

## **Beef Replacement Cows Questions: Decision Aids to Address to Economic Questions\***

This paper identifies common economic questions relating to replacement cows. Computerized decision aids are illustrated that help address these questions. Each producer's situation regarding replacement cows is unique. It's important to gather the data and let the decision aid provide reports. Let the **numbers do the talking**. In other words don't use the current example numbers in the decision aids but **use your own numbers**.

The single most important factor that determines beef cow-calf enterprise economics is the reproduction efficiency. Maintaining highly productive and economically efficient beef cattle herds requires a cost effective replacement program. Since a large number of first-calf heifers can fail to rebreed in sequence with the mature cow herd, economic efficiency of cow replacement is measured in terms of how much it costs to produce the first calf heifer bred back to produce the second calf. The reason considerations must go beyond the bred replacement or first calf is that the inefficiencies associated with the first calf heifer not breeding should be captured.

The objective of the replacement program is to select and produce females that stay in the herd. The judgment of success or failure for the beef cattle program must be based on the data for the cow over her economic life -measured by- weaning percentage, weaned calf production per exposure and longevity or the number of the productive years the cow stays in the herd. Any heifers that dies, is culled or open after the first calf is weaned must be considered a failure. Knowledge of "success" and the cost of replacement cows will also help evaluate whether replacements should be purchased or raised.

The marketing and management of cull cows should not be neglected as increasing cull cow sales or salvage value reduces the net cost of replacements. The seasonal price cycle for cull cows closely follows the weaning cycle – more in the fall (lower price) and few in the spring (higher price). Thin cows can also be up graded in quality grade and by moving a cow from Canner (body condition score 1-3) to Utility (body condition score 5 or above). This can mean an increase in price of \$3 to \$5 per cwt or a role up in price. Cost effectiveness is determined by the added revenue from weight gain and increase in price less the added cost of weight gain.

Three decision aids are illustrated including:

1. Bid Price for Beef Cows including Financing and Tax Implications
2. Cost to Produce Bred Replacement Heifers and Pairs
3. Sell or Keep Cull Cows

## **Decision Aid: Bid Price for Beef Cows Including Financing and Tax Implications**

### **Economic Questions - What can be paid for replacement cows?**

- How much can a producer afford to pay for a replacement cow?
- Should all open cows be culled? What about first calf heifers that does not rebreed but wean her first calf?
- Should replacements be purchased?
- How does a producer with terminal cross production meet replacement needs?
- What impact does reproduction have on the cow-calf economics?
- How does the level of operating cost affect bid price for a cow?

This decision aid facilitates the calculation of the dollar amount that what can feasibly be bid for a cow, and allows the user to do “what if” analysis, given alternative expectations. This financial analysis helps those considering borrowing money for the cow purchase. Both income and self-employment tax are included in this cow investment analysis.

This decision aid is based on a net present value approach to investment analysis. This capital budgeting approach takes into account the discount rate, or rate of return desired for the investment.

The estimates of tax implications are approximations. It is advisable to talk with a qualified tax practitioner to determine the actual implications. If the cow enterprise does not generate a taxable income or there is no taxable income from other sources, then tax credits would be zero. Be careful, as this may lead to the IRS classifying the cow-calf enterprise as a hobby activity. Call on your CPA when addressing tax questions.

Be realistic when estimating weaning weights, prices and cow operating costs used as an input in this model. While doing your sensitivity analysis, change the calf price and/or calf crop and observe the change in the net present value (NPV). This use of sensitivity analysis will show the maximum bid price based on alternative price and production assumptions.

## Key Definitions

The **net present value** (NPV) procedure accounts for the time value of money (in this case, a beef cow investment) that produces annual returns for several years. It reflects the earning potential of this investment that can earn for the specified discount rate. This is the economic feasibility of the investment.

The NPV of the net beef cow return would be the amount of money one would need today to earn an equal future rate of return on investments at the specified discount rate. If the NPV is zero or greater, it is returning at least the discount rate of return. If NPV is less than zero, the investment in the cow will not generate the specified return requirement.

**Discount rate** is the annual rate of return required for the investment in the cow. The discount rate should be selected such that it provides a rate of return comparable to an investment of similar risk.

**Internal rate of return** is the discount rate that would make the net present value equal to zero.

**Cow operating costs** are all the costs of the cow except cow depreciation and interest. The cow-calf budget decision aid can be used to calculate operating costs.

**Cow depreciation** calculated in the program is consistent with the mid-year election and the five-year life following IRS procedure. The purchase basis is cow cost minus accumulated depreciation. When the cow is sold, a capital gain (loss) accounts for the difference between the salvage value and the remaining tax basis in the cow.

**Cull cow price** is calculated based on the historical relationship between the cull cows prices and feeder 500-600 lb. steer prices in Amarillo. The equation is as follows:

$$\text{Cull Cow Price (\$/cwt.)} = 7.00 + 0.47 * (5\text{-}600 \text{ lb. steer price})$$

Calf prices are input values and should be net of marketing cost.

## **Decision Aid: Cost to Produce Bred Replacement Heifers and Pairs**

### **Questions - Cost to produce a bred heifer or pair cost?**

- What is the economics of producing and selling open heifers, bred heifers or pairs?
- What is the cost of losing a bred first calf heifer?
- Is it cost effective to hire extra labor when calving heifers?

This decision aid combines production and financial data to calculate the cost of a bred heifer as well as cost of a bred heifer and first calf pair. This information can be used to evaluate the cost of producing a bred replacement heifer or first calf pair and also the potential of production of replacements for sale. This is a long production cycle that begins when the replacement is weaned and finishes when the heifer is pregnancy tested or in the case of the pair when the calf is born or when the first calf heifers is diagnosed pregnant if sold as a three in one.

### **Input Data**

The first data input form gathers the production data that describes the dates and timing of the production cycle from the time the heifer is weaned until a pair would be available for sale. Heifer value at weaning is input as the base cost as the production cycle is completed and costs are accumulated. Reproduction and culling data is used calculate cull sales and the number of calves available for sale.

Production and cost data is entered is the in the next sheets for the bred replacement followed by the information for the first calf pair. Actual production and cost data generated from actual records is desired. Estimated value and use of “what if” capabilities in the spreadsheet are helpful even if data is limited. Critical numbers are success in getting heifers bred and calving success.

The final page provides a summary to the production and financial information. One can observe the costs and net income associated with the two options.

## **Decision Aid: Sell or Keep Cull Cows**

- What the best strategy for marketing cull cows?

Cow-calf producers are frequently faced with the alternative of selling their cull cows at the time they are culled or retaining them to improve the grade or body condition score (BSC). Not only is there a difference in price by grade, but also there is a seasonal price pattern that may be used to generate increased cull cow revenues. Cull cows prices are lower in the fall as supplies of cows are high as many producers cull in the fall when they wean calves. Spring cull cow prices are normally higher as supplies are lower.

Recall that the impact on the marketing margin of a higher price associated with grade change or the cull cow market price is substantial because the initial weight, which is high relative to the final weight, generates a high marketing margin that can supplement the grazing or feeding margin.

### **Input Data:**

The key data to evaluate the economics of selling or keeping cull cows is the value of the cow if sold thin and what is the expected value if fed and sold later. Expected average daily gain and the feed cost of gain are also key parameters.

### **Results**

The expected value of the cull cow is the net market price and expected net weight. If cattle are not sold when culled this is the unrealized sale value.

The second part of the analysis is to determine the weight gain and the total sales value of the marketing or production alternative to determine the difference in gross revenue. This is the marginal revenue (added revenue) associated with the alternative. To be a profitable “keep em”, the added revenue must offset added cost (marginal revenue must be greater than marginal cost).

The third part of the analysis is to project expenses associated with retaining the cull cows. Cost per head and cwt gain is calculated. Recall that delaying sales means capital is tied up. If borrowed capital is used in the enterprise, then the charge for the capital used is the cash interest cost. If owner financed, then the opportunity cost of capital (its use in the next best investment) should be used as the capital charge. Because of production and price risk involved, a “net margin per head objective” should be established and included as a cost.

The target net margin per head objective is the amount of net income per head that would meet the producers’ financial performance objective. The software calculates the price necessary to achieve the target net margin objective and what this would mean in terms of annual return to capital in terms of the target version actual.

One should not take the price and production risk for nothing. Breakevens are often calculated with no returns to cover indirect costs, capital, or owner management. Using these incomplete cost values as a guide for pricing, if only achieved, will eventually break the business. Why set targets to go broke?

The calculated values are the financial (excluding opportunity cost of capital) and economic (including opportunity cost of capital) advantage of retained ownership.

The sales price of the retained cows to achieve the net margin objective provides a guide to understanding the net price necessary for an acceptable marketing and production alternative.

### Summary Marginal Analysis

As noted, profitability keeping cull cows is dependent on two margins, the marketing margin and the feeding or grazing margin. The summary report identifies these margins. If cows are sold for a higher price in the seasonal cycle and better quality grade will have a positive marketing margin (roll up in price).

### Financial and Economic Advantage

The financial advantage accounts for financial cost plus the net margin per head objective. The economic advantage includes the opportunity cost of equity capital. Annualized return compares the target margin plus the earned net to calculate the annual rate of return on capital and compares this to the target return.

## Retained Ownership Analysis Guide -- Key Definitions

**Financial and Economic Advantage of Retained Ownership and Margins** is a measure of the financial and economic costs (including opportunity cost of capital) that is positive or negative. That is, is marginal revenue greater than cost? Net margin is based on head out. This margin shows the source of a positive or negative margin based on head out. Recall from the margin definition that net income can be positive only if the marketing margin can be offset by a positive feeding margin.

**Total Difference in Gross Revenue** is the difference between the net sales revenue generated and the unrealized sales value of the weaned calves. This is the added or marginal revenue.

**Total Sales Value** is the revenue generated after retained ownership, spending the added cost and time to produce the retained calves.

**Total Specified Added Costs** is the total cost including the target return (if a value is entered) for the retained ownership. This is the added or marginal cost of retained ownership. The marginal cost must be less than added revenue (marginal revenue) to make retained ownership profitable.

### Annualized Net Return on Assets (Capital)

**Financial ROA** is the annualized return on assets (ROA), including net margin objective, and is the net income plus cash interest cost plus the target margin objective divided by annualized capital (asset) requirement to support the enterprise. Capital is adjusted for the time cattle are fed.

The **economic ROA** would add back the entire opportunity cost of capital.

The reason interest is added back in the ROA calculation is that it had been calculated out in determining net income. Interest represents a cost of capital, so it must be added back to net income to calculate an income before interest to determine what net income is capital.

**Financial ROA** is the annualized return on equity. ROE, including net margin objective, is the net income plus the target margin objective divided by the annualized equity capital required to support the enterprise (capital required adjusted for time fed).

The ROA and ROE could be compared to alternative investments of similar risk for evaluation of the retained ownership investment.

This analysis, for simplification purposes, uses the same interest rate for actual interest and opportunity cost of capital or assets invested.

If actual return is above target capital return, it means the investment received “its opportunity cost” and target return is net. Difference between target and actual is how

the target was surpassed. If the actual economic ROA is less than the targeted, then the target has not been met nor has the opportunity cost been received for the investment.

### **Guidelines On Interpretation of ROE/ROA**

When no capital is borrowed, financial ROA and ROE will be the same. Economic actual return will be lower because it accounts for an opportunity cost of capital (interest rate).

If the ROE/ROA ratio is positive and greater than one, then the return on debt is greater than its cost of debt (COD) (interest is less than earnings).

Using debt is favorable when  $ROE > ROA > COD$ .

To gain quick access to select definitions, move the cursor to the “red marker” on the spreadsheet cells.

### **Cost Accounting**

It is highly desirable to organize the accounting system to calculate the cost of producing replacement heifers. This requires identifying replacements as a separate activity at weaning and accumulation cost until they enter replacement cows.