

## Abstract

Many cow/calf producers struggle with what is a fair price to pay for cows or heifers in an up cattle market. This article is designed to demonstrate the important relationship between profitability and debt serving capacity. With high calf prices, it is important for each producer to analyze the investment and financial feasibility of purchasing breeding animals. Only after determining the profitability of the investment can a sound decision be made.

## Investment Analysis—Purchasing Cows and Heifers in a Strong Cattle Market

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### Introduction

Many cow/calf producers struggle with what is a fair price to pay for cows or heifers in an up cattle market, the same type of market that we face now. If the price is too high, the female may not produce enough calves (including her cull value) to pay for herself and her annual maintenance costs. This is particularly true if the cattle cycle is about to peak and switch directions, i.e., future calves produced are less valuable and cow maintenance costs are too high.



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From the manager's perspective it is important to ask what is a reasonable amount of debt that a female can service in good times as well as poor market times. It is also important to consider the adaptability of the female to the operating environment.

The cattle cycle has been evident in the U.S. livestock industry since 1867 - the first year that beef cattle data were collected. Initially the cycle had longer down cycle movements during which the cow herd contracted, but in the last 30 to 40 years the cycle has remained in a 9 to 11 year cycle with shorter downturns (2-3 years) and lower cow numbers coming out of the cycle. Figure 1 contains a graphic depiction of the cattle inventory since 1945. As indicated in the figure, cattle inventory is at a low point in 2003-2004, with the herd beginning to expand in 2005. During an expansionary phase, replacement heifers are scarce, and have more value, as producers seek to expand.

Given the beef cattle prices observed in 2003 through 2005 there is much interest by producers in expanding cow numbers or new investors entering the market. In Colorado, this is due in part to the significant number of cows being liquidated due to the drought of 2000-2003. In some cases, producers with improved forage conditions are considering rebuilding their herds. Although recent tax legislation has expanded the time period of I.R.S. 1033e to four years, recent high cattle prices are possibly clouding the decisions to invest in expensive heifer or young cows. Fall 2005 sales data reveal bred heifers are selling in the \$1,200 to \$1,400 per head range. Coupled with \$1.25-\$1.40 per pound yearling heifers, many producers cannot afford to hold or retain heifers beyond the historical replacement rates for their cow herd.

The purpose of this paper is to provide cow/calf producers with a tool to help analyze their own beef cow investment opportunity.

### Investment Analysis

The first step on analyzing any investment decision is to evaluate whether the investment is profitable. Once the investment is determined to be profitable (if not profitable, the analysis has served its purpose), the producer must address the financial feasibility of the investment. (1) In other words, does

the investment generate sufficient income to cover the operational costs (cow-costs) as well as service the associated debt? Often cows/heifers are financed over a shorter period than their productive lives.

Certainly debt can be covered from other enterprises within the ranch/farm business, however that can be construed as subsidization, which can lead to larger financial problems for the overall business over time (management of debt and financial strengths and weakness of the business are critical to the long run sustainability of any business).

### Steps to the Bottom line

For many breeding livestock investments, a longer term rather than a single production year analysis must be considered because the net profit stream generated by the asset extends beyond the initial accounting period to end of its useful life. Thus, the decision to purchase heifers/young cows has an investment horizon of four to twelve years for many cow/calf producers.

There are a number of critical data needs to accomplish this analysis. These are as follows:

1. What are the annual cow costs (estimate the annual operating overhead costs on a per cow basis)? An additional cost that must be included is the cost of either equity and lender capital (interest cost).
2. What market price will calves and culls sell for over the cow's productive life?
3. What production levels are reasonable to consider (estimates of death loss, replacement rates, weaning weights, etc.)?
4. What are the annual net returns per cow? [Revenues (calf sales/cull sales) minus cow costs].
5. What is the expected rate of return that is acceptable on this investment?
6. What will be the terminal (salvage/cull) value of the cow once she leaves the herd?

Once the values discussed above are determined then proceed with the new investment analysis. (2) For those interested in the mathematical presentation, the analysis can be constructed as follows:

$$\text{Purchase Price} = \frac{A_1}{(1+r)^1} + \frac{A_2}{(1+r)^2} + \dots + \frac{A_n}{(1+r)^n} + \frac{SV_n}{(1+r)^n}$$

Where  $A_1$  to  $A_n$  are annual net returns for the female.  
 $r$  is the desired rate of return on investment. An example rate of return might be four percent given current financial market returns.  
 $SV$  is the cull value of the female at the end of her productive life.

The following example demonstrates this analysis (400 cow unit):

**Assumptions**

- Total females exposed: 400 cows
- Conception rate: 95%
- Weaning rate: 95%
- Average calf weights: 550 lbs.
- Yearling heifer weights: 882 lbs.
- Expected rate of return: 4%
- Replacement heifer retention rate: 15%
- Actual cow replacement rate: 12%
- Salvage value: \$500 per cow
- 400 cows \* 95% conception rate \* 95% weaning rate: 361 calves
- 400 cows \* 15% retention rate: 60 heifers
- 400 cows \* 12% replacement rate: 48 heifers
- Cow/replacement/heifer death loss: 2 %

**Cash Flow Calculations**

- Annual Revenues:
- 181 steers \* 550 lbs \* \$1.30: \$129,415
- 120 heifers \* 550 lbs \* \$1.20: 79,200
- 12 yearling heifers \* 882 lbs \* \$.90: 9,525
- Total: \$218,140
- Annual Operating Profile:
- 400 cows \* \$300: (\$120,000)
- Net Operating Profits: \$98,140
- Family Living Costs: (\$30,000)
- Long Term Principal Payment:
- (Land, machinery, or livestock payments): ( \$15,000)
- Net Returns: \$53,140
- Net Returns Per Cow: \$132.85

**Present Value Calculations**

Present Value =  $\frac{\$132.85}{(1.04)^1} + \frac{\$132.85}{(1.04)^2} + \frac{\$132.85}{(1.04)^3} + \frac{\$132.85}{(1.04)^4} + \frac{\$132.85}{(1.04)^5} + \frac{\$132.85}{(1.04)^6} + \frac{\$132.85}{(1.04)^7} + \frac{\$132.85}{(1.04)^8} + \frac{\$500}{(1.04)^8}$

\$132.85 (6.7327) = \$894.44 (Net return to the cow without considering her cull value)

\$500 (1.048) = \$500 (0.7307) = \$365.35 (Present value of the cow’s worth when sold eight years from now)

Total \$1,260.00

Based on this single analysis, a producer could afford to pay \$1,260 per cow. At this price, a producer would earn a four percent return on the investment.

**Financial Feasibility**

The next step is to determine if this investment is financially feasible - in other words how much debt are the net returns capable of serving. Financial feasibility addresses the debt carrying capacity of the female given the production levels, market prices, and costs identified in the previous analysis. To accomplish this task the following items must be addressed:

1. Interest rate
2. Amortization period
3. Amount borrowed

Continuing the example, bred females were purchased for \$1,260 per head. Assuming the financial institution will lend 60 percent of the initial purchase price (\$760 per head) for a period of five years at seven percent interest, what debt level can these animals service? The amortization factor for a five year term and seven percent interest rate is 0.2374, assuming equal annual payments. The annual payment will be \$180.42 per animal (\$760 \* 0.2374) which exceeds the net return of \$132.85 per head. Thus while this investment will return four percent per year it is not financially feasible. Back to the point of subsidization, this investment (total of \$237.85 over the term of the note \$180.42 - \$132.85 = \$47.57 \* five years = \$237.85) would need to subsidization from other enterprises.

Cash deficits do not mean that the investment is unprofitable or should not be made. It does mean that servicing the debt could

be difficult. These cash deficits can be reduced or eliminated by extending the term of the debt, increasing the amount of the down payment, reducing the interest rate, or increasing net cash flow. (Berry, et. al., 1995)

From Table 1 one can determine what net receipts must be achieved annually to service the debt associate with each female. For example, if the debt load is \$600 per head with a 5-year note at 6 or 7 percent interest, one needs to generate \$142 to \$146 net profit per head to service the debt.

Table 2 combines average market prices, weaning weights, and cow costs to determine the amount one could pay for a replacement. (The analysis uses a 4% opportunity cost of money as the discount rate). For example, if market prices are \$1.00 per pound, coupled with 500 pound weaning weight and \$300 cow costs, one could pay up to \$1,061 for a replacement animal. The negative value in Table 2 represent operations that are not covering their cow costs.

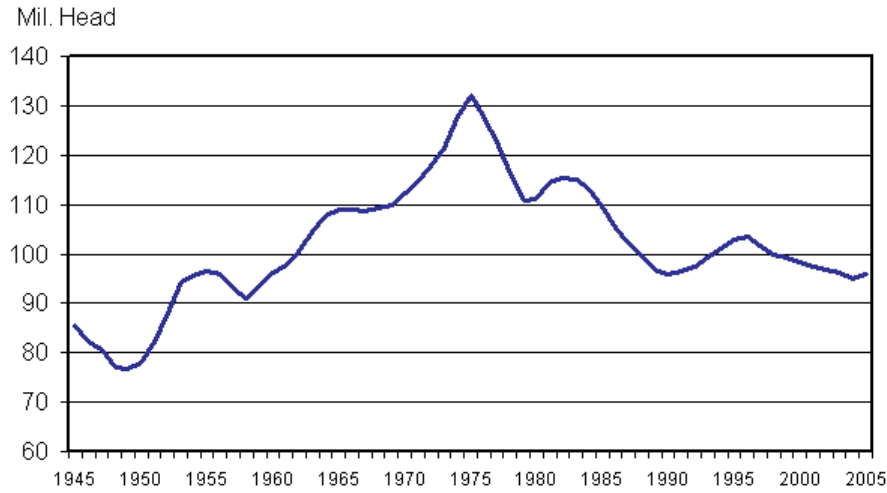
An Excel spreadsheet has been developed to allow the user to address a number of variables. An investor may want to estimate the price received for steer and heifer calves over time, the interest rate (discount rate), salvage value, cow costs, etc. This worksheet will allow the user to evaluate a number of alternatives. The worksheet entitled “Cow Investment Analysis” is accessible at the following Web site:  
<http://www.coopext.colostate.edu/ABM/Abmndx.html>, once at that site go to Section 4 – 4.12 under ABM notes.

This paper is designed to demonstrate the important relationship between profitability and debt serving capability. Even with high calf prices, it is important for each producer to analyze the investment and financial feasibility of purchasing breeding animals. Profitability and debt carrying capacity will vary greatly from operation to operation. Only after determining the profitability of the investment can a sound decision be made. The authors have observed over time that beef cattle in Colorado can typically service no more than \$300 to \$400 debt per cow.

### References

- Peter Berry, Paul Ellinger, John Hopkin and C.R. Becker, *Financial Management in Agriculture*. 5th Edition. Interstate Publishing, Danville, Indiana, 1995 pp 299 – 310.
- Michael D. Boehllje and Vernon R. Eidman, *Farm Management*, John Wiley and Sons, New York, New York, 1984 pp 315 – 334.
- James Robb, *Livestock Marketing Information Center*, Denver, Colorado, 2005.

Figure 1. January 1 total cattle inventory, U.S., Annual



Source: James Robb, Livestock Marketing Information Center, Denver, Colorado

Table 1. Sensitivity analysis

Purchase Price	Debt <sup>a</sup>	Debt service Requirements per head is		
		6%	7%	8%
600	\$360	\$85.46	\$87.80	\$96.18
650	\$390	\$92.59	\$95.12	\$97.70
700	\$420	\$99.71	\$102.44	\$105.21
800	\$480	\$113.95	\$117.07	\$120.24
900	\$540	\$128.20	\$131.71	\$135.27
1000	\$600	\$142.44	\$146.34	\$150.30

a) 60% debt to value

b) Equal total annual payments

c) Amortization factors for 6 percent (0.2374) 7 percent (0.2439), and 8 percent (0.2505) for 5 year amortization period.

Table 2. Sensitivity analysis of beef female purchase price with varying weaning weights, market prices, and annual cow costs

Average Weaning Weight	Average Market Price	Annual Cow Costs			
		\$300	\$350	\$400	\$450
400	\$0.80	\$396	\$174	-\$49	-\$271
450		\$530	\$307	\$85	-\$138
500		\$664	\$441	\$218	-\$4
550		\$797	\$575	\$352	\$129
600		\$931	\$708	\$486	\$263
400	\$0.90	\$562	\$339	\$116	-\$106
450		\$712	\$489	\$267	\$44
500		\$862	\$640	\$417	\$194
550		\$1,012	\$790	\$567	\$345
600		\$1,163	\$940	\$717	\$495
400	\$1.00	\$727	\$504	\$282	\$59
450		\$894	\$671	\$448	\$226
500		\$1,061	\$838	\$615	\$393
550		\$1,228	\$1,005	\$782	\$560
600		\$1,395	\$1,172	\$949	\$727
400	\$1.10	\$892	\$669	\$447	\$224
450		\$1,076	\$853	\$630	\$408
500		\$1,259	\$1,037	\$814	\$591
550		\$1,443	\$1,220	\$998	\$775
600		\$1,627	\$1,404	\$1,181	\$959