

Alternative cattle finishing systems to reduce feed cost

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Farmers who finish their own calves or purchase feeder cattle should re-evaluate their feeding system and ration in light of higher grain prices and a wider selection of feedstuffs. The feeding system refers to the time and weight to start cattle, whether to background, and for how long. Once the weight and targeted gain are determined, there are several different rations that can achieve chosen performance. This paper summarizes a modeling study that compared four different feeding systems for fall-weaned steer calves using six different rations.

The analysis considers a steer calf that weighs 550 pounds if weaned October 1 and 575 pounds if weaned in November. The Beef Ration and Nutrition Decision Software (BRaNDs) was used to develop rations and predict animal performance for the four growing and finishing systems listed in Table 1. System 1 is an accelerated finishing program with no backgrounding. Calves are weaned earlier and lighter than others and brought on feed quickly to reach market weight of 1200 pounds May 1. Systems 2 and 3 have backgrounding programs of 50 and 100 days, respectively, and reach the same market weight of 1275 on either June 15 or July 4. System 4 is designed to minimize corn feeding by using an extended backgrounding ration of ground corn stalks and MGDS. The steers are fed a more typical corn/MGDS ration the last 60 days and are marketed in early August.

Table 1. Alternative Grow-Finish Systems for Spring Born Calves

System	Start Date	Start Wt	Bckg Days	Bckg ADG	Finish In Wt	Harvest date	Overall ADG	Harvest Weight
1	1-Oct	550	0	---	550	1-May	3.07	1200
2	1-Nov	575	50	2.50	700	15-Jun	3.08	1275
3	1-Nov	575	100	2.50	825	4-Jul	2.85	1275
4	1-Nov	575	227	2.31	1100	6-Aug	2.60	1300

Feedstuffs are listed in Table 2 and diets were balanced to achieve the same average daily gain, and thus slaughter weight, within each system. Once the system is selected there are multiple rations and costs that can achieve the same end point depending on the feedstuffs available. The percent corn in a ration differs by ten percentage points or more within a system and total corn usage ranges three-fold from 16.1 to 48.5 bushels per head across the systems. Feed to gain increases and the average daily decreases with the length of the backgrounding period. It is assumed that dressing percentage, yield grade and quality grade are not impacted across systems or diets. This assumption will be tested using sensitivity analysis.

The analysis was conducted using actual prices for 20 calf crops 1998-2007 and the price series used are listed in Table 3. Feeder cattle prices are based on Oklahoma City prices adjusted by the 2000-2008 Iowa basis to OKC for weight and dates. Fed cattle prices are for Iowa prices reported by USDA for the week of the expected sale date. Corn prices are the simple average over the feeding period for the state of Iowa. Hay price is the average of "US Other Hay". Corn silage price per ton is valued at 9 times the corn price per bushel. Corn stalks are valued at 66.7% the price of hay. Modified distillers grains with solubles are priced at their average relationship to corn based on weekly prices for October 2006-December 2008 at Iowa ethanol plants reported by USDA. This relationship is that a ton of MDGS (45-50% dry matter) was



Table 2. Total Dry Matter Feed and Percent of Diet by System and Diet

System	Diet	Feed	DM lbs	Corn F:G	Alf-Grs	Modified Hay	Corn DGS	Corn Silage	Balancer Stalks	36% Suppl.
1	1	4023	6.19	51%	22%	24%	0%	0%	1%	1%
1	2	4055	6.24	49%	23%	27%	0%	0%	2%	0%
1	3	4097	6.30	44%	0%	35%	0%	19%	2%	0%
1	4	4071	6.26	43%	15%	24%	14%	0%	1%	1%
1	5	4236	6.52	40%	6%	31%	5%	16%	2%	0%
2	1	4487	6.41	51%	22%	25%	0%	0%	1%	1%
2	2	4509	6.44	49%	22%	27%	0%	0%	2%	0%
2	3	4596	6.57	45%	0%	35%	0%	19%	2%	0%
2	4	4531	6.47	43%	15%	24%	14%	0%	2%	1%
2	5	4753	6.79	40%	6%	31%	5%	16%	2%	0%
3	1	4783	6.83	48%	30%	19%	0%	0%	1%	2%
3	2	4842	6.92	44%	30%	24%	0%	0%	2%	0%
3	3	4889	6.98	34%	0%	40%	0%	24%	2%	0%
3	4	4870	6.96	39%	22%	18%	17%	0%	1%	3%
3	5	4944	7.06	31%	5%	33%	14%	15%	2%	0%
4	6	5779	7.97	13%	0%	51%	0%	34%	2%	0%

15.08 times the price of a bushel of corn and was rounded to 15 in the analysis. Assuming 85% dry matter on corn, a dry pound of MDGS averaged 75.6% the dry matter price of corn. Commercial 36% natural supplement and interest rates are reported in the Iowa State University Estimated Returns Series and reflect prices for Iowa during each feeding period. Balancer supplement and yardage rates are based on 2008 rates, \$160/ton and \$.35/head day, respectively and adjusted them for inflation in earlier years. For example, yardage was \$.35/head/date in 2008 but \$.218/head/day in 1987.

Table 3. Price Series for Cattle and Feedstuffs, 20 and 10 Year Averages

	Feeder Cattle OKC Adjusted to Iowa		Iowa Fed Cattle	
	1988-07	1998-07	1988-07	1998-07
Oct 1 550#	97.25	105.20	May 1 76.01	80.71
Nov 1 575#	92.63	101.90	Jun 15 73.83	78.27
			July 4 72.72	77.81
			Aug 6 72.89	77.63

Corn and hay price average for feeding period

Feeding period	Corn \$/bu		Hay \$/ton	
	1988-07	1998-07	1988-07	1998-07
Oct-Apr	2.35	2.30	75.13	82.15
Nov-May	2.41	2.37	76.17	83.51
Nov-Jun	2.43	2.40	76.20	83.75
Nov-Jul	2.43	2.39	76.07	83.80
Jun-Jul	2.49	2.46		

The cost of the feeder animal doesn't differ greatly between October and November. In the last 10 years the 550# steer the first week of October has cost \$7.33 less than the 575# steer the first week of November. Over the 20 years the difference it cost \$2.26 per head more in October. Feed costs were lower for the October – April feeding period than those starting in November and continuing into the summer. In this analysis MDGS, silage and stalks are tied to these prices as well. Fed cattle selling prices are higher for the May sold cattle and lowest for those sold in June. Adjusting by selling weight shows that over the last 10 years revenue was highest for the August sold 1300# steers and least for the May sold 1200# steers.



Results

Cost of production and return per head was repeated for each system and diet for each year 1988-2007 and the results are summarized for the most profitable ration within the system in Table 4 (See Appendix Table A-D for the ration detail). Table 4 reports the average and range in feed cost of gain (\$/cwt), total cost (\$/cwt) and net return (\$/head) for the two time periods. The averages do not differ greatly between the two time periods. There is as much or more difference in economic variables across systems that there is across rations within a system.

Table 4. Summary of Feeding Systems at Most Profitable Ration In Each System

	20 Calf Crops 1988-2007				10 Calf Crops 1998-2007			
	Avg.	Range	Loss Yrs.		Avg	Range	Loss Yrs.	
Oct 1 550# - May 1 1200#, no Backgrounding								
Feed COG \$/cwt	27.21	21.31	47.99	0	26.98	21.31	47.99	0
Total Cost \$/cwt	67.48	53.33	93.56	0	71.65	53.33	93.56	0
Net Return \$/hd	102.36	-74.56	252.38	4	108.71	-45.80	252.38	2
Nov 1 575#-Jun 15 1275#, 45-day Backgrounding								
Feed COG \$/cwt	29.03	22.33	53.51	0	28.93	22.33	53.51	0
Total Cost \$/cwt	67.32	54.08	94.60	0	72.13	55.33	94.60	0
Net Return \$/hd	83.03	-35.60	200.44	3	78.28	-35.60	190.66	2
Nov 1 575#-July 4 1275#, 100-day Backgrounding								
Feed COG \$/cwt	29.79	23.31	56.14	0	29.92	23.31	56.14	0
Total Cost \$/cwt	68.16	54.74	96.57	0	73.14	56.10	96.57	0
Net Return \$/hd	58.16	-68.07	149.66	3	59.53	-3.96	149.66	1
Extended Backgrounding MDG = 15x Corn Price								
Feed COG \$/cwt	31.20	24.38	60.51	0	31.73	24.38	60.51	0
Total Cost \$/cwt	68.92	55.36	99.11	0	74.10	56.68	99.11	0
Net Return \$/hd	51.65	-58.59	212.34	5	45.81	-30.86	212.34	3

In general, costs increased and net returns decreased as the length of backgrounding increased. System 1 was the most profitable g
8 out
nearly \$108/head net return in 1998-2007 compared to \$78, \$60 and \$45 for Systems 2, 3 and 4, respectively. The ranking and relative differences were similar for the 1988-2007 calf crops as well. eturns

Figure 1

but it was not the lowest every year. System 4 that used the least corn had the highest average feed costs and the cost disadvantage increases with corn prices. This is for two reasons. First the model prices MDGS based on corn prices and thus feed costs increase even when corn is not fed. Second, the corn used in fed during the summer when corn prices are the highest. Figure 2 shows the net return per head over time. While System 1 has the highest average profit, it was more profitable than the others in 12 out of 20 years and least profitable in 2 of 20 years (Figure 2). The shifting in profit ranking between the systems is due to fed cattle selling price. Fed cattle price is more variable than feed price because the cattle are sold on one date whereas the feed prices are averaged over the feeding period.

The reason for the difference in net return per head between systems is due to both revenue and costs (Table 5). Systems 2, 3 and 4 had higher average revenue per head by selling more pounds than System 1.. However, these three systems evaluated at their most profitable ration had higher feed cost of gain and total costs per head resulting in lower net revenue. For example, compared to System 1 over the 20 years System 2 had \$29.21 higher average revenue but \$48.55 higher cost leading to \$19.34/head less net return. The importance of cost control is clear in the 1998-2007 period, when the cost increases widens while the revenue difference



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remains constant. As noted earlier, System 1's cost advantage is due to both less total feed used and lower average prices due to the time cattle are on feed.

Table 5. Difference in Revenue, Costs and Returns Between Systems 2, 3 and 4 Compared to System 1 (\$/head)

20 Calf Crops 1988-2007			
	2 v 1	3 v 1	4 v 1
Revenue	29.21	15.07	35.45
Feed COG	26.29	31.67	49.30
Total cost	48.55	59.27	86.17
Net Return	-19.34	-44.20	-50.71

10 Calf Crops 1998-2007			
	2 v 1	3 v 1	4 v 1
Revenue	29.41	23.50	40.63
Feed COG	27.14	34.09	54.71
Total cost	59.84	72.68	103.53
Net Return	-30.43	-49.18	-62.90

It is to how much the grade would have to improve to offset the difference in returns. For example, from Table 5 the difference between System 3 and System 1 during 1988-2007 is \$44/head. Steers with 800 pound carcasses would have to average over \$5/cwt carcass premium to make up the difference.

System 4 is the least profitable when evaluated at the average prices and price ratios of the past. However, when the price of MDGS is low relative to corn the opportunity for System 4 improves. This scenario may occur when a farmer has purchased co-products at distressed sale prices or contracted a low prices and corn prices increased later. Of course if MDG are cheaper relative to corn profits also increase for other systems as well. For example, the returns for System 2 and 4 are about equal if MDG are 7.5 times the price of corn when stalks are 66.7% the price of hay. This is half the long run average relationship.

Summary

The feeding system involving starting weight and date, length of backgrounding and marketing date impacts cattle feeding profitability. Once a system is selected, alternative rations can be used to achieve the targeted performance. This analysis indicates that for both the 1988-2007 and 1998-2007 that feed and total costs are lower and profits higher for shorter backgrounding period. System 1 had the lowest feed cost of gain, total cost and highest net return. This system did not have a backgrounding period and was the most profitable in spite of having lower revenue per head. Although carcass premiums were assumed to be constant across the systems, carcass premiums would have to be \$5/cwt carcass weight or more in Systems 2, 3 and 4 to offset the advantage of System 1.

Once the feeding system is selected there are multiple rations that can achieve the same performance. This analysis used historic prices for corn and hay, but a fixed price relationship to corn or hay to price modified distillers grains with solubles, corn silage, and corn stalks. If the feedlot prices these variables differently such as a flat price contract for MDGS or at cost of production for silage and stalks, but relative prices may change and favor one ration over another.



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Table A. Summary of Five Accelerated Calf Feeding Rations, Oct 1 550# - May 1 1200#

	20 Calf Crops 1988-2007				10 Calf Crops 1998-2007			
	Avg.	Range		Loss Yrs.	Avg.	Range		Loss Yrs.
System 1 Ration 1								
Feed COG \$/cwt	29.96	23.98	51.90	0	29.96	23.98	51.90	0
Total Cost \$/cwt	68.97	54.74	95.68	0	73.27	54.74	95.68	0
Net Return \$/hd	84.52	-89.93	233.50	5	89.32	-66.70	233.50	3
System 1 Ration 2								
Feed COG \$/cwt	29.18	23.23	51.12	0	29.20	23.23	51.12	0
Total Cost \$/cwt	68.55	54.36	95.26	0	72.85	54.36	95.26	0
Net Return \$/hd	89.57	-83.69	240.87	5	94.28	-61.45	240.87	3
System 1 Ration 3								
Feed COG \$/cwt	27.21	21.31	47.99	0	26.98	21.31	47.99	0
Total Cost \$/cwt	67.48	53.33	93.56	0	71.65	53.33	93.56	0
Net Return \$/hd	102.36	-74.56	252.38	4	108.71	-45.80	252.38	2
System 1 Ration 4								
Feed COG \$/cwt	28.85	23.01	49.73	0	28.66	23.01	49.73	0
Total Cost \$/cwt	68.37	54.17	94.50	0	72.56	54.17	94.50	0
Net Return \$/hd	91.71	-85.48	238.56	5	97.76	-57.85	238.56	3
System 1 Ration 5								
Feed COG \$/cwt	27.84	22.05	48.87	0	27.75	22.05	48.87	0
Total Cost \$/cwt	67.82	53.70	94.04	0	72.07	53.70	94.04	0
Net Return \$/hd	98.32	-75.44	249.08	5	103.71	-52.11	249.08	3

Table B. Summary of Five Calf Feeding Rations, Nov 1 575# - Jun 15 1275, 50 Day Bkg

	20 Calf Crops 1988-2007				10 Calf Crops 1998-2007			
	Avg	Range		Loss Yrs.	Avg	Range		Loss Yrs.
System 2 Ration 1								
Feed COG \$/cwt	31.63	25.09	57.15	0	31.77	25.09	57.15	0
Total Cost \$/cwt	68.75	55.68	96.60	0	73.69	56.68	96.60	0
Net Return \$/hd	64.81	-57.64	183.66	5	58.39	-57.64	171.09	3
System 2 Ration 2								
Feed COG \$/cwt	30.79	24.26	56.24	0	30.95	24.26	56.24	0
Total Cost \$/cwt	68.29	55.07	96.10	0	73.24	56.27	96.10	0
Net Return \$/hd	70.67	-51.73	189.48	4	64.13	-51.73	177.12	2
System 2 Ration 3								
Feed COG \$/cwt	29.03	22.33	53.51	0	28.93	22.33	53.51	0
Total Cost \$/cwt	67.32	54.08	94.60	0	72.13	55.33	94.60	0
Net Return \$/hd	83.03	-35.60	200.44	3	78.28	-35.60	190.66	2



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Table 4 cont...

	20 Calf Crops 1988-2007				10 Calf Crops 1998-2007			
	Avg.	Range		Loss Yrs.	Avg.	Range		Loss Yrs.
System 2 Ration 4								
Feed COG \$/cwt	30.40	23.88	54.73	0	30.35	23.88	54.73	0
Total Cost \$/cwt	68.07	55.05	95.27	0	72.91	56.06	95.27	0
Net Return \$/hd	73.42	-47.16	190.56	3	68.35	-47.16	180.14	2
System 2 Ration 5								
Feed COG \$/cwt	29.67	23.17	54.37	0	29.73	23.17	54.37	0
Total Cost \$/cwt	67.67	54.44	95.07	0	72.57	55.71	95.07	0
Net Return \$/hd	78.51	-42.90	196.26	3	72.70	-42.90	185.22	2

Table C. Summary of Five Calf Feeding Rations, Nov 1 575# - Jul 4 1275, 100 Day Bkg

	20 Calf Crops 1988-2007				10 Calf Crops 1998-2007			
	Avg	Range		Loss Yrs.	Avg	Range		Loss Yrs.
System 3 Ration 1								
Feed COG \$/cwt	35.21	28.68	63.79	0	35.73	28.68	63.79	0
Total Cost \$/cwt	71.13	58.08	100.77	0	76.33	58.86	100.77	0
Net Return \$/hd	20.26	-104.94	114.90	7	18.86	-42.08	109.82	4
System 3 Ration 2								
Feed COG \$/cwt	33.39	26.95	61.89	0	33.95	26.95	61.89	0
Total Cost \$/cwt	70.13	56.77	99.73	0	75.35	57.97	99.73	0
Net Return \$/hd	32.97	-91.26	127.64	7	31.34	-29.72	123.01	4
System 3 Ration 3								
Feed COG \$/cwt	29.79	23.31	56.14	0	29.92	23.31	56.14	0
Total Cost \$/cwt	68.16	54.74	96.57	0	73.14	56.10	96.57	0
Net Return \$/hd	58.16	-68.07	149.66	3	59.53	-3.96	149.66	1
System 3 Ration 4								
Feed COG \$/cwt	34.35	28.00	61.51	0	34.63	28.00	61.51	0
Total Cost \$/cwt	70.66	57.75	99.52	0	75.72	58.43	99.52	0
Net Return \$/hd	26.24	-100.42	118.73	7	26.56	-36.12	116.13	4
System 3 Ration 5								
Feed COG \$/cwt	29.47	22.92	55.69	0	29.53	22.92	55.69	0
Total Cost \$/cwt	67.98	54.56	96.32	0	72.92	55.92	96.32	0
Net Return \$/hd	60.44	-66.15	152.27	3	62.25	-1.28	152.27	1



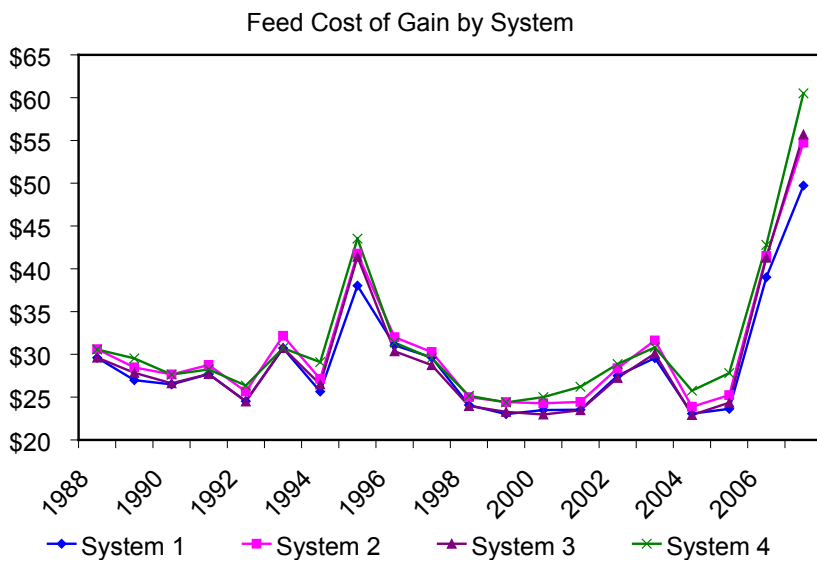
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Table D. Summary of Extended Backgrounding, Nov 1 575# - Aug 6 1300#, 240 Day Bkg

20 Calf Crops 1988-2007				10 Calf Crops 1998-2007				
	Avg	Range		Loss Yrs.	Avg	Range		Loss Yrs.
MDG:Corn	15.00	Stalks:Hay	66.7%		15.00	Stalks:Hay	66.7%	
Feed COG \$/cwt	31.20	24.38	60.51	0	31.73	24.38	60.51	0
Total Cost \$/cwt	68.92	55.36	99.11	0	74.10	56.68	99.11	0
Net Return \$/hd	51.65	-58.59	212.34	5	45.81	-30.86	212.34	3
MDG:Corn	7.50	Stalks:Hay	50.0%		7.50	Stalks:Hay	50.0%	
Feed COG \$/cwt	21.82	17.13	42.14	0	22.26	17.13	42.14	0
Total Cost \$/cwt	63.68	50.01	88.87	0	68.82	52.51	88.87	0
Net Return \$/hd	119.67	6.98	274.89	0	114.47	24.02	274.89	0
MDG:Corn	10.00	Stalks:Hay	66.7%		10.00	Stalks:Hay	66.7%	
Feed COG \$/cwt	26.50	20.95	50.86	0	27.13	20.95	50.86	0
Total Cost \$/cwt	66.30	52.68	93.73	0	71.54	54.69	93.73	0
Net Return \$/hd	85.71	-26.07	242.50	2	79.18	-5.28	242.50	1
MDG:Corn	7.50	Stalks:Hay	66.7%		7.50	Stalks:Hay	66.7%	
Feed COG \$/cwt	24.15	19.24	46.04	0	24.83	19.24	46.04	0
Total Cost \$/cwt	64.99	51.34	91.04	0	70.25	53.70	91.04	0
Net Return \$/hd	102.74	-9.81	257.58	1	95.87	7.52	257.58	0
MDG:Corn	15.00	Stalks:Hay	50.0%		15.00	Stalks:Hay	50.0%	
Feed COG \$/cwt	28.86	22.27	56.61	0	29.17	22.27	56.61	0
Total Cost \$/cwt	67.61	54.03	96.94	0	72.67	55.49	96.94	0
Net Return \$/hd	68.59	-41.80	229.65	4	64.41	-14.36	229.65	3

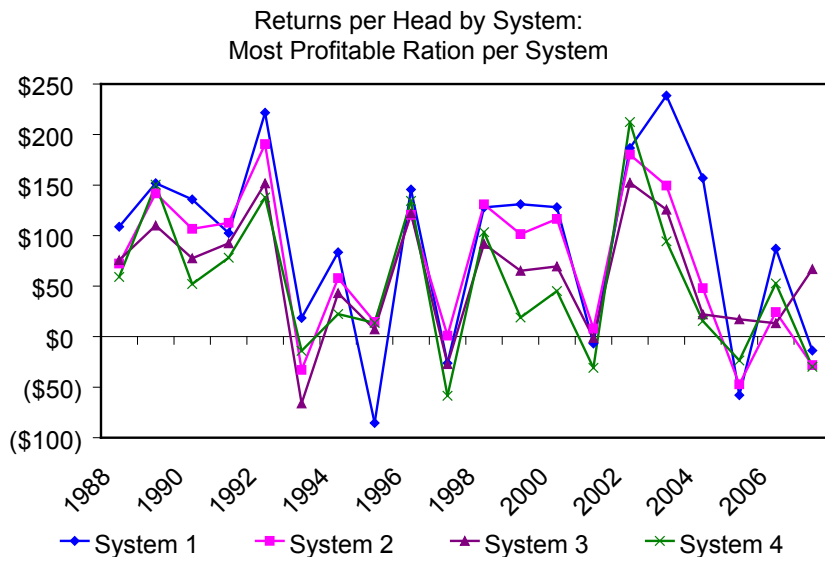
Figure 1



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Figure 2



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