Current Report

A Marketing Decision Tool
for Cattle Feeders

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Cattle feeders regularly face the decision of whether to market cattle on feed this week, or to feed them another week and market them at that time. The goal in marketing is to maximize profit. That may or may not occur at the highest price. Costs must also be considered. This Extension Current Report illustrates a computer spreadsheet program that can assist cattle feeders with their decision to sell now, or hold and continue to feed.

The Decision Framework

Beefpackers usually visit cattle feedlots weekly. Thus, cattle feeders tend to make marketing decisions on a weekly basis. For cattle nearing slaughter weight and finish, feeders must determine whether to market cattle this week at a given bid or market price, or hold cattle another week. Holding cattle another week means incurring added costs associated with the additional one-week feeding period. It usually results in more pounds of cattle marketed, but also exposes the feeder to the risk of a price decline which could offset the additional pounds marketed, especially when coupled with the added costs incurred. Feedlot performance over the extended feeding period (i.e. feed conversion, average daily gain, and feeding costs) is also uncertain and thus risky.

Economists would argue that the proper approach (in their jargon) would be to market those cattle when marginal revenue equals marginal cost. For the marketing decision being considered, that can be explained as follows. Marginal cost is the change in costs or expenses associated with feeding cattle one more week. Marginal revenue is the change in total revenue or income associated with feeding cattle one more week. (Here, one more feeding interval is one week, but one more feeding interval could be 10 days, 2 weeks, or a month.)

Marketing cattle at the optimum time (when marginal cost equals marginal revenue) requires understanding the process packers follow in pricing fed cattle. That, in turn, emphasizes the need to estimate the physiological performance changes of the cattle and to estimate expected costs and expected prices over the decision interval.

The pricing process followed by packers is explained in OSU Extension Facts 459, and is described briefly here. Packers begin with a basic economic principle, that profit equals total revenue minus total cost. Thus, packers estimate the returns from carcass and byproducts sales, subtract estimated slaughter costs and a profit target, and convert net returns to a live weight price they can pay for cattle.

Feedlot pens of cattle consist of cattle varying in weight, quality grade, and yield grade, and sometimes in sex. Consequently, packers must estimate the value of cattle in a pen based on estimates of live and dressed weight, quality and yield grade, and dressing percentage. Packers begin with a wholesale price for a standard or base type of carcass (for example, a Choice grade, yield grade 3, steer carcass weighing 600-700 pounds). Then they adjust the base carcass price if all cattle in the feedlot pen do not fit the standard or base type. The base carcass price is usually adjusted for cattle sex, quality grade, and yield grade. Packers may also adjust the base carcass price for carcass weight. They then convert the adjusted carcass price to a live weight basis by estimating the average dressing percentage of the cattle. The final step is to add in the byproducts credits for hide and offal, and subtract costs for slaughter, freight, cooler shrink, and a profit target. Then they negotiate a sale price with feeders.

The pricing process followed by packers suggests the importance of certain physiological characteristics of the cattle (for example, cattle sex, weight, percentage of cattle grading Choice, percentage of cattle yield grading 3 or above, and dressing percentage). An additional feeding period will usually: (1) increase cattle weight; (2) increase the percentage of Choice grade cattle; (3) increase dressing percentage; and (4) decrease the percentage of yield grade 1-3 cattle. The first three factors contribute to increased returns, while the latter one decreases returns.

Estimating Costs and Returns

To market cattle effectively, feedlot operators must estimate the added cost of feeding cattle another feeding interval. Commercial feedlot managers maintain records on rations fed and daily feed consumption per head. They also monitor other feedlot performance criteria such as conversion ratios, average daily gain, cost of gain, and cost per head per day (i.e. including feed, yardage, animal health, and other costs, excluding interest on cattle). Cost per head per day is used in estimating expected added costs for a given feeding interval.

Feeders must also estimate the expected added income if cattle were fed another feeding

interval. The key factor affecting expected added income is the expected price of cattle at the end of that period. The marketing tool that will be explained shortly allows feedlot operators to use the current period price as a starting point in estimating expected income. They then can use whatever information is available and their judgement to estimate the next period price. One of the principal advantages of computer spreadsheets is that users can insert alternative pieces of information (in this case, cattle prices) and then see how much difference the changes make.

Marketing Tool Description and Example

The marketing tool uses a Visicalc spreadsheet program for the Apple II+/IIe microcomputer. It could be modified for other computers and spreadsheet programs. A copy of the program can be obtained for the cost of a blank disk (about $2) from Clem Ward, 513 Ag. Hall, OSU, Stillwater, OK 74078.

Feeders are asked to insert information wherever a ">" appears in the program (table 1). Feeders input selected information for the current period (as if cattle were marketed at the end of the current feeding period) and for the next feeding period (as if cattle were fed another feeding interval). Thus, feeders select: (1) a decision period (line 1 in table 1); (2) number of cattle on feed (line 2); (3) beginning average weight (line 3); (4) expected average daily gain over the next feeding period (line 4); (5) interest rate (line 5); (6) expected costs per head per day over the next feeding period (line 6); (7) current and expected carcass prices (lines 8-10); (8) current and expected hide and offal values (line 11); (9) estimated current and expected percentage of cattle quality grading Good or below (line 13) and yield grading 4 or 5 (line 14); and (10) the estimated current and expected dressing percentage of the cattle (line 15).

Feeders face both production risks and marketing risks. Thus, they may input 3 levels of feedlot performance and 3 levels of market conditions (better than expected, expected, and worse than expected). The program computes all remaining figures, including added revenue (lines 26-30), added cost (lines 31-35), added profit (the difference between added cost and added revenue) (lines 36-40), break-even prices (lines 42-46), and break-even average daily gains (lines 47-51).

Total and added revenue depend jointly on feedlot performance and market conditions. Thus, 9 total revenues and 9 added revenues are generated. Added costs are independent of market conditions so they change only as feedlot performance changes, leaving just 3 possible outcomes. Added revenue and added costs combine to form 9 possible added profits outcomes under alternative feeding and marketing conditions. Three break-even prices are computed (given the assumptions about feedlot performance). Nine break-even ADG's are computed (given the assumptions about market conditions and feedlot performance). The basic formulas used in the spreadsheet are shown in table 2.

The example in table 1 is for a 7-day feeding interval (line 1), for 125 head of steer cattle (line 2) weighing an estimated 1125 pounds (line 3). Several assumptions were made for purposes of illustration. For example, average daily gains over the next week (as cattle near slaughter weight and finish) may range from 2.2 with better than expected feeding conditions, to 1.6 with worse than expected feeding conditions (line 4). Gains are expected to be 1.9 pounds per day. Interest rates (line 5) are assumed to range from 13 to 14 percent. Interest rates are used to compute the cost of tying up capital one-period longer, rather than marketing cattle at the end of the current period. Costs per head per day (line 6) may be as low as $1.60 or as high as $2.20. Generally, feed intake changes little and may even decline as cattle remain on feed longer (as they near slaughter weight and finish). However, feed conversion gets worse. Consequently, feeding performance declines and feeding costs per head per day increase.

Expected prices and byproducts values for next week are assumed to be the same as currently, with possible changes above and below the current level (lines 8-11). A higher percentage of cattle are expected to quality grade Choice or better if fed another week (meaning there will be a lower percentage of Good grade and below cattle) (line 13). There will also be a higher percentage of cattle expected to yield grade 4 or worse (meaning a lower percentage of cattle yield grading 3 or better) (line 14). Dressing percentage (line 15) is expected to improve.

The program computes an estimated price (line 18) by a method similar to that followed by packers and as described above. Part of that process requires estimating slaughter costs and packer profits, which are usually unknown by feeders. Therefore, the estimated price in the program may differ from current reported prices that feeders see or hear in market reports. However, estimated prices for the future period under alternative market conditions are computed in the same manner in the program as is the current price. Thus, price comparisons "within the table" are appropriate but price comparisons "between the table and reported prices" could be high or low. Any differences between prices in the program and market prices will not affect the program estimates for added revenue.

In the example here, added revenue exceeds added cost only when market conditions are at the better than expected level (lines 38-40, column 1). Added profit (added revenue minus added cost) is estimated at $11.67/head when feeding conditions are better than expected, $10.33 when feeding conditions are as expected, and $8.98 when feeding conditions are worse than expected. Added profit is negative (meaning added cost exceeds added revenue) when market conditions are at the expected level or are worse than expected, regardless of the level of feedlot performance (lines 38-40, columns 2 and 3). In this example, a feeder would probably choose to market cattle this week rather than feed them another week.

A feeder can also assess the possibility that market conditions may be better than expected. When market conditions are better than expected, added revenue exceeds added costs. In that case, cattle should be marketed in the current period.

Break-even prices (lines 44-46) suggest that if cattle gain as expected, it will take about a $.40/cwt. price increase for it to be worthwhile to feed cattle longer (line 45 compared with line 18, column 1). Break-even ADG's (lines 49-51) suggest that with expected market conditions (lines 49-51, column 2), cattle could probably only gain fast enough to offset the added costs if feedlot performance was better than expected (2.22 lbs./day) (line 49, column 2).

Conclusions

This relatively simple marketing tool illustrates how packers price cattle and the physiological factors affecting costs and returns.

It provides a tool for studying alternative production and market risk scenarios. Feeders can quickly and accurately go through several "what if" situations regarding feedlot performance and market conditions, and see how they combine to affect sell vs. hold-and-feed decisions.

TABLE 1. ESTIMATED COSTS AND RETURNS FOR MARKETING CATTLE NOW VS. FEEDING THEM FOR A LONGER PERIOD.

	CURRENT PERIOD	NEXT PERIOD BETTER THAN EXPECTED	EXPECTED	WORSE THAN EXPECTED
	(1)	(2)	(3)	(4)
1. DECISION PERIOD (NUMBER OF DAYS)--->	7---------------------------			
2. NUMBER OF HEAD------------------->	125-------------------------			
3. BEGINNING AVERAGE WEIGHT (LBS)----->	1125------------------------			
4. AVERAGE DAILY GAIN (ADG) (LBS/DAY)---------->		2.2	1.9	1.6
5. INTEREST RATE (PERCENT)---------------------->		13	13.5	14
6. COSTS PER HEAD PER DAY ($/HD/DAY)----------->		1.60	1.90	2.20
7. CARCASS STEER OR HEIFER PRICES ($/CWT):				
8. CHOICE 3 6/700 LBS---------------->	94.50	95.50	94.50	93.50
9. GOOD 3 6/700 LBS------------------>	90.00	91.00	90.00	89.00
10. CHOICE 4 6/700 LBS---------------->	86.00	87.00	86.00	85.00
11. HIDE AND OFFAL VALUE ($/CWT)------->	7.10	7.20	7.10	7.00
12. PERCENT OF CATTLE FITTING CARCASS CLASSES:				
13. PERCENT OF GOOD 3 6/7 CATTLE------>	30	25	27.5	30
14. PERCENT OF CHOICE 4 6/7 CATTLE---->	5	2.5	5	7.5
15. DRESSING PERCENT------------------->	62.5	62.8	62.7	62.6
16. TOTAL GAIN (LBS)--------------------------		15.4	13.3	11.2
17. ENDING AVERAGE WEIGHT (LBS)---------	1125	1140.4	1138.3	1136.2
18. ESTIMATED PRICE ($/CWT)-------------	62.65	63.97	62.94	61.91
19. ESTIMATED CURRENT REVENUE ($/HD)----	704.85-----------------------			

20. COSTS AND RETURNS COMPARISON ($/HD), DECISION, AND BREAK-EVEN ANALYSIS

	MARKET CONDITIONS BETTER THAN EXPECTED	EXPECTED	WORSE THAN EXPECTED
	(1)	(2)	(3)
21. TOTAL REVENUE ($/HD)			
22. FEEDLOT PERFORMANCE:			
23. (A) BETTER THAN EXPECTED--------	729.47	717.74	706.03
24. (B) EXPECTED--------------------	728.13	716.41	704.73
25. (C) WORSE THAN EXPECTED---------	726.79	715.09	703.43
26. ADDED REVENUE ($/HD)			
27. FEEDLOT PERFORMANCE:			
28. (A) BETTER THAN EXPECTED--------	24.63	12.89	1.18
29. (B) EXPECTED--------------------	23.28	11.57	-0.12
30. (C) WORSE THAN EXPECTED---------	21.94	10.24	-1.42
31. ADDED COSTS ($/HD)			
32. FEEDLOT PERFORMANCE:			
33. (A) BETTER THAN EXPECTED----------------		12.96---------	
34. (B) EXPECTED----------------------------		15.12---------	
35. (C) WORSE THAN EXPECTED-----------------		17.29---------	

36. FEED VS. MARKET DECISION (FEED IF + AND MARKET IF -) ($/HD)

	(1)	(2)	(3)
37. FEEDLOT PERFORMANCE:			
38. (A) BETTER THAN EXPECTED--------	11.67	-2.24	-16.11
39. (B) EXPECTED--------------------	10.33	-3.56	-17.41
40. (C) WORSE THAN EXPECTED---------	8.98	-4.88	-18.71

41. BREAK-EVEN ANALYSIS
42. PRICE ($/CWT)

	(1)	(2)	(3)
43. FEEDLOT PERFORMANCE:			
44. (A) BETTER THAN EXPECTED----------------		62.94---------	
45. (B) EXPECTED----------------------------		63.06---------	
46. (C) WORSE THAN EXPECTED-----------------		63.56---------	
47. ADG (LBS/DAY)			
48. FEEDLOT PERFORMANCE--------------			
49. (A) BETTER THAN EXPECTED--------	-.405955	2.215807	4.917703
50. (B) EXPECTED--------------------	.0781357	2.707814	5.417870
51. (C) WORSE THAN EXPECTED---------	.5924151	3.199822	5.918036

Table 2. Spreadsheet formulas.

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(1) Total Gain = Decision period x Average daily gain

(2) Ending average weight = Beginning average weight + Total gain

(3) Estimated price = {Choice 3 6/700 carcass price − [(Choice 3 6/700 carcass price − Good 3 6/700 carcass price) x (Percent of Good 3 6/700 Cattle ÷ 100)] − [(Choice 3 6/700 carcass price − Choice 4 6/700 carcass price) x (Percent of Choice 4 6/700 cattle ÷ 100)]} x (Dressing percentage ÷ 100) + hide and offal value − ($27 ÷ Ending average weight x 100)

(4) Estimated current revenue = Estimated price x Ending average weight

(5) Total revenue = Estimated price x Ending average weight

(6) Added revenue = Total revenue − Estimated current revenue

(7) Added cost = (Decision period x Cost per head per day) + (Interest rate ÷ 100 x Estimated current revenue ÷ 365 x Decision period)

(8) Feed vs. Market decision = Added revenue − Added cost

(9) Break-even price = (Estimated current revenue + Added cost) ÷ Ending average weight

(10) Break-even ADG = (Estimated current revenue + Added cost) ÷ (Estimated price x 100) − (Beginning average weight ÷ Decision period)