from steers and heifers grazing rye-ryegrass at three stocking rates (SR) and three levels of supplemental corn ration (SUP)

| **SR (hd/ac)** | **1.5** | **2.1** | **3.0** | **1.5** | **2.1** | **3.1** | **1.5** | **2.2** | **3.0** |
|---|---|---|---|---|---|---|---|---|---|
| **SUP (% BW)** | **0** | **0** | **0** | **0.4** | **0.4** | **0.4** | **0.8** | **0.8** | **0.8** |
| **Item** | | | | | | | | | |
| Days on Pasture | 148 | 148 | 148 | 148 | 148 | 148 | 148 | 148 | 148 |
| Avg. Initial Wt (lbs) | 577 | 565 | 574 | 566 | 587 | 589 | 584 | 582 | 579 |
| Avg. Daily SUP (lbs/hd) | 0 | 0 | 0 | 2.82 | 2.80 | 2.70 | 5.90 | 5.94 | 5.40 |
| Avg. Daily Gain (lb/da) | 2.80 | 2.21 | 1.12 | 3.13 | 2.85 | 1.93 | 3.24 | 3.11 | 2.10 |
| Revenue / Head ($)[1] | 934 | 874 | 781 | 967 | 946 | 866 | 1004 | 980 | 879 |
| Revenue / Acre ($) | 1401 | 1834 | 2389 | 1450 | 1987 | 2685 | 1507 | 2156 | 2636 |
| Value of Gain ($/lb) | 0.57 | 0.58 | 0.53 | 0.61 | 0.57 | 0.55 | 0.61 | 0.60 | 0.59 |
| Cost / Head ($)[2,3,4] | 844 | 814 | 807 | 857 | 857 | 848 | 914 | 882 | 857 |
| Cost / Acre ($)[5] | 1266 | 1710 | 2468 | 1286 | 1799 | 2630 | 1372 | 1941 | 2571 |
| Cost / lb gain ($/lb) | 0.36 | 0.40 | 0.69 | 0.38 | 0.36 | 0.48 | 0.43 | 0.39 | 0.52 |
| Return / Head ($) | 90 | 59 | -26 | 110 | 89 | 18 | 90 | 98 | 22 |
| Return / Acre ($) | 135 | 124 | -80 | 164 | 187 | 55 | 135 | 215 | 65 |
| Breakeven Wt (lb/hd) | 896 | 834 | 765 | 911 | 911 | 856 | 972 | 938 | 865 |
| Breakeven Price ($/lb) | 0.85 | 0.91 | 1.09 | 0.83 | 0.85 | 0.97 | 0.86 | 0.85 | 0.97 |
| Return / lb Gain ($) | 0.22 | 0.18 | -0.16 | 0.24 | 0.21 | 0.06 | 0.19 | 0.21 | 0.07 |

[1]Sales price varied according to weight and sex of calf (Table 1, Sale Price I).
[2]Supplement cost used was $125/ton ($0.625/lb).
[3]Hay was priced at $80/ton.
[4]Purchase price used for 575 lb calves was $1.26/lb for steers and $1.15/lb for heifers.
[5]Fertilizer prices used were: Ammonium nitrate, 34-0-0, at $340/ton ($0.50/lb N), and 21-8-17 at $380/ton.

Table 3. Differential returns per acre among stocking rate (SR) x supplement treatments (SUP)[3]

| **SR** | **SUP** | **0-1.5** | **0-2.1** | **0-3.0** | **.4-1.5** | **.4-2.1** | **.4-3.1** | **.8-1.5** | **.8-2.2** | **.8-3.0** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **$/Ac** | | | | | | | | |
| 1.5 | 0 | 0.00 | | | | | | | | |
| 2.1 | 0 | - 11[1] | 0.00 | | | | | | | |
| 3.0 | 0 | -215 | -204 | 0.00 | | | | | | |
| 1.5 | 0.4 | 30 | 41 | 245 | 0.00 | | | | | |
| 2.1 | 0.4 | 53 | 63 | 267 | 23 | 0.00 | | | | |
| 3.1 | 0.4 | -79 | -69 | 135 | -109 | -132 | 0.00 | | | |
| 1.5 | 0.8 | 0 | 11 | 215 | -30 | -52 | 80 | 0.00 | | |
| 2.2 | 0.8 | 80 | 91 | 294[2] | 50 | 27 | 159 | 80 | 0.00 | |
| 3.0 | 0.8 | -70 | -59 | 145 | -100 | -122 | 10 | -70 | -150 | 0.00 |

[1]If 0-2.1 is compared with 0-1.5; $11/ac was lost due to increasing stocking rate from 1.5 to 2.1 hd/ac.
[2]An additional $294/ac was obtained by decreasing stocking rate from 3.0 to 2.2 hd/ac, and supplementing with .8% BW.
[3]Return/ac are summarized from Table 2, and uses same input cost assumptions.

Table 4. Commodity prices for ammonium nitrate and corn

| **Ammonium Nitrate (34-0-0)** | | | **Corn** | | |
|---|---|---|---|---|---|
| **Price/ton ($)** | **Price/lb ($)** | **Price/lb N ($)** | **Price/ton ($)** | **Price/lb ($)** | **Price/bu[1] ($)** |
| 272 | .136 | .40 | 100 | .05 | 2.80 |
| 306 | .153 | .45 | 120 | .06 | 3.36 |
| 340 | .170 | .50 | 140 | .07 | 3.92 |
| 374 | .187 | .55 | 160 | .08 | 4.48 |
| 408 | .204 | .60 | 180 | .09 | 5.04 |
| 442 | .221 | .65 | 200 | .10 | 5.60 |
| 476 | .238 | .70 | 240 | .12 | 6.72 |

[1]Bushel of corn weight = 56 lbs.

Table 5. Projected returns per acre for three stocking rates and three levels of supplementation with variable fertilizer nitrogen (N) costs

| | | Variable Fertilizer Nitrogen Costs | | | | |
|---|---|---|---|---|---|---|
| **Ammonium Nitrate Costs[1]** | | | | | | |
| **Cost/ton ($/T)** | | **340** | **374** | **408** | **442** | **476** |
| **Cost/lb N ($/lb)** | | **.50** | **.55** | **.60** | **.65** | **.70** |
| **SR[2]** | **SUP[3]** | **Returns[4] /ac ($/ac)** | | | | |
| 1.5 | 0 | 135 | 128 | 121 | 114 | 107 |
| 2.1 | 0 | 124 | 117 | 110 | 103 | 96 |
| 3.0 | 0 | -84 | -91 | -98 | -105 | -112 |
| 1.5 | .4 | 164 | 158 | 151 | 144 | 137 |
| 2.1 | .4 | 187 | 181 | 174 | 167 | 160 |
| 3.1 | .4 | 55 | 48 | 41 | 34 | 27 |
| 1.5 | .8 | 135 | 128 | 121 | 114 | 107 |
| 2.2 | .8 | 215 | 209 | 202 | 194 | 187 |
| 3.0 | .8 | 65 | 58 | 51 | 44 | 37 |

[1]Ammonium nitrate (34-0-0) cost/ton and cost/lb Nitrogen.
[2]Initial stocking rates based on 550 lb calf = 1 hd.
[3]Supplementation rates of 0, .4% BW, and .8% BW/hd/da.
[4]Returns per acre assuming purchase price of $1.15/lb for heifers and $1.26 for steers with sales prices based on sex and weight of calf (Refer to Table 1; Sales Price I).

Table 6. Projected returns per acre for three stocking rates and three levels of supplementation with variable supplement costs

| **Supplement** | | **Variable Supplement[1] Costs** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Cost/ton ($/T)** | | **125** | **150** | **180** | **210** | **240** | **300** | **400** |
| **Cost/lb ($/lb)** | | **.0625** | **.075** | **.090** | **.105** | **.120** | **.15** | **.20** |
| **SR[2]** | **SUP[3]** | **Returns /ac ($/ac)[4]** | | | | | | |
| 1.5 | 0 | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| 2.1 | 0 | 124 | 124 | 124 | 124 | 124 | 124 | 124 |
| 3.0 | 0 | -84 | -84 | -84 | -84 | -84 | -84 | -84 |
| 1.5 | .4 | 164 | 157 | 147 | 137 | 128 | 108 | 76 |
| 2.1 | .4 | 187 | 177 | 163 | 150 | 136 | 109 | 64 |
| 3.1 | .4 | 55 | 39 | 20 | 1 | -19 | -57 | -122 |
| 1.5 | .8 | 135 | 118 | 98 | 77 | 57 | 16 | -52 |
| 2.2 | .8 | 215 | 190 | 160 | 130 | 100 | 39 | -61 |
| 3.0 | .8 | 65 | 34 | -4 | -41 | -78 | -153 | -278 |

[1]Supplement costs per ton and per pound.
[2]Initial stocking rates based on 550 lb calf = 1 hd.
[3]Supplementation rates of 0, 0.4% BW, and 0.8% BW/hd/da.
[4]Returns per acre assuming purchase prices of $1.15/lb for heifers and $1.26 for steers with sales prices based on sex and weight of calf (Refer to Table 1; Sales Price I).

Table 7. Purchase prices with negative and zero margin sale prices for stocking rate (SR) x supplementation (SUP)

| | | Purchase at $0.90 and $0.95 | | Purchase at $0.80 and $0.85 | |
|---|---|---|---|---|---|
| **SR** | **SUP** | **Negative[1] Margin Sales** | **Zero[2] Margin Sales** | **Negative[3] Margin Sales** | **Zero[4] Margin Sales** |
| | | **----------------------------Returns/ac ($/ac)[5]** | | | **-----------------------------** |
| 1.5 | 0 | 51 | 376 | -8 | 317 |
| 2.1 | 0 | 24 | 390 | -40 | 326 |
| 3.0 | 0 | -76 | 152 | -119 | 108 |
| 1.5 | .4 | 39 | 378 | -27 | 312 |
| 2.1 | .4 | 28 | 493 | -55 | 409 |
| 3.1 | .4 | -113 | 377 | -194 | 295 |
| 1.5 | .8 | -19 | 333 | -88 | 264 |
| 2.2 | .8 | -11 | 493 | -107 | 397 |
| 3.0 | .8 | -166 | 313 | -251 | 227 |

[1]Purchase price = .90 for heifers; .95 for steers, sale price = .68 to .75 based on weight and sex.
[2]Purchase price = .90 heifers; .95 steers, sale price = .90 to .95 (0 margin).
[3]Purchase price = .80 heifers; .85 steers, sale price = .58 to .65 based on weight and sex.
[4]Purchase price = .80 heifers; .85 steers, sale price = .80 to .85 (0 margin).
[5]N price @ $374/ton, ($.55/lb N) and supplementation = $200/ton ($0.10/lb).

Table 8. Budget summaries of performance, costs, and returns based on $374/ton ammonium nitrate, $200/ton corn and purchase price of $1.15 for steers and $1.10 for heifers

| **SR (hd/ac)** | **1.5** | **2.1** | **3.0** | **1.5** | **2.1** | **3.1** | **1.5** | **2.2** | **3.0** |
|---|---|---|---|---|---|---|---|---|---|
| **SUP (% BW)** | **0** | **0** | **0** | **0.4** | **0.4** | **0.4** | **0.8** | **0.8** | **0.8** |
| **Item** | | | | | | | | | |
| Days on Pasture | 148 | 148 | 148 | 148 | 148 | 148 | 148 | 148 | 148 |
| Avg. Initial Wt (lbs) | 577 | 565 | 574 | 566 | 587 | 589 | 584 | 582 | 579 |
| Avg. Daily SUP (lbs/hd) | 0 | 0 | 0 | 2.82 | 2.80 | 2.70 | 5.90 | 5.94 | 5.40 |
| Avg. Daily Gain (lb/da) | 2.80 | 2.21 | 1.12 | 3.13 | 2.85 | 1.93 | 3.24 | 3.11 | 2.10 |
| Revenue / Head ($)[1] | 900 | 833 | 759 | 932 | 912 | 827 | 969 | 944 | 839 |
| Revenue / Acre ($) | 1350 | 1750 | 2322 | 1398 | 1914 | 2562 | 1453 | 2078 | 2516 |
| Value of Gain ($/lb) | 0.61 | 0.60 | 0.68 | 0.64 | 0.60 | 0.57 | 0.61 | 0.63 | 0.61 |
| Cost / Head ($)[2,3,4] | 788 | 761 | 755 | 818 | 818 | 810 | 890 | 862 | 837 |
| Cost / Acre ($)[5] | 1181 | 1597 | 2310 | 1227 | 1718 | 2512 | 1335 | 1897 | 2510 |
| Cost / lb gain ($/lb) | 0.33 | 0.38 | 0.66 | 0.39 | 0.38 | 0.52 | 0.48 | 0.45 | 0.60 |
| Return / Head ($) | 112 | 73 | 4 | 114 | 93 | 16 | 79 | 82 | 2 |
| Return / Acre ($) | 168 | 152 | 12 | 171 | 196 | 50 | 118 | 0.81 | 6 |
| Breakeven Wt (lb/hd) | 867 | 816 | 737 | 902 | 903 | 857 | 980 | 951 | 885 |
| Breakeven Price ($/lb) | 0.79 | 0.85 | 1.02 | 0.80 | 0.81 | 0.93 | 0.93 | 0.83 | 0.94 |
| Return / lb Gain ($) | 0.27 | 0.22 | 0.02 | 0.25 | 0.22 | 0.06 | 0.16 | 0.18 | 0.01 |

[1]Sales price varied according to weight and sex of calf (Table 1, Sale Price II).
[2]Supplement cost used was $200/ton ($0.10/lb).
[3]Hay was priced at $80/ton.
[4]Purchase price used for 575 lb calves was $1.15/lb for steers and $1.10/lb for heifers.
[5]Fertilizer prices used were: Ammonium nitrate, 34-0-0, at $374/ton ($0.55/lb N), and 21-8-17 at $380/ton.

Table 9. Differential returns per acre based on $374/ton of ammonium nitrate and $200/ton supplement

| SR | SUP | 0-1.5 | 0-2.1 | 0-3.0 | .4-1.5 | .4-2.1 | .4-3.1 | .8-1.5 | .8-2.2 | .8-3.0 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | -------------------------------------------$/Ac[1]------------------------------------------------ | | | | | | | | |
| 1.5 | 0 | 0.00 | | | | | | | | |
| 2.1 | 0 | -16 | 0.00 | | | | | | | |
| 3.0 | 0 | -156 | -141 | 0.00 | | | | | | |
| 1.5 | 0.4 | 2[2] | 18 | 159 | 0.00 | | | | | |
| 2.1 | 0.4 | 28 | 43 | 184[3] | 25 | 0.00 | | | | |
| 3.1 | 0.4 | -118 | -103 | 38 | -121 | -146 | 0.00 | | | |
| 1.5 | 0.8 | -50 | -34 | 106 | -53 | -78 | 68 | 0.00 | | |
| 2.2 | 0.8 | 13 | 29 | 169 | 10 | -15 | 131 | 63 | 0.00 | |
| 3.0 | 0.8 | -163 | -147 | -6 | -165 | -190 | -44 | -113 | -175 | 0.00 |

[1]Assumptions for purchase and sales from Table 8.

[2]If stocking rates of 1.5 hd/ac without supplementation is compared with stocking rates of 1.5 hd/ac with .4% BW, a $2/ac increase was realized.

[3]An additional $184/ac was realized by changing stocking rate from 3.0 hd/ac without supplementation to 2.1 hd/ac and 0.4% BW daily supplement.