

# AN EFFECTIVE COMBINATION: Partial Budgeting and Sensitivity Analysis

*by Bridger Feuz and John Ritten*

Ranchers must make many management decisions throughout the year. A few examples might be:

- Should I sell calves or yearlings?
- Should I retain ownership of my heifers?
- What should I do with my cull cows?
- Should I buy hay or put up my own?

Each decision can affect overall ranch profitability, yet the impacts of changes can sometimes be difficult to quantify. The essential question is, “Will I be better or worse off for implementing a decision?”

A relatively simple and effective approach for answering this question is using a combination of a partial budget and sensitivity analysis.

Whether on the back of a napkin or on a barn wall, business men and ranchers have for ages put a “pencil” to many management scenarios. Partial budgeting is a simple tool that provides the framework for the calculations needed and the important information to answer “Will I be better of...?”

A partial budget only looks at the costs and returns that will change with the proposed scenario and results in an estimate of the positive or negative dollar value impact of a specific change to the operation.

Partial budgeting accomplishes this by asking four essential questions in a systematic way to compare the benefits and costs of any proposed change.

The four questions are:

1. What new or additional costs will be incurred?
2. What current income will be lost or reduced?
3. What new or additional income will be received?
4. What current costs will be reduced or eliminated?

There are times when a partial budget is not sufficient for answering questions on a farm or ranch. Sometimes decisions



require a more complex analysis. However, no matter the potential complexity of the decision, one benefit of using the partial budget approach is it helps you consider all changes in costs and returns with any proposed change. No matter what approach one takes to make a final decision, asking the four questions that make up a partial budget is vital to the process.

Figure 1 is an example of a partial budget using a yearling steer strategy. To better understand the process, we will look at each of the four essential questions. Keep in mind some items may fit under more than one question. The key is to account for all of the essential elements of the decision in at least one of the four categories, making sure not to double count any one element.

### **1. What new or additional costs will be incurred?**

All direct costs associated with the proposed change should be included in this section. Specific examples associated with adding yearlings would include feed, fuel, transportation, maintenance and repairs, labor, veterinary fees, interest, death loss, etc.

### **2. What current income will be lost or reduced?**

This section accounts for the current income being received before the proposed change. This is often receipts from the sale of livestock or crops. Since we are often delaying income opportunities in many proposed changes, we also need to consider the interest from the sale of the crop or livestock (retained calves if we keep

them for yearlings). For example, if we delay repaying an operating note, we must account for the additional interest that would be accrued.

### **3. What new or additional income will be received?**

This section accounts for the receipts from the sale of livestock or crops directly associated with the proposed change.

### **4. What current costs will be reduced or eliminated?**

This section usually takes some extra thought to identify these costs, but often there are costs that will be eliminated because of the change. Some examples of the costs are:

- If we change from selling calves at the auction barn to selling yearlings off the ranch, we will no longer have a transportation cost for the calves to the auction.
- If we purchase hay instead of raising our own, costs such as fuel, equipment maintenance, and possibly labor would be reduced or eliminated.

To compare the total benefits to the total costs, sections one and two are added together (the total negative impact from the proposed change – reduced income and added costs) and subtracted from the total of sections three and four (the total positive impact of the proposed change – additional revenues and reduced costs).

This calculation results in a positive or negative return. The decision to implement the change still depends on the individual and is influenced by the amount of cash flow, risk tolerance, and confidence in the analysis. For example, if the positive impact of a decision is only \$50, it may not be worth the added effort or risk.

Now that a positive or negative return has been calculated, sensitivity analysis provides a framework to visualize the risk of uncertainty and imperfect information. This is done by calculating a worst, most likely, and best-case scenario on both the cost side and the return side of the partial budget. Once made, the calculations are then put in a grid format. Examples of this analysis can be seen at the bottom of Figure 1.

The worst, most likely, and best case figures can be calculated using a general error factor rate; in the figure, the factors used are 5 and 10 percent. These general factors show the cumulative impact to net income or loss if all cost and/or returns used in the analysis are

**Wyoming Master Stockman  
Partial Budget Tool**

**Proposed Change**

**Retain 100 Steers Through Summer Grass**

Additional Costs			
Description	Number of Units	Price/ Cost	Total
Feed - Head Days	21500	0.90	\$19,350.00
Pasture - AU's	450	20.00	\$9,000.00
Transportation - 200 miles	400	3.75	\$1,500.00
Vet	100	2.50	\$250.00
Fuel/Repair	1	1,000.00	\$1,000.00
Misc.	1	500.00	\$500.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00

Additional Income			
Description	Number of Units	Price/ Cost	Total
9 wt Steers - 98	88200	1.55	\$136,710.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00

Reduced Income			
Description	Number of Units	Price/ Cost	Total
5 wt Steers	50000	1.95	\$97,500.00
Interest at 7%	1	6,825.00	\$6,825.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00

Reduced Costs			
Description	Number of Units	Price/ Cost	Total
Transportation - 1 Truck	200	3.75	\$750.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00

**Total Additional Costs and Reduced Income \$135,925.00**

**Total Additional Income and Reduced Costs \$137,460.00**

**Net Income or Loss \$1,535.00**

**Sensitivity Analysis**

**10% General Factor**

	Worst Revenue	Likely Revenue	Best Revenue
Worst-Cost	\$-25,804	\$-12,058	\$1,689
Likely-Cost	\$-12,211	\$1,535	\$15,281
Best-Cost	\$1,382	\$15,128	\$28,874

**5% General Factor**

	Worst Revenue	Likely Revenue	Best Revenue
Worst-Cost	\$-12,134	\$-5,261	\$1,612
Likely-Cost	\$-5,338	\$1,535	\$8,408
Best-Cost	\$1,458	\$8,331	\$15,204

**Figure 1. Example Partial Budget with Sensitivity Analysis**



over- or underestimated by the given factor rate. For example, in the worst-cost, worst-revenue scenario, the resulting net income or loss is calculated with all negative impacts increased by the factor rate over what is used in the partial budget, and all positive impacts are decreased by that rate. In the best-cost, best revenue scenario, all negative impacts are decreased by the factor rate and all positive impacts are increased by the general factor. You can also estimate the impact of a specific price or set of prices (such as calf and yearling prices) by adjusting them separately in the budget.

The end result of the sensitivity analysis is a grid of possible returns from the proposed change. This can be very helpful in not only convincing yourself, but convincing others involved in the decision making process. It is a very good tool to take to your loan officer if funding is needed for the proposed change.

The combination of partial budgeting and sensitivity analysis is robust enough to handle many of the questions ranchers face each year. Cattle ranchers deal with a significant amount of uncertainty every day. From uncertainty about seasonal weather to daily fluctuations in market prices, agricultural producers are forced to make decisions based on imperfect information. This uncertainty creates the possibility of financial loss or financial gain.

While uncertainty can lead to positive and negative outcomes, we normally think of risk as the possibility of adverse outcomes due to uncertainty and imperfect knowledge in decision-making. The methods described here should help better frame the problem and help quantify some of the risks involved to make better informed decisions.

*Issued in furtherance of extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Glen Whipple, director, University of Wyoming Extension, University of Wyoming, Laramie, Wyoming 82071.*

*The University is committed to equal opportunity for all persons in all facets of the University's operations. All qualified applicants for employment and educational programs, benefits, and services will be considered without regard to race, color, religion, sex, national origin, disability or protected veteran status or any other characteristic protected by law and University policy.*