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Abstract

Corn-finished cattle are the backbone of the US beef production system. Traditionally cattle are fed a total-mixed ration (TMR) where all feed ingredients are mixed together, delivered, and fed daily to cattle. Previous research evaluated complete self-fed finishing rations where the diet is placed into a self-feeder. With advancements in technology and varieties of corn, the purpose of this study was to determine the differences in finishing cattle gains, feed efficiency, carcass merit, and cost of production on a TMR ration as compared to a self-fed finishing ration. Thirty-five steers and heifers were sorted into 8 pens and assigned to one of two finishing diet treatments: traditional TMR or self-fed finishing ration. There were 3 pens of heifers and 1 pen of steers per treatment group. There were no differences based on the sex of the cattle. Calves on the self-fed finishing diet had a greater ADG and total gain. Self-fed calves also tended to have a heavier hot carcass weight, greater marbling score, and greater average carcass value than calves on TMR. There was no difference in yield grade. Calves on the self-fed ration had a greater average daily intake and tended to have a higher feed:gain conversion ratio. Cost of gain was \$0.58 more for self-fed calves.

Keywords

free-choice finishing, low input finishing

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Comparison of Finishing Cattle on Self-Feeder or Total-Mixed Ration

J.K. Farney

Summary

Corn-finished cattle are the backbone of the US beef production system. Traditionally cattle are fed a total-mixed ration (TMR) where all feed ingredients are mixed together, delivered, and fed daily to cattle. Previous research evaluated complete self-fed finishing rations where the diet is placed into a self-feeder. With advancements in technology and varieties of corn, the purpose of this study was to determine the differences in finishing cattle gains, feed efficiency, carcass merit, and cost of production on a TMR ration as compared to a self-fed finishing ration. Thirty-five steers and heifers were sorted into 8 pens and assigned to one of two finishing diet treatments: traditional TMR or self-fed finishing ration. There were 3 pens of heifers and 1 pen of steers per treatment group. There were no differences based on the sex of the cattle. Calves on the self-fed finishing diet had a greater ADG and total gain. Self-fed calves also tended to have a heavier hot carcass weight, greater marbling score, and greater average carcass value than calves on TMR. There was no difference in yield grade. Calves on the self-fed ration had a greater average daily intake and tended to have a higher feed:gain conversion ratio. Cost of gain was \$0.36 more for self-fed calves.

Introduction

Feeding corn to beef cattle improves the flavor of beef in the United States. To produce the high quality and flavorful beef, the cattle must be finished on a high-corn diet. Feedlots have been developed to make the cost of producing beef most efficient. This feeding method has been found to have a greater efficiency of feed conversion to produce pounds of beef. There are lots of infrastructure, equipment, labor, and time commitments to make this system work. This is why economies of scale are so important in feedlot finishing systems.

Cattle geneticist have been working on improving marbling and carcass characteristics. However, many cow-calf producers have not been able to capture revenue from the improvements in carcass genetics they have been implementing. It has been proposed that a low-input finishing system is an option for cow-calf producers to be able to feed their own calves to finished market weight and be able to capture premiums on the rail. One method that does not include lots of pen and feeding equipment infrastructure is a complete ration fed through a self-feeder (creep feeder).

Older studies have been conducted examining self-fed rations as compared to total mixed rations (TMR). In a 2002 report from North Dakota there was no difference in

cattle performance or carcass characteristics in a self-fed or TMR feeding system. Also, based on 2002 prices it was economically feasible to feed cattle with a self-fed ration.

The purpose of this study is to evaluate current feed ingredients and costs associated with production based on either a self-fed ration or as a total mixed ration.

Experimental Procedures

Thirty-five heifers and steers (29 heifers and 6 steers) were weighed and assigned to one of 8 pens. There were 6 pens of heifers (4–5 head per pen) and 2 pens of steers (3 head per pen). Half of the pens were assigned to a totally mixed ration (TMR) diet that consisted of a dry matter basis including 80% whole shelled corn, 15% corn silage, and 5% supplement containing Tylan and Rumensin. Calves on the TMR ration were offered step-up rations over 3 weeks by increasing the amount of corn and decreasing amount of corn silage. The other half of the pens were provided a complete feed in a self-feeder that consisted of 62% whole shelled corn, 14% wheat midds (pelleted), 10% dried distillers grains, 8% cottonseed hulls (loose), and 6% supplement (contained limestone, salt, mineral pack, vitamin E, urea, MGA, copper sulfate, and 35 lb/ton of molasses). To prepare calves to be completely on the self-fed finishing diet, in the first week calves had free-choice prairie hay and were fed the finishing ration at 1% of body weight on a dry matter basis. The next week feed was increased up to 1.5% of body weight, and the third week they were fed the finisher diet at 2% of body weight. On the fourth week the calves were placed on the self feeders and all the hay was removed.

Calves were started on trial January 6, 2021, and were sent to Creekstone Farms (Arkansas City, KS) packing plant on June 6, 2021 (143 days on feed). Initial weight of calves were 707 lb \pm 41 lb. Heifers were implanted at start of feeding with Revalor XH and steers with Revalor XS.

Results and Discussion

There was no difference in performance of calves based on whether they were steers or heifers, so gains and carcass characteristics are reported based on finishing diets. No digestive problems were observed in the cattle on these diets.

Calves that were consuming the self-fed finishing ration tended to weigh 50 lb more at harvest than TMR-fed calves. This corresponded to 45 pounds more gain during the feeding period and a 0.33 lb/d advantage in average daily gain. Calves on the self-fed finishing ration also had a greater marbling score, 26 lb more hot carcass weight, and had carcasses that sold for an average of \$62.94 more than calves on the TMR. Yield grades were not different between the two feeding methods. Calves on the TMR were more efficient as they had a much better feed to gain ratio. They also had a lower dry matter intake. Overall, calves on the TMR had a more appealing cost of gain (\$0.92 versus \$1.28 for the self-fed calves).

Even though gains were better with the self-fed ration and actual carcass sale prices were higher, the calves on the self-fed ration lost money, using 2021 values, whereas calves on the TMR made a \$100 profit. Based on 2021 prices and the diet formulated, it was not cost effective to use a self-fed ration for finishing calves. Providing self-fed rations could be an option for producers, but producers need to develop a budget before

determining if their options for feed ingredients and final marketing plans allow for profit. The self-fed ration that was developed focused on trying to develop a ration that would maximize gains and be very “safe” from digestive issues. We successfully met those goals, however, the poor efficiency (conversion of grain to weight) was less than desirable. Another thing that would have made the self-fed supplement more attractive was if we could have locked in the January prices for the commodities. This would have saved \$20 per ton or \$47.20 per head on feed cost for the self-fed ration. Another thing that makes the self-fed feeding option attractive is that smaller producers may have the chance to feed out their own cattle. In the calculations used, a yardage of \$0.45/hd/d was included that was supposed to account for feed truck and infrastructure charges. That value is the feedlot industry standard value, and as previously mentioned, economies of scale probably make that number much lower than the cost for a small farmer-feeder. That is another operational specific cost that needs to be evaluated to determine if the cost, spread out over time, is economical to purchase feeding equipment. An easily made complete feed that is delivered and deposited into feeding pens may be more beneficial for smaller producers.

More self-fed diet options would need to be evaluated if a producer is interested in using this method. The 2002 study from North Dakota used free-choice hay as an option to minimize digestive issues in calves on the self-fed diet, however, their average daily gains were only 3.6 lb/d whereas the gains in this current study were 4.10 pounds. The calves used in the North Dakota study were also all steers and in all other studies steers are more efficient and have faster gains than heifers. The complete self-fed ration developed for this study was excellent at gains, but there are still adjustments needed to make it more financially feasible for cattle producers.

References

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Table 1. Cattle performance and cost of production comparing total mixed ration (TMR) versus a self-fed ration

Item	TMR	Self-fed	SEM	<i>P</i>-value
Initial weight, lb	707	707	10	0.96
Final weight, lb	1248	1292	20	0.14
Total gain, lb	540	585	12.9	0.02
Total ADG, lb/d	3.77	4.10	0.09	0.02
Marbling score	375	390	6.0	0.09
Yield grade	2.98	3.10	0.12	0.50
Hot carcass weight, lb	753	779	12	0.14
Average intake, lb DM	24.9	28.3	0.5	0.01
Feed:gain (DM-basis)	5.97	7.03	0.32	0.06
Cost of gain (\$/lb) ¹	\$0.92	\$1.28	--	--
Average carcass value, \$	\$1484.51	\$1547.45	26	0.10
Cost/ton of feed, \$/lb	\$168.78	\$294.90	--	--
Net profit, \$/hd ²	\$99.38	\$-110.08	--	--

¹Feeding cost of gain. Includes actual feed and delivery costs during study period with \$0.45/hd/d and \$0.05/hd/d yardage for the total-mixed ration (TMR) and self-fed diets respectively.

²Cattle purchase price was based on Pratt Livestock Market price average for heifers January 2021 (\$122.80). The TMR ration costs included corn valued based on monthly USDA corn value report (https://www.nass.usda.gov/Charts_and_Maps/graphics/data/pricecn.txt) with a \$0.20/bu storage and handling cost; corn silage valued at 8× the cost of average corn cost for the month and included harvesting costs, handling and storage fees (range was \$59.61 to \$72.28 per ton); supplement at \$700/ton, and yardage at \$0.45/hd/d. Self-fed ration costs included actual receipts from Bartlett COOP (Bartlett, KS) for the time frame, including delivery and mixing charges (23-mile delivery). Other costs included in profit analysis include cattle trucking, vaccines, and implants.