Management Production Systems and Timing Strategies for Cull Cows

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Abstract

Two management systems and five timing alternatives for cull cows were compared. Data were measured at intervals for cull cows on grass vs. in a dry lot from October to April. Cows in both treatments gained weight initially but average daily gain declined following the first 42 days and cost of gain generally increased for longer feeding periods. Overall, net returns for grass-fed cows exceeded those for dry lot cows for each period at and beyond 111 days. Regression results revealed average daily gain and beginning weight positively affected net returns while feed cost per gain was inversely related to net returns.

Keywords: Cattle, Cull cows, Management, Marketing, Production systems, Timing

Introduction

Marketing cull cows provides a significant source of income to U.S. cow-calf producers. Experience has shown that most producers spend time on feeding and marketing steers, heifers, and reproductive cows. Although cull cows represent 15-30% of a cow-calf herd's revenue, little attention is given to cull cow marketing. Most cow-calf producers traditionally cull and sell their cull cows in the fall when prices are low. However, alternative timing of cull cow marketing may increase net revenue that cull cows bring to the cow-calf operation.

Feuz (1995) reported that cull cow prices generally follow a consistent seasonal pattern. Prices are usually lower in November, December, and January and higher in March, April, and May. He also suggests that feed cost, price differences between cull cows' slaughter grades and percentage of cull cows in each grade should be considered when making a decision to sell cull cows.

The primary question is whether the common management strategy, i.e., marketing cull cows at culling time, is more profitable compared to feeding culled cows for alternative periods of time. Peel and Doye (2007) stated that many producers choose to dispose of cull cows as quickly and easily as possible with small consideration for increasing the salvage value of these animals. They add that better management and marketing strategies could increase the value of cull cows by 25-45%. However, feeding cost, risk of holding cows for alternative periods of time, and price fluctuation should be evaluated as opposed to only the potential for enhancing value. In addition, Wright (2005) mentioned that when deciding to feed culled cattle, a producer must consider the effects on facilities as well as time on feed. Management systems that can be used to improve animal performance will help improve the profitability of feeding cull cows.

He also points out that cow type should be considered as well as feed cost and marketing timeframe. Feeding and marketing strategies that could significantly increase the final weight and improve dressing percentage and quality grade need to be identified.

The general objective of this research is to examine alternative production management systems and timing strategies for marketing cull cows. We specifically analyze the impact on net revenue to the cow-calf enterprise from cull cow marketing of two production management systems across five marketing periods.

Methods, Procedures, and Data

The goal of any cow-calf enterprise is to maximize profit, given a limited amount of inputs. The timing of marketing cull cows and the decision to hold and feed cull cows beyond culling impacts the net revenue of a cow-calf enterprise. However, the net return of keeping cull cows may increase or decrease depending on the availability and affordability of forage and grain. The key question is: Is it more profitable to sell cull cows immediately after they are culled or should they be fed for alternative time periods and marketed later?

An experiment involving feeding cull cows on grain and forage versus cull cows fed on forage only was conducted by the Noble foundation from October 2007 to April 2008. Cows were pregnancy checked and open (unbred) cows were culled. The 48 culled cows were randomly assigned to two treatments at the Noble Foundation ranch in Ardmore, Oklahoma. In treatment one, cows were fed in a dry lot environment (dry lot) with a grain supplement and forage. In treatment two, cows were fed in a grazing environment with forage only (grass). The contribution of cows to net revenue was evaluated at 42, 78, 111, 134, and 164 days. The experiment led to the following hypotheses:

1. Because of relatively high grain costs, we hypothesize that cull cows fed on hay and grain supplement (dry lot) have lower marginal returns compared to cull cows grazing on forages (grass).
2. Average daily gain, total gain, and cost per pound of gain from dry lot fed cull cows are higher than for grass fed cull cows.
3. Factors such as beginning weight, average daily gain (ADG), feed cost per pound of gain, and treatment significantly influence net returns.

A general linear model with fixed and random effects on the dependent variables was chosen. Data were collected approximately monthly on weight, USDA grade, dressing percentage, costs (feed, animal health, etc.), and estimated market value. For each interval, estimated animal performance and net returns were calculated. Both the estimated USDA grade and estimated dressing percentage were used to assign a price to each cow, based on prices reported by the Agricultural Marketing Service (http://www.ams.usda.gov/AMSv1.0/ams.fetchTemplateData.do?template=TemplateA&navID=MarketNewsAndTransportationData&leftNav=MarketNewsAndTransportationData&page=MarketNewsAndTransportationData&acct=AMSPW). Thus, costs and value were estimated for each cow in each production system for each feeding interval.

Mean comparisons between grass fed cows and dry lot cows at each weigh period were analyzed. A mixed model was estimated using a restricted maximum likelihood (REML) estimation technique. Likelihood ratio tests (LRT) indicated that an unstructured covariance matrix was most appropriate in comparing mean and variance differences in weight gain, ADG, cost per gain, and net margin between cull cows fed on grain and supplement and those fed on forages.

Net returns were evaluated based on a partial budget associated with feeding cull cows for 42, 78, 111, 134, and 164 days after culling. In this case marginal returns can be defined as:

$$(1)\ \mathrm{M}_i = P_{end} Wt_{end} - P_{begin} Wt_{begin} - \sum_{i=1}^{n} C_{ij}$$

where M_i is marginal returns for the i[th] feeding period, $\mathrm{P_{end}}$ represents the price of the cow at marketing, $\mathrm{Wt_{end}}$ represents the ending weight of the cow, $\mathrm{P_{begin}}$ represents the beginning price of the cow at culling, $\mathrm{Wt_{begin}}$ is the culling weight of the cow, and *Cij* is the cost of j^{th} inputs for the i^{th} feeding interval.

Descriptive statistics were used to compare cost and returns. Maximum likelihood estimation was used to test hypothesis 2 and the following statistical model was used.

$$(2)\ Y_{ijk} = \mu + \alpha_i + \beta_k + \alpha\beta_{ik} + \theta_{j(i)} + \varepsilon_{ijk}$$

where i is the dry lot or grass treatment, k is the feeding interval (42, 78, 111, 134, and 164 days), Y_{ijk} is the observation at time k on the experimental unit j of treatment level i (where Y_{ijk} represents the value of various dependent variables to be compared), μ is the overall mean, α_i is the treatment level effect, β_k is the time effect, $\alpha\beta_{ik}$ is the treatment*time interaction effect, $\theta_{j(i)}$ is the random effect due to j cows in the i^{th} treatment, and ε_{ijk} is random error with $\varepsilon_{ijk} \approx \mathrm{N}(0, \sigma_\varepsilon^2)$.

Regression analysis was used to analyze the influence of beginning weight, ADG, the feed cost per gain, and treatment on net returns using the following equation:

$$(3)\ Netreturns = \beta_1 + \beta_2 begweight + \beta_3 ADG + \beta_4 Feed\,\mathrm{cost}pergain + \beta_5 Treatment$$

where *Netreturns* is the net margin for each feeding interval, *begweight* is the culling weight of each cow, *ADG* is average daily gain, *Feedcostpergain* is the cost of gain, and *Treatment* is a dummy variable for treatment (1 is dry lot, 0 is grass).

Results

Results presented should be considered preliminary. Table 1 reports summary statistics of some key variables considered in the study (means, standard deviation, maximum, and minimum values for weight, dressing percentage, total gain, average daily gain, feed costs, other costs, total costs, revenue, net returns per pound of gain, cost per pound of gain, ending price, and net margin) for cumulative feeding intervals and for each treatment. Figures 1-4 show average cow weight, net returns, ADG, and cost per gain for each weigh period and treatment.

Figure 1 shows that average weight for dry lot cows peaked at 134 days and average weight for grass fed cows peaked at 42 days. Figure 2 shows that net returns for dry lot cows marketed at 42 and 78 days are higher than for grass cows, but after these periods net returns for grass cows are higher than that of dry lot cows. Both peak in terms of net returns at 134 days. Figure 3 shows that the average daily gain of dry lot cows is above that for grass cows throughout the experiment. This also holds for cost per pound of gain as shown in Figure 4.

Table 1 Summary statistics on key physical attributes of cull cows from October 2007 to April 2008

		Grass				Pen			
		Mean	*Std dev*	*Min*	*Max*	*Mean*	*Std dev*	*Min*	*Max*
At culling (October)	*Beginning weight*	1260.75	147.92	1048.00	1608.00	1269.04	171.54	1034.00	1644.00
	Beginning dressing percent	49.21	2.19	46.00	54.00	50.42	1.74	48.00	53.00
	Beginning Revenue	1154.84	144.88	951.76	1501.81	1175	174.4	939.04	1535.43
	Beginning price	91.56	2.47	87.50	97.06	92.48	2.54	87.50	97.06
0-42 Days (November)	*Weight*	1353.54	143.94	1090.00	1660.00	1367.29	139.96	1120.00	1610.00
	Dressing percent	49.21	2.19	46.00	54.00	50.42	1.74	48.00	53.00
	Total gain	92.79	34.20	42.00	174.00	98.25	72.22	-34.00	337.00
	Average daily gain	2.21	0.81	1.00	4.14	2.34	1.72	-0.81	8.02
	*Feed costs**	18.81	0.00	18.81	18.81	24.11	0.00	24.11	24.11
	*Other costs***	1.96	0.00	1.96	1.96	3.35	0.00	3.35	3.35
	Total costs	20.77	0.00	20.77	20.77	27.46	0.00	27.46	27.46
	Revenue	1069.35	120.6	857.9	1333.85	1090.29	132.93	824.21	1289.42
	Netreturns per pound of gain	-1.20	0.91	-3.27	0.05	-4.98	20.49	-100.65	7.33
	Cost per pound of gain	0.26	0.11	0.12	0.49	0.85	2.76	-0.81	13.73
	Ending price	80.54	2.37	76.04	84.80	81.63	2.44	76.04	87.50
	Net Margin	-85.48	37.91	-167.96	8.68	-85.04	75.70	-249.07	136.25
0-78 days (January)	*Weight*	1342.08	131.35	1090.00	1625.00	1429.58	135.58	1200.00	1665.00
	Dressing percent	49.21	2.19	46.00	54.00	50.46	1.69	48.00	53.00
	Total gain	81.33	50.97	-19.00	169.00	160.54	82.19	21.00	412.00
	Average daily gain	1.04	0.65	-0.24	2.17	2.06	1.05	0.27	5.28
	*Feed costs**	34.39	0.00	34.39	34.39	113.37	0.00	113.37	113.37
	*Other costs***	4.93	0.00	4.93	4.93	8.60	0.00	8.60	8.60
	Total costs	39.32	0.00	39.32	39.32	122.75	0.00	122.75	122.75

	Revenue	1148.62	138.37	913.93	1452.1	1179.31	158	885.39	1414.88
	Netreturns per pound of gain	-2.30	5.51	-20.04	11.20	-1.62	3.80	-17.74	0.84
	Cost per pound of gain	0.69	1.03	-2.07	3.93	1.12	1.14	0.30	5.85
	Ending price	88.67	3.24	83.07	95.59	90.67	3.77	81.38	96.81
	Net Margin	-6.22	42.73	-80.37	72.47	3.98	75.82	-123.57	209.54
0-111 days (February)	*Weight*	1328.75	128.20	1065.00	1570.00	1426.67	145.80	1175.00	1680.00
	Dressing percent	49.08	2.08	46.00	54.00	50.92	1.75	48.00	54.00
	Total gain	68.00	53.34	-38.00	154.00	157.63	115.14	-150.00	402.00
	Average daily gain	0.61	0.48	-0.34	1.39	1.42	1.04	-1.35	3.62
	*Feed costs**	49.79	0.00	49.79	49.79	197.86	0.00	197.86	197.86
	*Other costs***	8.42	0.00	8.42	8.42	13.53	0.00	13.53	13.53
	Total costs	58.21	0.00	58.21	58.21	212.18	0.00	212.17	212.18
	Revenue	1270.9	142.6	1021.38	1576.65	1231.64	184.63	854.94	1585.48
	Netreturns per pound of gain	1.99	6.57	-5.16	29.72	-1.52	5.70	-25.01	3.74
	Cost per pound of gain	-0.18	4.27	-19.40	3.88	1.93	2.58	-1.41	12.48
	Ending price	100.34	2.97	94.01	109.31	101.26	4.05	91.16	108.86
	Net Margin	116.06	60.86	12.54	223.04	56.31	143.20	-299.09	309.22
0-134 days (March)	*Weight*	1305.00	124.07	1075.00	1540.00	1471.46	148.11	1200.00	1705.00
	Dressing percent	49.40	2.12	46.50	54.00	50.85	1.65	48.00	53.50
	Total gain	44.25	54.48	-68.00	149.00	202.42	91.23	61.00	447.00
	Average daily gain	0.33	0.41	-0.51	1.11	1.51	0.68	0.46	3.34
	*Feed costs**	64.76	0.00	64.76	64.76	262.59	0.00	262.59	262.59
	*Other costs***	13.18	0.00	13.18	13.18	18.71	0.00	18.71	18.71
	Total costs	77.10	0.00	77.10	77.10	282.08	0.00	282.08	282.08
	Revenue	1276.81	140.06	1039.39	1566.81	1248.81	180.7	913.65	1506.75
	Netreturns per pound of gain	2.86	3.34	-7.74	9.76	-0.50	2.40	-7.36	2.17
	Cost per pound of gain	0.50	4.85	-15.42	11.01	1.70	0.86	0.63	4.62
	Ending price	100.34	2.97	94.01	109.31	101.26	4.05	91.16	108.86
	Net Margin	121.60	60.05	31.41	227.29	73.47	111.47	-76.18	318.75

0-164 days (April)	*Weight*	1314.17	122.02	1075.00	1535.00	1471.46	148.11	1200.00	1705.00
	Dressing percent	49.10	2.21	45.50	54.00	50.98	1.69	48.00	54.00
	Total gain	53.42	61.20	-88.00	161.00	202.42	91.23	61.00	447.00
	Average daily gain	0.33	0.37	-0.54	0.98	1.23	0.56	0.37	2.73
	*Feed costs**	82.39	0.00	82.39	82.39	327.32	0.00	327.32	327.32
	*Other costs***	17.52	0.00	17.52	17.52	24.51	0.00	24.51	24.51
	Total costs	99.07	0.00	99.07	99.07	352.61	0.00	352.60	352.61
	Revenue	1210.18	130.18	945.27	1458.4	1108.87	188.68	791.23	1408.9
	Netreturns per pound of gain	3.20	3.97	-10.67	12.64	-1.10	3.24	-10.41	2.61
	Cost per pound of gain	1.70	4.85	-7.08	19.81	2.12	1.08	0.79	5.78
	Ending price	100.27	2.71	96.00	105.49	100.96	4.11	96.00	110.40
	Net Margin	55.34	73.20	-82.42	220.14	-66.46	116.32	-199.09	164.20

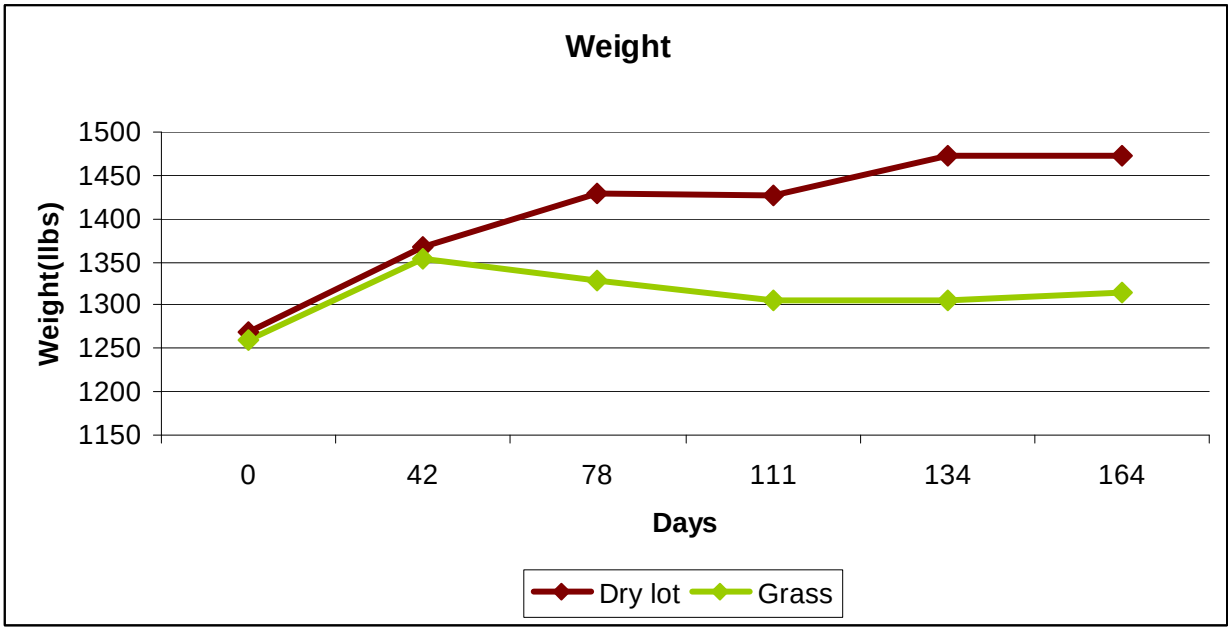

Figure 1. Average cow weight at each weigh date for both treatments.

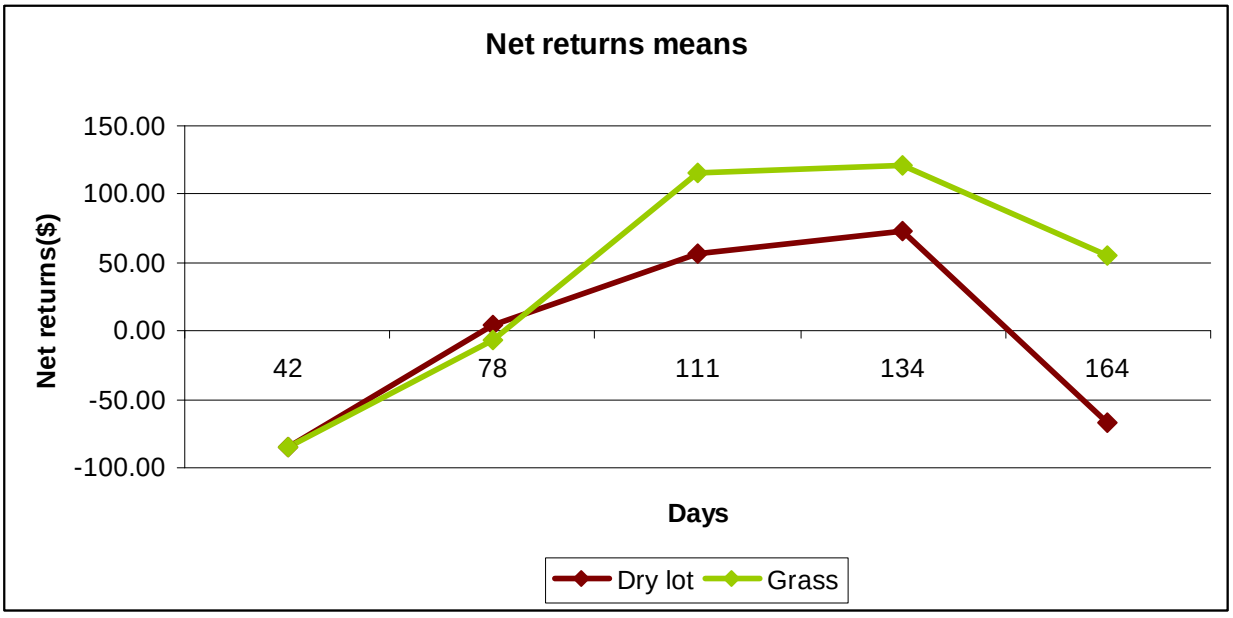

Figure 2. Average net returns per cow at each feeding interval for both treatments.

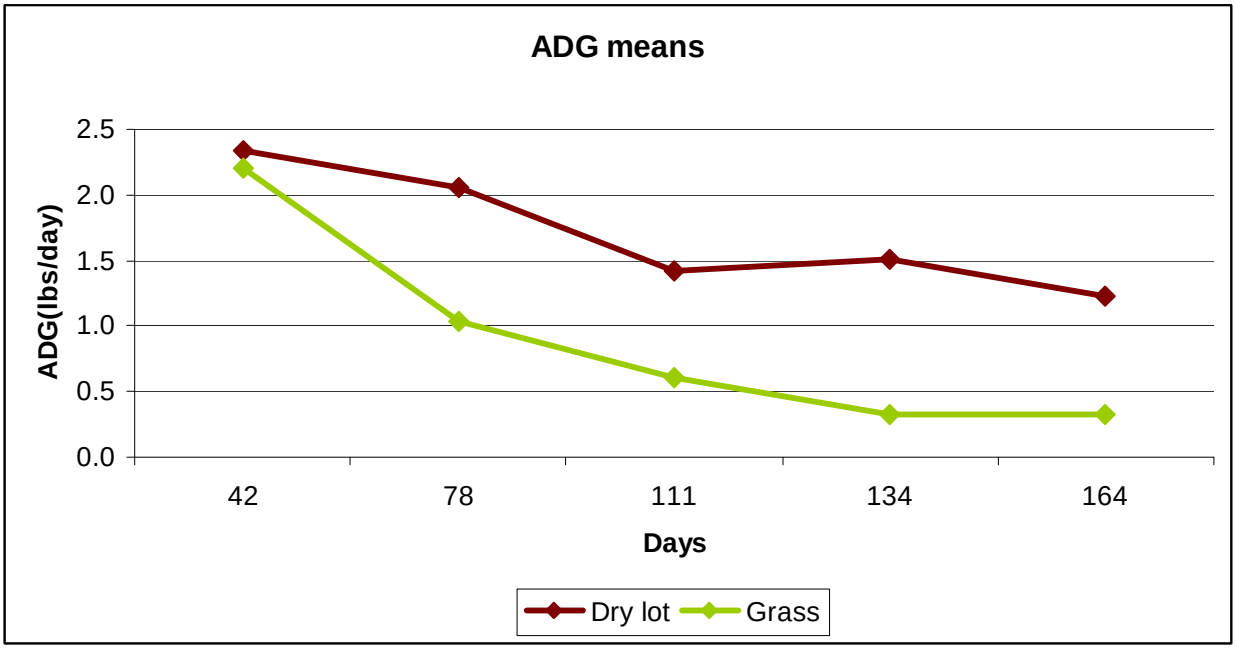

Figure 3. Average ADG per cow at each feeding interval for Grass and Dry Lot cows.

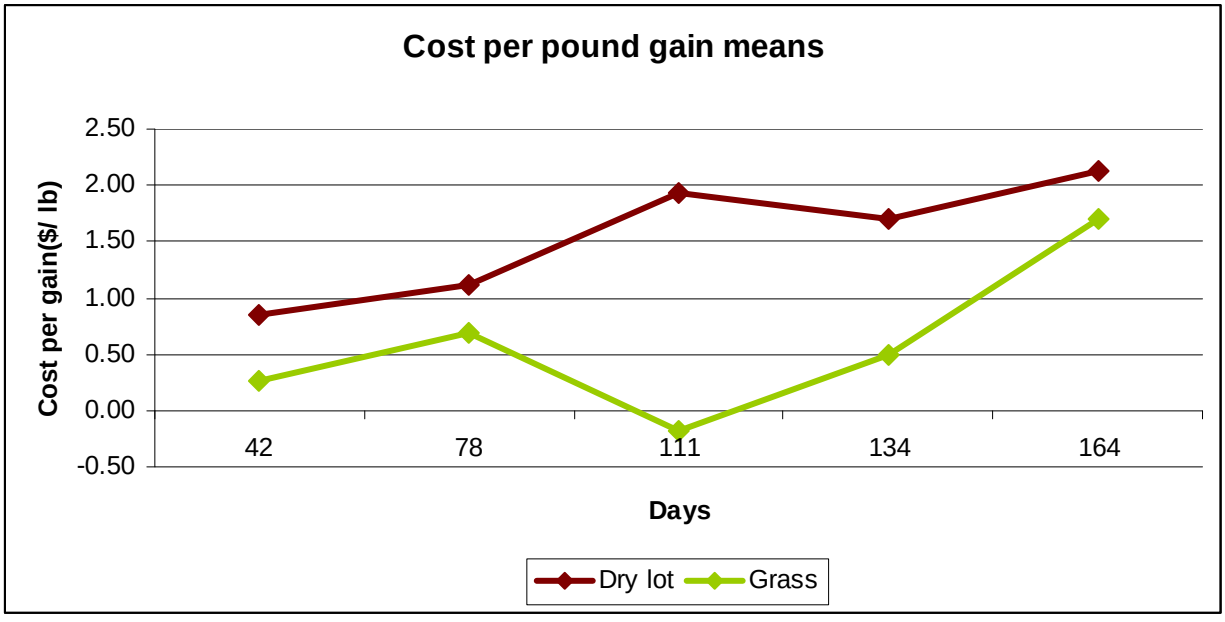

Figure 4. Average cost per pound of gain at each feeding interval for Grass and Dry Lot cows.

Table 2 below presents general linear model estimates for net returns, ADG, gain, cost per gain, and revenue per gain for grass and dry lot treatments. Negative coefficients favor dry lot while positive coefficients favor grass. Statistically significant differences in net returns were found in favor of grass at 111 days and beyond.

Table 2. Comparison of net returns, ADG, gain, cost per gain, and revenue per gain for grass vs. dry lot cows.

Grass Interval - Dry lot Interval	Net returns Estimates	ADG Estimates	Gain Estimates	Cost per gain Estimates	Revenue per gain Estimates
42-42	-2.3733ns (17.5797)	-0.1304ns (0.3883)	-5.4583ns (16.3121)	-0.5854ns (0.5640)	1.8825ns (2.1420)
78-78	-10.9233ns (17.7448)	-1.0163*** (0.2528)	-79.2083*** (19.7406)	-0.35ns (0.3211)	1.6158*** (0.3360)
111-111	61.3387* (31.8342)	-0.8067*** (0.2332)	-89.625*** (25.9032)	-2.1687* (1.0860)	0.7892ns (0.8876)
134-134	49.275* (25.9543)	-1.1813*** (0.1619)	-158.17*** (21.6904)	-1.2783ns (1.0944)	1.16ns (1.0356)
164-164	117.48*** (28.1544)	-0.9079*** (0.1369)	-163.37*** (22.6413)	-0.4721ns (1.0810)	1.4908*** (0.2602)

[1] Ns =not significant, * = significant at 10%, ** =significant at 5%, and ***= significant at 1%
[2] The numbers in parentheses are the standard error.

Table 2 also shows that the average daily gain (ADG) and total gain of dry lot cows was significantly higher than for grass cows at 78, 111, 134, and 164 days and was statistically significant. The cost per gain for dry lot cows was significantly higher than for grass cows at 111 days. Furthermore, the revenue per pound of gain, which reflects price changes combined with weight gain, was statistically higher for grass cows at 78 and 164 days.

Table 3 presents comparisons for grass cows only across adjacent feeding intervals. The coefficient estimates reflect the earlier time period in the interval as compared to the later time period in the interval. Thus, negative net return estimates favor the second time period while positive net return estimates favor the earlier time period in the interval. Net returns of grass cows are significantly higher as the feeding interval moves from 42 to 78 days and from 79 to

111 days. There is no significant difference between net returns at 111 and 134 days. However, in this experiment, holding cull cows on grass past 134 days results in a significant decrease in net returns. ADG and total gains indicated decline in weight gain as the experiment progressed beyond 42 days with the exception of the 134 to 164 day interval. Cost per gain and revenue per gain were not statistically different between adjacent intervals.

Table 3. Comparison of net returns, ADG, gain, cost per gain, and revenue per gain across adjacent time intervals for grass vs. grass

Time Interval	Net returns Estimates	ADG Estimates	Gain Estimates	Cost gain Estimates	Revenue per gain Estimates
42-78	-79.2646*** (8.5237)	1.1667*** (0.1472)	11.4583ns (6.8547)	-0.4833ns (0.4167)	-1.7662ns (1.4421)
78-111	-122.28*** (8.7269)	0.4287*** (0.08237)	13.333ns (8.7269)	0.9408ns (0.7542)	0.7512ns (0.6159)
111-134	-5.5417ns (11.3494)	0.2838*** (0.08208)	23.75*** (8.437)	-0.7446ns (1.2775)	-0.5733ns (1.1519)
134-164	66.2621*** (8.9076)	0.004167ns (0.02780)	-9.1667** (4.2455)	-1.3025ns (1.2820)	0.5354ns (0.7171)

[1] Ns =not significant, * = significant at 10%, ** =significant at 5%, and ***= significant at 1%

[2] The numbers in parentheses are the standard error.

Table 4 reports similar comparisons for dry lot cows across adjacent feeding intervals. The results demonstrated that net returns of dry lot cows follow a similar pattern to that of grass cows, though net returns in absolute terms are lower. Net returns increase with each feeding interval until 111 days. There is no statistical difference in returns from 111 days to 134 days and net returns at 134 days are preferred to those at 164 days. Average daily gains generally favored the shorter feeding period, reflecting declining ADGs as the experiment progressed. However, cattle continued gaining weight throughout the 164 day study period. Moreover, cost per gain and revenue per gain estimates for dry lot cows across time intervals indicates no statistically significant difference.

Table 4. Comparison of net returns, ADG, gain, cost per gain, and revenue per gain across adjacent time intervals for dry lot vs. dry lot

Time interval	Net returns Estimates	ADG Estimates	Gain Estimates	Cost per gain Estimates	Revenue per gain Estimates
42-78	-87.8146*** (8.5237)	0.2808* (0.1472)	-62.2917*** (6.8547)	-0.2479ns (0.4167)	-2.0329ns (1.4421)
78- 111	-50.0163*** (15.3652)	0.6383*** (0.08237)	2.9167ns (8.7269)	-0.8779ns (0.7542)	-0.07542ns (0.6159)
111_134	-17.6054ns (11.3494)	-0.09083ns (0.08208)	-44.7917*** (8.437)	0.1458ns (1.2775)	-0.2025ns (1.1519)
134-164	134.46*** (8.9076)	0.2775*** (0.02780)	-14.375*** (4.2455)	-0.4962ns (1.2822)	0.8396ns (0.7171)

[1] Ns =not significant, * = significant at 10%, ** =significant at 5%, and ***= significant at 1%
[2] The numbers in parentheses are the standard error.

Table 5. Comparison of net returns, ADG, gain, cost per gain, and revenue per gain from the base period to specified interval using least square means (LSM)

Grass- Pen	LS Means Net returns	LS Means ADG	LS Means Gain	LS Means Cost per gain	LS Means Revenue per gain
Grass-42	-85.4829*** (12.4307)	2.2087*** (0.2746)	92.7917** (11.5344)	0.2604ns (0.3988)	-0.2142ns (1.5146)
Grass-78	-6.2183ns (12.5474)	1.0421*** (0.1787)	81.333*** (13.9587)	0.7437*** (0.2270)	1.5521*** (0.2376)
Grass-111	116.06*** (22.5102)	0.6133*** (0.1649)	68*** (18.3163)	-0.1971ns (0.7679)	0.8008ns (0.6276)
Grass-134	121.6*** (18.3525)	0.3296*** (0.1145)	44.25*** (15.3374)	0.5475ns (0.7739)	1.3743* (0.7323)
Grass-164	55.3396*** (19.9082)	0.3254*** (0.09680)	53.4167*** (16.0098)	1.85** (0.7644)	0.8388*** (0.1840)
Dry lot-42	-81.6036*** (12.4307)	2.3392*** (0.2746)	98.25*** (11.5344)	0.8458 ** (0.3988)	-2.0967ns (1.5146)
Dry lot-78	4.7050ns (12.5474)	2.0583*** (0.1787)	160.54** (13.9587)	1.0938*** (0.2270)	-0.06375 (0.2376)
Dry lot-111	54.7213** (22.5102)	1.42*** (0.1649)	157.62*** (18.3163)	1.9717** (0.7679)	0.01167ns (0.6276)
Dry lot-134	72.3267*** (18.3525)	1.5108*** (0.1145)	202.42*** (15.3374)	1.8258** (0.7739)	0.2142ns (0.7323)
Dry lot-164	-62.1362*** (19.9082)	1.2333*** (0.09680)	216.79*** (16.0098)	2.3221*** (0.7794)	-0.6521*** (0.1840)
Log-likelihood value N =48	-2295.8	-175.1	-2273.3	-1045.4	-1092.7

[1] Ns =not significant, * = significant at 10%, ** =significant at 5%, and ***= significant at 1%
[2] The numbers in parentheses are the standard error.

Table 5 reports marginal changes from the base period to specific measurement dates (e.g. 0-42 days, 0-78 days) for both treatment groups. Net returns of grass cows from base to 42 days were negative and statistically significant, while net returns from base to 78 days were not statistically different from zero. Net returns at 111 days and beyond are positive and statistically significant, implying that grass fed cows marketed at or beyond 111 days yield a positive net return as compared to marketing at the initial culling. Net returns are highest at 134 days; however, recall that table 3 reports no statistical difference between net returns at 111 and 134 days. This implies that producers must weigh the risk of holding cull cows for the additional period when choosing a marketing date.

Net returns for dry lot cows follow a pattern similar to that of grass cows in that net returns at 0-42 days and 0-78 days are either negative or not statistically difference from zero. Marketing cull cows from the dry lot at 111 days and 134 days yields a positive net return, though as table 4 indicates, there is no statistical difference between net returns at these two marketing points. This research indicates that holding cull cows in a dry lot setting beyond 134 days yielded negative net returns in this case. Previous research concluded that economic gain from cull cows could be achieved between 56 to 90 days Cartes and Johnson 2006; Schnell et al, 1997; Torell, et al, 2001).

Table 5 shows that the average daily gain (ADG) and overall gain for both treatments were generally statistically significant. Results reveal that as time of feeding increases, gain continues but at a declining rate across feeding intervals for both total gain and average daily gain. This implies that cull cows rapidly gain weight during the first period of their placement, but then the rate of weight gain decreases.

Cost per gain generally increased with longer feeding periods. Revenue per gain varied for the marginal feeding periods, again reflecting a combination of seasonal price changes and weight changes for cows in both treatments.

Table 6 reports parameter estimates of the regression model at 111 days. Figure 2 shows net returns were higher for both treatment groups at 134 days than at 111 days. However, the difference was small for the grass fed cows. Thus, considering the risk of death loss from aging cull cows, it was assumed both sets of cows would be marketed at 111 days. Both linear and semi log models have coefficient signs for ADG, feed cost per gain, and treatment which were correctly specified and expected. However, the sign for beginning weight in both models was positively related to net returns.

The effect of beginning weight on net returns was not as hypothesized. One explanation is that heavier cows also were healthier and thus gained weight more efficiently than lighter cows when culled. It was thought lighter cows would have a lower body condition score and thus might benefit from compensatory gain. Falconer, Bevers, and Bennett (2006) note the importance in terms of added value of adding weight to thin cull cows. Results of the linear model indicate that a one unit increase in beginning weight would increase the net returns by $0.08 while a one unit increase in feed cost per gain would decrease the net returns by $11.60. Net returns for dry lot were $51.48 lower than for grass fed cows. Similarly, the semi-log model shows that one 1% increase in beginning weight and ADG would increase the net returns by 1.07% and 2.08% respectively, but 1% increase in feed cost per gain would decrease the net returns by 0.15%.

Table 6. Regression of net returns on key variables

Linear Model		Semi-Log Model	
Variables	Parameters	Variables	Parameters
Constant	-179.82*** (34.72)	Constant	-873.962*** (299.84)
Beginweight	0.085*** (0.025)	InBeginweight	107.008*** (41.31)
ADG	96.12*** (6.57)	LnADG	208.567** (17.24)
Feedcostgrain	-11.598** (5.65)	Lnfeedcostgrain	-15.622** (6.52)
Treatment(dry lot=1, grass =0)	-51.479*** (8.76)	Treatment(dry lot=1, grass =0)	-53.446*** (10.12)
R^2	0.88	R^2	0.80

[1] Ns =not significant, * = significant at 10%, ** =significant at 5%, and ***= significant at 1%
[2] The numbers in parentheses are the standard error.

Conclusions and implications

This study investigated whether cull cows should be sold immediately after being culled from the herd or kept and fed on grass or in a dry lot for alternative periods of time. An experiment involving 24 cull cows fed on grass and 24 cull cows fed in a dry lot was conducted by Noble Foundation from October 2007 to April 2008.

Results reveal that cows in both treatments gained a significant amount of weight initially. Cows in the grass treatment then began losing weight on average while the dry lot cows increased weight significantly. ADGs for both groups declined following the first 42 days. Cost of gain generally increased for both groups as the feeding period increased.

Prices changed over the experimental period generally in line with the seasonal pattern. Therefore, increasing prices combined with modest weight gains led to higher net returns at 78 days or more for both treatment groups. Net returns for grass-fed cows exceeded those for dry lot cows for each period at and beyond 111 days. Increasing cost per gain led to lower net returns for the dry lot cows.

Regression results revealed that across the two treatments, average daily gain and beginning weight positively and significantly affected net returns, both in the linear and semi-log model specifications. Feed cost per gain was inversely related with net returns.

In conclusion, holding cull cows beyond culling generated more returns than selling them immediately after culling, both for a grass or dry lot feeding program. Producers need to consider the weight and condition of cows at culling, potential for gain at reasonable cost, and the normal seasonal pattern when considering how long to feed cows before marketing them.

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