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LIVESTOCK ECONOMICS

Stocker Cattle Transitioning to Wheat Pasture May Not Need Supplement



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It is common practice for stocker cattle producers to purchase cattle from sale barns at weaning in the fall, receive and precondition them in drylot environments for approximately 45 days, then grow them out on wheat pasture before sending them to feedyards for fattening prior to final processing. Past research suggests cattle transitioning to wheat pasture from a drylot require an acclimation period before they gain significant body weight. In fact, it has been shown that substantial weight loss often occurs during the drylot-to-pasture adaptation period. Previous research also concludes that weight loss can be decreased by altering the diet in the drylot prior to turning cattle out to wheat pasture. With this finding in mind, it has been hypothesized that providing a transitional diet during the drylot phase and during the first three weeks of wheat pasture can significantly reduce weight loss during the adaptation period.

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To explore this topic, we conducted a project with two objectives:

- Determine the effect of a transitional diet strategy on stocker heifer average daily gain and total gain during the grazing period.
- Determine whether or not the transitional diet strategies are more profitable than the conventional practice.

DATA AND METHODS

We used a total of 307 stocker heifers in this experiment, all purchased directly from farms and ranches in Oklahoma during the fall of 2015, 2016 and 2017. All heifers received the same preconditioning treatments upon arrival at Noble Research Institute facilities. All heifers were also treated with a standard receiving protocol. They were treated for internal parasites with a dewormer, given a clostridial vaccine and a zeranol implant, and tested for persistent infection upon arrival at Noble's Oswalt Ranch cattle handling facilities in Love County, Oklahoma.

Heifers were randomly assigned to one of six 6-acre preconditioning pastures (two pastures per treatment), stratified by weight. The average starting weight of the heifers in each treatment group was 524 pounds. We used 120 head in 2015 (body weight ± standard deviation = 456 ± 3.94 pounds), 92 head in 2016 (531 ± 8.20 pounds) and 95 head in 2017 (584 ± 8.49 pounds).

Three alternative diet treatments were randomly assigned to animals each year:

- Low-energy diet fed at 1% of animal body weight only during the drylot phase (1%BWDL).
- High energy diet fed at 2% of animal body weight only during the drylot phase (2%BWDL).
- High energy diet fed at 2% of animal body weight during the drylot phase and the first 21 days of the wheat pasture phase (2%BWDLWP).

The 1%BWDL represents a typical (control) diet fed to stocker cattle during the preconditioning phase. All three diets had the same ingredients. The 2015, 2016 and 2017 heifers remained in drylot for 84, 39 and 44 days, respectively. The number of days in the drylot was much greater in 2015 due to the drought that fall. Chute weights were recorded each morning for two consecutive days for each animal at the start and finish of the drylot phase. Once finished with the end phase weighing, cattle were transported on the same day to Noble's Red River Ranch and randomly assigned to one of six wheat forage pastures. Cattle in each pasture had access to water at one of three GrowSafe Beef® individual animal weigh scales. Individual animal daily weights were recorded for the duration of the grazing period.

We used mixed effects analysis of variance (ANOVA) models to test the hypothesis of no statistical difference in average daily gain and total gain between the three alternative diets during the drylot and wheat pasture grazing phases. We also

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Table 1. Three-year average measures of stocker heifer performance and expected values for revenues, costs and net returns by diet strategy

	Diet Treatments*			
Measures of animal and economic performance:	Low energy drylot only (1%BWDL)	High energy drylot only (2%BWDL)	Transitional drylot and wheat pasture (2%BWDLWP)	P-value
DRYLOT PHASE				
Beginning date	Oct. 10	Oct. 10	Oct. 10	-
Beginning weight (pounds per head)	524	524	524	0.9214
Days on feed in drylot (days)	56	56	56	-
Average daily gain (pounds per head)	1.46[a]	1.90[b]	1.90[b]	0.0325
Total gain (pounds per head)	81.76[a]	106.40[b]	106.40[b]	0.0255
Ending weight in drylot (pounds per head)	605.76[a]	630.40[b]	630.40[b]	0.0365
WHEAT PASTURE PHASE				
Placement date	Dec. 5	Dec. 5	Dec. 5	-
Stocking rate (head per acre)	1.50	1.50	1.50	-
Grazing duration (days)	119	119	119	-
Total accumulated gain on Day 1 (pounds per head)	-28.38[a]	-20.09[b]	-21.83[c]	0.0214
Total accumulated gain on Day 7 (pounds per head)	-16.78[a]	-14.12[b]	-8.56[c]	0.0354
Total accumulated gain on Day 14 (pounds per head)	2.54[a]	3.15[a]	11.33[b]	0.0145
Total accumulated gain on Day 119 (pounds per head)	256.46	258.36	242.06	0.1254
Grazing termination date	April 3	April 3	April 3	-
Final weight (pounds per head)	862.22	888.76	872.46	0.1254
Average daily gain (pounds per head)	2.18	2.18	2.05	0.1963
ECONOMICS				
Total gain in drylot and wheat pasture (pounds per head)	338.22	364.76	348.46	0.1689
Ten-year average value of gain (cost per pound)	0.90	0.90	0.90	-
Revenue (cost per head)	328.28	328.28	328.28	-
Preconditioning costs, excluding feed (cost per head)	39.50	39.50	39.50	-
Seed and seed establishment costs (cost per head)	55.77	57.77	55.77	-
Fertilizer and fertilizer application costs (cost per head)	45.36	45.36	45.36	-
Pesticides and pesticides application costs (cost per head)	18.00	18.00	18.00	-
Feed costs (cost per head)	47.79	98.05	134.3	-
Interest cost on cash operating expenses (cost per head)	2.72	3.41	3.86	-
Interest cost for stocker heifer ownership (cost per head)	20.04	20.04	20.04	-
Total costs (cost per head)	229.17	282.12	316.82	-
Net return (cost per head)	99.11	46.16	11.46	-
Relative difference in net return (cost per head)	-	-52.95	-87.65	-
Relative breakeven cost of feed (cost per head)	-	45.10	46.65	-

* Letters that differ within a row are statistically different at a 95% level of confidence.

used contrast testing to test the hypothesis of no statistically significant differences in accumulated total weight gain during the pasture grazing phase between the three diet treatments at Day 1, Day 7, Day 14 and at the end of the grazing period, which, on average, was Day 119. This is important because the previous literature suggests that the acclimation period between drylot and pasture typically takes place within the first two weeks.

Enterprise budgeting techniques were used along with the parameter estimates obtained from the mixed ANOVA models described above to determine the effect of each diet treatment on the profitability of a typical stocker cattle production system.

RESULTS

Animal Performance

Three-year average measures of stocker cattle heifer performance and expected values for revenues, costs and net returns by diet strategy are reported in Table 1.

Three-year average daily gain across the wheat grazing phase was 2.18, 2.18 and 2.05 pounds per day per head for the 1%BWDL, 2%BWDL and 2%BWDLWP diets, respectively; they were not statistically different, with a 95% level of confidence.

Total accumulated weight gain at the end of Day 1, averaged across all three years, was -28.4, -20.1 and -21.8 pounds per head for the 1%BWDL, 2%BWDL and 2%BWDLWP diets, respectively. These three weights were all statistically different from each other with a 95% level of confidence and are similar to previous research findings.

After one week (Day 7), accumulated gain remained negative for all three diets but were substantially less negative compared to Day 1. By the end of the second week (Day 7), total accumulative weight gain for all three treatments were positive at 2.5, 3.2 and 11.3 pounds per head for the 1%BWDL, 2%BWDL and 2%BWDLWP diets, respectively.

The Day 14 weights for the 1%BWDL and 2%BWDL diets were not different statistically but were both less than the 2%BWDLWP weights with a 95% level of confidence. This result indicates that the transitional diet (2%BWDLWP) did work to improve the loss in weights on Day 1 faster than the other two diets. Unfortunately, this difference did not hold up at the end of the wheat-pasture grazing period.

At the end of that period, total accumulated weight gain was 257, 259 and 242 pounds per head for the 1%BWDL, 2%BWDL and 2%BWDLWP diets, respectively and were not statistically different from each other, with a 95% level of confidence.

Economics

Because the total accumulated gain from both the drylot and the wheat pasture phases between the three diets were not statistically different (P = 0.1689), revenues from the three diets are the same. We calculated revenue for each diet strategy using total gains from the 2%BWDL diet (i.e., 364.76 pounds per head) and the 10 year (2010-2020) average value of gain of $0.90 per pound. This was an arbitrary choice that gave us the greatest revenue between the three gains. We could have just as easily chosen to use the gain from the 1%BWDL (control) diet, which would have given all three systems the smallest revenue. We also included the total list of costs associated with our stocker system, including preconditioning/healthcare, seed and seed establishment, fertilizer and fertilizer application, pest management, feed, and interest on cash operating capital and cash operating capital for purchased stocker cattle. However, you can see from a glance at Table 1 that the only costs that vary between the three diet strategies is the cost of feed and the portion of the interest for operating capital associated with feed. As a result, net return for the 2%BWDL and 2%BWDLWP diets are 52.95 and 87.65 lower than the 1%BWDL (control) diet strategy.

CONCLUSIONS

The results of the mixed ANOVA models, as they pertain to the weight gain of cattle in these two feeding segments, concur with and confirm much of what has already been established by previous research on cattle adapting to wheat pasture. During the drylot phase, cattle that are fed more can be expected to gain more weight. During the pasture phase, weight loss that cattle may experience is expected to occur almost immediately after turnout as they transition to pasture. Because of the individual animal data obtained from the Growsafe Beef units, we were able to show that positive daily gains begin as soon as the third day after transitioning rather than slowly over time as the literature suggests. Although previous work has attributed the change in weight to what is often referred to as a two-week adaptation or transition period, the results of this study indicate that the transition period is much shorter. This information is valuable because it shows producers that the net losses from this adaptation period are relatively small.

Although providing a high-energy supplement to cattle transitioning to pasture affected their weight gain during the first two weeks, the gains were not sustained in the long run. The additional cost of feed in drylot and on pasture were the determining factors for the economics. The most economically sound practice is to not provide any energy supplement with the intent of aiding cattle transitioning to wheat pasture. Hence, we do not recommend providing energy supplementation to aid cattle in adapting to wheat pasture.