

OPTIMAL MARKETING WEIGHT FOR FED CATTLE

by John Lawrence

Iowa Beef Center at Iowa State University

The dramatic increase in feed costs has feedlot operators looking for ways to reduce feed cost and improve profitability. One decision to re-evaluate is the marketing weight of fed cattle. Pounds of feed per pound of gain increase at an increasing rate as cattle approach market weight. Marketing cattle sooner can save feed and reduce feed costs, but revenue may also be reduced if fewer pounds are sold. So what is the optimal market weight, or more importantly how do you know?

The economic decision rule for optimal marketing weight is simple; it is where marginal cost equals marginal revenue. In other words, continue to add weight until the cost of the last pound is equal to the revenue from the last pound. While the rule is simple, putting it into practice can be difficult because both costs and revenue change as the animal grows. Let's consider each and the factors that influence them.

Marginal costs: Cattle feeders typically talk about average cost of gain for the entire feeding period that is calculated from the closeout. However, the important number for marketing decision is the marginal cost as cattle approach market weight. The average cost of gain changes slowly, but the marginal cost of gain changes rapidly. A steer that has an average feed:gain of 6.25 from 700 to 1200 pounds may have a marginal feed:gain of 8.0 on the last 50 pounds. By the time the steer reaches 1300 pounds the marginal feed:gain could be 10.0 even though the average feed:gain is still much lower.

Feed cost of gain on the marginal pound if the feed:gain is 10.0 and ration cost is \$100/ton (\$.05/lb) is \$.50/pound. However, when ration cost is \$200/ton the marginal cost of gain increases to \$1/pound. Selling the last pound for \$.90 made sense with \$100/ton rations, but it does not with \$200/ton rations. Thus, marginal cost changes with feed:gain and feed price.

Marginal revenue: Marginal revenue is the change in income from selling at a later date and it is also a moving target. First, there are additional pounds to sell. Second, carcass merit and value of the cattle change with weight. And, finally, cattle prices may increase or decrease while the cattle gain weight. Although complicated, these values can be predicted.

Weight gain is predictable using feedlot monitoring programs based on feed intake. Furthermore, it is measureable by weighing cattle to determine gain at different stages of the feeding period. Changes in grade are more difficult to predict and depend in part on how large of a weight change is being considered. Deciding whether to sell this week or waiting until next week probably will not change the grade measurably. However, selling at 1200 pounds rather than 1350 pounds will likely result in lower quality and yield grades. Accurately estimating how cattle will grade at different weights is important. How much carcass value changes depends on the change in the number of premium and discount carcasses and the size of the price adjustment. Predicting price change is difficult, but seasonal price patterns and existing price trends can improve the odds.

Other factors: In addition to feed, interest and out-of-pocket yardage cost should also be included in marginal cost. For small delays in marketing, i.e., a week, interest is often insignificant. If the pen space is not needed



immediately or a daily yardage is not charged, the out-of-pocket yardage charge may be small as well.

Example: Consider the following two examples where the cattle weigh 1250 and the farmer is considering whether to sell today at \$155/cwt in the beef or waiting for two weeks. The cattle are expected to gain 4.0 pounds/day and marginal feed:gain is 8.0. The farmer expects the base price and average grade premium to remain steady. In scenario #1 feed prices are \$120/ton, but in scenario #2 has feed cost of \$240/ton.

In scenario #1 the farmer gains over \$22/head by feeding cattle to the heavier weight. In scenario #2 the farmer feeds the cattle for two additional weeks for no additional income and he is as well off to sell today.

Expected Return From Selling Cattle At a Later Date					
		Scenario #1		Scenario #2	
		Live	Carcass	Live	Carcass
Current Weight of Animals		1250		1250	
Number of Days		14		14	
Expected Average Daily Gain		4.0		4.0	
Expected Added Gain	A	56		56	
Percent Yield			62.5%		62.5%
Expected Market Weight	D	1306	816	1306	816
Current Base Price (\$/cwt)	B	\$96.88	\$155.00	\$96.88	\$155.00
Expected Price Change (\$/cwt)	F	\$0.00	\$0.00	\$0.00	\$0.00
Change in Premium (\$/cwt)	E	\$0.00	\$0.00	\$0.00	\$0.00
Price Per Pound of Feed		\$0.0600		\$0.1200	
Expected Feed Efficiency		8.00		8.00	
Added Feed Cost Per Head		\$26.88		\$53.76	
Opportunity Cost of Space		\$4.90		\$4.90	
Cost of Added Weight		\$31.78		\$58.66	
Cost of Added Weight (\$/cwt)	C	\$56.75	\$90.80	\$104.75	\$167.60
Change in Return Analysis	A*(B-C)+D*(E+F) = Change in Return				
Change in Return from Selling Later (\$/head)		\$22.47		\$0.00	

As is shown at the end of the table, the analysis takes the current price and subtracts the cost of putting on the additional weight and multiplies it by the pounds added. Next, add the change in base price and premiums/discounts and multiply by the expected finish weight. This spreadsheet is available online at www.iowabeefcenter.org.

Another simple application of the marginal cost – marginal revenue analysis is to calculate the cost per day (feed and out of pocket yardage) and compare it to the average daily gain multiplied by the selling price. For example, steers eating 24 pounds a day at \$240/ton is \$2.88 for feed and \$.35 yardage has a daily cost of \$3.23 per head. A steer gaining 3.5 pounds a day will have to sell for \$92.25/cwt to breakeven.

