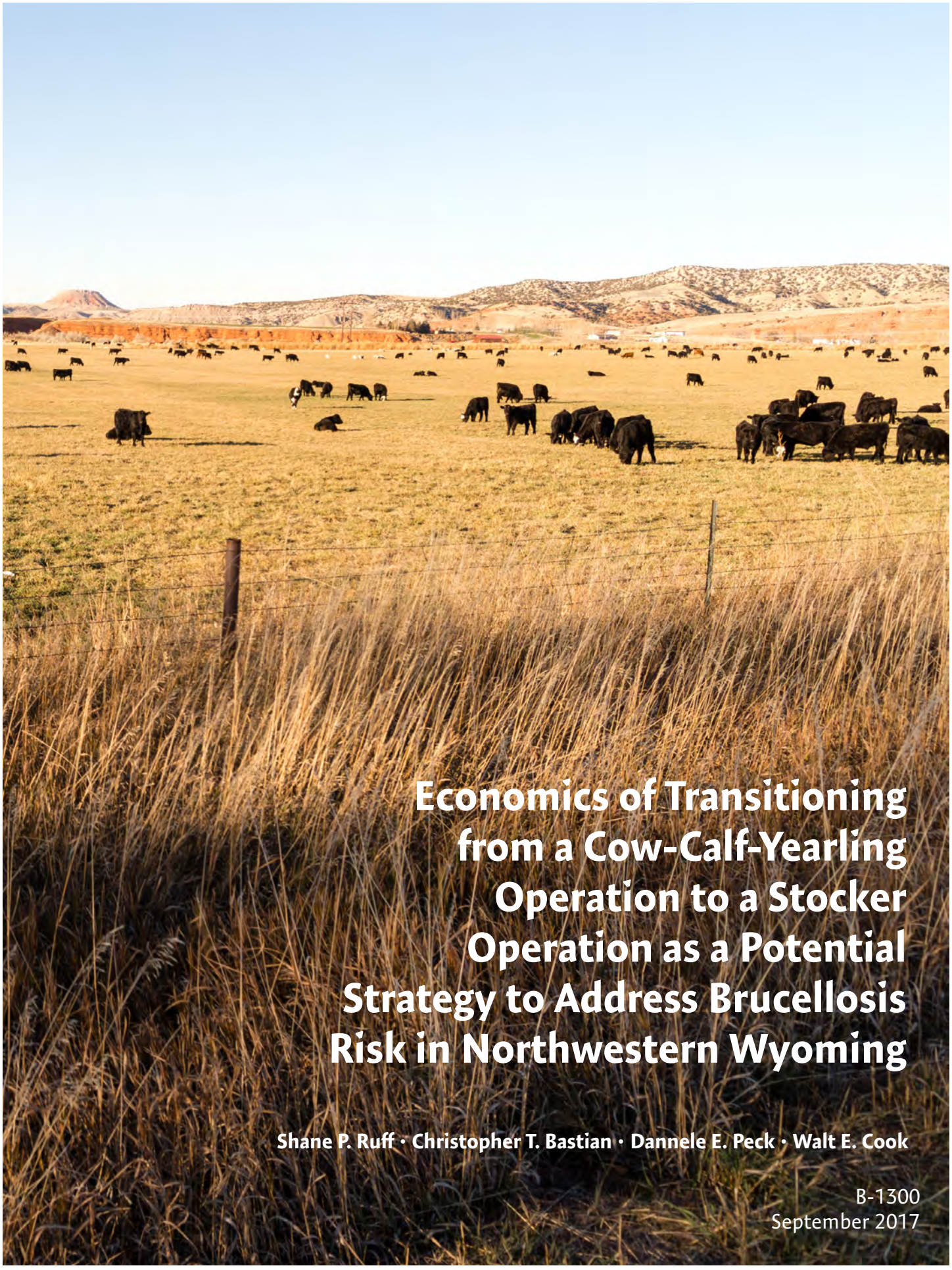

Economics of Transitioning from a Cow-Calf-Yearling Operation to a Stocker Operation as a Potential Strategy to Address Brucellosis Risk in Northwestern Wyoming

Shane P. Ruff · Christopher T. Bastian · Dannele E. Peck · Walt E. Cook

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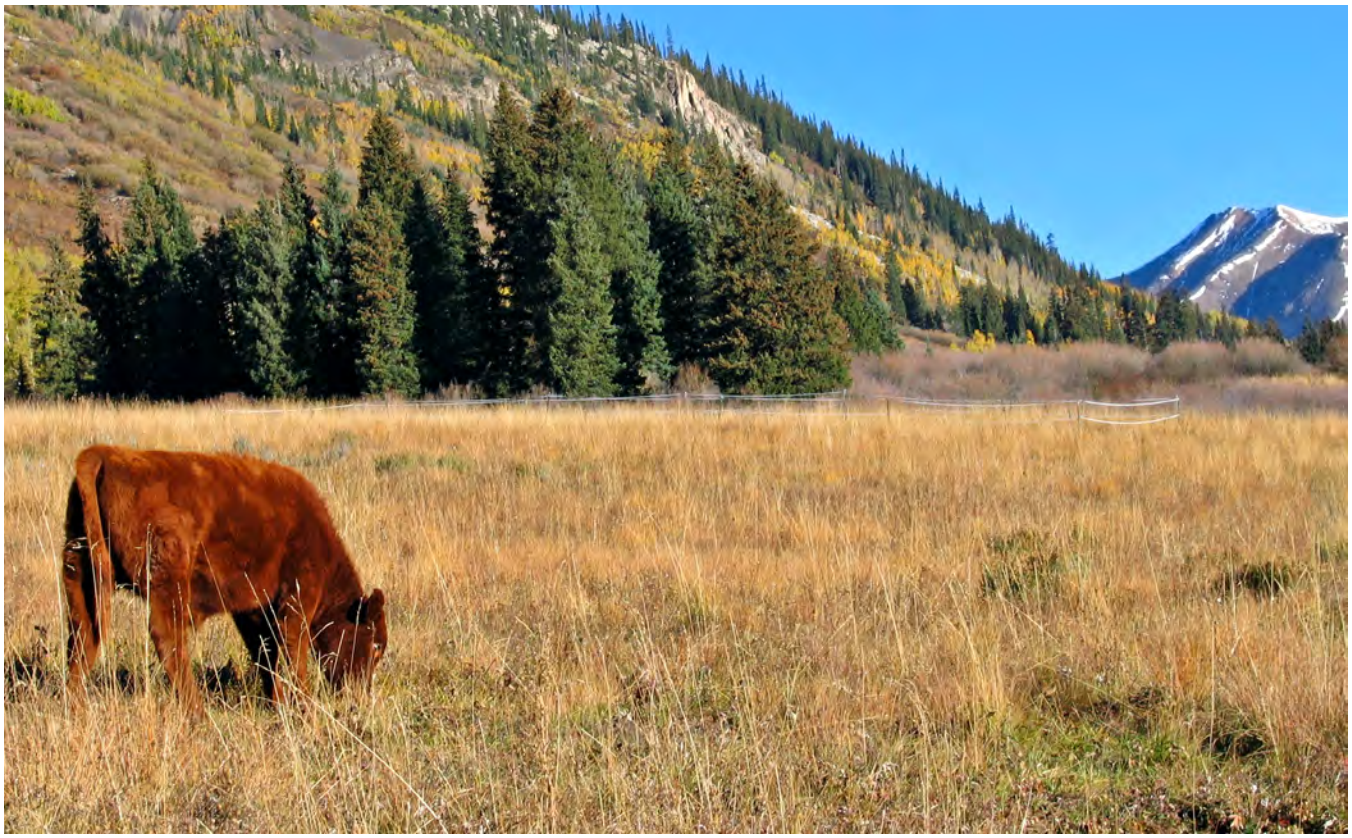

Why Might a Producer Consider Switching to a Stocker Operation from a Cow-Calf-Yearling Operation?

An alternative enterprise for cattle ranchers who produce cows and calves is the production of stocker cattle. While stocker-only operations have generally been less profitable than cow-calf or cow-calf-yearling operations (Ruff et al., 2016), reasons for switching to stockers from cows could include producer desire to avoid winter feeding, to reduce labor associated with calving during inclement weather, to adapt more quickly to existing forage supplies, or to address potential disease issues within the cowherd.

In northwest Wyoming, brucellosis is a key factor affecting the decision to switch to stocker cattle from cow-calf or cow-calf-yearling production. Brucellosis can cause a large number of abortions in newly-infected cattle herds (Waggener, 2005). Once a herd is infected or a herd borders an infected herd, the U. S. government quarantines potentially affected animals until all infected animals are detected and culled. This can reduce profits significantly (Wilson, 2011).

Herds can be infected with brucellosis when cows ingest materials left after infected wildlife, such as elk, give birth or abort (Schumaker et al., 2012). Brucellosis is endemic in wild elk and bison in the Greater Yellowstone Area (GYA), and thus, producers there are searching for alternative management strategies to avoid the potential economic consequences associated with infection.

Many producers in the area are considering switching from current operations to purely stocker grazing operations, i.e., switching to non-reproductive livestock to reduce the potential costs of brucellosis. Steers and spayed heifers in a stocker operation are known as "dead-end" hosts, meaning they can contract brucellosis but cannot spread the disease to other animals.

During a meeting with University of Wyoming researchers, producers in the GYA expressed concerns about the profitability and financial risks of switching cow-calf-yearling operations, which are common in that area, to stockers only. Researchers were asked to investigate the economics associated with different transition strategies to stockers and the ultimate profitability of doing so for producers in the region.

While much work has been done on the economics of cow-calf-yearling operations versus stockers alone (Ruff et al., 2016), no analyses to our knowledge have investigated the transition itself. Thus, for producers considering a switch to stockers, there is little guidance on the economics of how best to transition to such an enterprise. The objective of this bulletin is to investigate the profitability and risks associated with a short, one-year transition to stockers versus a longer transition, compared to the traditional cow-calf-yearling production system in the area.

Transition Strategies to Consider

Two ways a producer could transition to a stocker operation are (1) sell all breeding livestock in the fall (assuming spring calving) then purchase heavier-weight, spring-born animals each spring thereafter or (2) transition over a period of years, which gives the producer time to find a reliable long-term supply of stocker calves and perhaps reduce income tax liability associated with breeding livestock sales for a one-year herd liquidation and stocker transition. The two transitions analyzed and discussed in this bulletin are a single-year transition and an eight-year transition to stockers.

Budget analyses of spring-purchased 600-pound calves versus 700-pound calves indicate the 600-pound purchased stockers have higher returns over variable costs (ROVC = $19,185, assuming 969 stocker steers are purchased) than the 700-pound stocker enterprise (ROVC = $15,759, assuming 879 steers are purchased) (Ruff et al., 2014a; Ruff et al., 2014b). Given this result, we analyze only transition to the 600-pound stocker enterprise for this bulletin.

For the single-year transition to 600-pound stockers, we assume all breeding animals are sold in year one and replaced with a number of stocker steers based on the total animal unit equivalents (AUEs) the ranch can support. The single-year transitioner purchases stocker steers in May at 600 pounds and sells the steers in September weighing 846 pounds. We understand that selling all breeding animals at once can be risky for the producer, given price variability. However, we assume the producer can control when to transition and sell the breeding animals, which reduces the level of risk.

In the eight-year transition to 600-pound stockers, we assume 15 percent of the breeding herd is culled each year, as is common in the region (Ruff et al., 2014c), and replaced with stockers. While other timing for stocker operations can be used, such as buying stockers only in the spring, we use this transition strategy to allow the current cow-calf-yearling operation to continue during the transition.

We assume steers and heifers are used during the transition to stockers because producers in our focus group expressed concerns that finding a consistent supply of steers early on could be difficult. For years one through six of the transition, stocker steers and heifers are purchased in November (either from other producers or calves produced by the cow-calf enterprise) and sold the following September. Steers are purchased at 550 pounds (this equals the weight of the steer calves for the cow-calf-yearling operation that transitions to the yearling enterprise) and sold at 977 pounds. Heifers are purchased at 500 pounds (again this equals the weight of heifer calves transitioning to the yearling enterprise) and sold at 927 pounds. This is similar to the produc-

tion schedule assumed in the base cow-calf-yearling budget (Ruff et al., 2014c).

In the last year of the transition (year seven), remaining breeding livestock are sold and the remaining calves are transitioned to yearlings, along with other purchased calves so only yearlings are sold at the end of that year. The cow-calf-yearling operation then is a stocker-only operation in year eight of the analysis. Each transition ends with a stocker enterprise comprised of 600-pound spring-purchased stocker steers that are sold at 846 pounds in September (see Ruff et al. 2014a).

Prices for livestock are based on historical prices from the Livestock Marketing Information Center for the years 1999-2010 and adjusted for inflation. All operational costs and assumptions come from Ruff et al. (2014 a, b, c). We use simulation analysis to randomly draw prices for our calculations to account for price variability and market risk. Given the longer transition takes eight years, we analyze the profits for the base cow-calf-yearling operation and each of the transitions for at least eight years.

Because a dollar today does not have the same purchasing power as a dollar eight years from now, we use a technique called net present value analysis to discount all profits over the years analyzed to present-day values. This allows us to calculate what a stream of revenues over time would be worth today, so we can compare different scenarios all in today's dollars. Given that each operation may have a unique set of equipment and other capital resources, we focus on returns over variable cost in the rest of our analyses as a potential measure of profitability. Recognize that fixed costs associated with such factors as depreciation, interest, repairs, taxes and insurance must be considered by someone considering a different operation. Ruff et al. (2014a, b, and c) find negative net profit after considering all fixed costs assumed in their base budgets. For more details on this analysis see Ruff et al. (2016).

What Do Livestock Numbers Look Like for the Transition Strategies?

Livestock numbers for each operation/transition for years one through eight are shown in Table 1. These numbers generally reflect a marketing and production year going from fall to fall with the exception of the spring-purchased stockers. The numbers are generally what the ranch has at the beginning of the production cycle starting in the fall. The cow-calf-yearling operation can support 760 animal unit equivalents or AUEs (calculated as (live animal weight)$^{0.75}$/ 1000$^{0.75}$) on summer grazing. The 760 AUEs consist of 448 cows, 23 bulls, 360 calves, and 280 yearlings each year. The 448 cows include 80 replacement heifers.

Given the cow-calf-yearling operation can support 760 AUEs during summer grazing, we assume the 600-pound stocker model can support 760 AUEs. This translates to 969 steers on summer grazing pastures. We assume a 2 percent death loss on the steers, so a total of 950 steers are sold at 846 pounds in September.

The eight-year transition to 600-pound stockers culls 15 percent of the breeding herd each year from the cow-calf-yearling operation. In year one there are 380 cows, 360 calves, and 358 yearlings on summer grazing pasture. Given the base cow-calf-yearling operation sells yearlings weaned from the operation and transitions to the yearlings, we continue this in years two through seven of the transition. As calf numbers decline, we assume the operation purchases steer and heifer calves in the fall. These yearlings are sold the following fall at the same weight as the base operation sold them, e.g., 550-pound steer calves are sold as 977-pound yearlings and 500-pound heifer calves are sold as 927-pound yearlings.

In year seven, all breeding animals and remaining calves have been sold, and there are 887 yearlings on summer pasture. These are sold in the fall.

In year eight, the operation transitions from the year-round yearling operation to the 600-pound stocker operation with the purchase of calves in the spring and sale of yearling steers that fall. This transition is designed to keep the operation and production schedules as similar as possible to those of the base operation until the final transition to the spring-purchased 600-pound stockers. In year eight, the operation purchases 969 stockers at 600 pounds and sells 950 yearlings weighing 846 pounds each in the fall (see Table 1).

Table 1. Number of Livestock in Each Operation

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Cow/Calf/Yearling	**Livestock Numbers**							
Cows	448	448	448	448	448	448	448	448
Calves	360	360	360	360	360	360	360	360
Yearlings	280	280	280	280	280	280	280	280
Single-Year Transition								
Yearlings Steers	969	969	969	969	969	969	969	969
Eight-Year Transition								
Cows	380	314	247	180	113	46	0	0
Calves	360	307	247	180	113	46	0	0
Yearlings Steers	180	221	267	315	363	411	444	969
Yearlings Heifers	178	221	267	315	362	411	443	0

Revenues, Costs, and Returns Over Variable Costs

The revenues, costs, and returns over variable costs (ROVC) for each operation and transition are listed in Table 2. (Average prices used in the estimates for this table are in nominal dollars, i.e., they have not been discounted.) These figures are listed to eight years so each operation can be measured against the eight-year transition to 600-pound stockers. The cow-calf-yearling operation, given average prices, has an average ROVC of $41,741 across all eight years. For a detailed description of the revenues and costs for this operation, refer to the Cow/Calf/Yearling Extension Budget (Ruff et al., 2014c). The total ROVC across eight years would be $333,928.

The single-year transition to 600-pound stockers has an average ROVC of $497,438 in the first year of operation. The ROVC is much larger in year one because of the up-front sale of all breeding livestock. In years two through eight, the average ROVC for the operation is $19,185. The total ROVC for this transition scenario for the eight-year period would be $631,733.

The largest average ROVC for the eight-year transition is $169,467, which occurs in year one. The smallest average ROVC for the eight-year transition is $19,185, which occurs in year eight once the transition to spring-purchased stockers is complete. This average ROVC is the same as in years two through seven in the single-year transition. The average ROVC for the eight-year transition increases slightly and then declines as more breeding animals are sold and more stockers added until year eight. This reflects breeding livestock sales coupled with increased yearling sales until the breeding livestock are liquidated. Overall, this transition scenario is estimated to have the highest total ROVC sum across the eight-year period, equaling $926,744.

Net Present Value

The long-term net present values (NPV) for each operation/transition are listed in Table 3. Recall that because a dollar today does not have the same purchasing power as a dollar in the future, we use net present value analysis to discount all profits to present-day values. Each number represents what the sum of the ROVC would be worth in today's dollars given the different assumed number of years the operation is in business. Given the transition includes a liquidation from cow-calf-yearling to stockers, we include a liquidation of the cow-calf-yearling operation at the end of each period analyzed to compare what a producer would have if he or she got out of the cow-calf-yearling operation altogether to what he or she would have over the same period by liquidating the cow-calf-yearling operation early on and transitioning to stockers for the remaining years.

As discount rate increases, the total NPV of each scenario decreases, as shown in Ruff et al. (2016). We use a 2 percent discount rate to represent the riskless

long-term inflation rate for estimates reported in Table 3. Net present values are shown when taxes are not included and when taxes are included. The scenarios in which taxes are included estimate taxes on ROVC. This assumes all returns over variable costs are taxable. *This would be a worst-case scenario in terms of total tax liability for the operation. Most producers would not pay this level of taxes, as other factors, such as depreciation on capital and other allowable deductions, would be used to estimate taxable income.* We do this analysis only to illustrate the nature of how tax liability impacts the transition strategies. It is important to remember that tax liabilities would likely differ across operations from what is illustrated here.

We choose to report NPV over eight years as a relevant planning period to capture the full transition over time. We also analyze the net present values for planning horizons of 20 and 30 years to show how this transition strategy would look for a rancher over a longer period of time. For the shorter periods of either 8 or 20 years, the producer, on average, would have higher average total ROVC from the eight-year transition to 600-pound stockers than from remaining with the cow-calf-yearling operation (Table 3). This is true when estimated tax liability on the ROVC is removed. The eight-year transition has an average advantage of nearly fifty thousand dollars over 20 years; however, when a worst-case scenario of full taxes paid on ROVC is estimated, that advantage is reduced to $33,847.

Overall, these numbers reflect that early liquidation creates more total income for the producer than remaining in the cow-calf-yearling operation, even though it has better income on average than the stocker operation.

As the planning horizon increases to thirty years, the better average annual income from the cow-calf-yearling operation overtakes the discounted returns for the eight-year transition to stockers. The discounted ROVC for the base cow-calf-yearling operation over that period, including liquidation of the cow herd in the last year, is $1,170,370 compared to $1,142,648. The after-tax advantage is $945,543 compared to $908,643.

These numbers suggest if a producer is planning to retire in 30 years or more, the cow-calf-yearling operation would be more profitable than the transition models. If a producer is planning to retire sooner than about 25 years (see Ruff 2013), the eight-year transition to a stocker operation would be more profitable.

What About Price Variability and Market Risk?

The numbers in tables 2 and 3 reflect earning potential assuming average prices. Producers know too well that cattle markets can be volatile. We use simulation analysis to evaluate the impact of price variability

Table 2. Revenues, Costs, and Returns Over Variable Costs for Each Operation/Transition

Operation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Cow-Calf-Yearling								
Revenues	$552,928	$552,928	$552,928	$552,928	$552,928	$552,928	$552,928	$552,928
Costs	$511,187	$511,187	$511,187	$511,187	$511,187	$511,187	$511,187	$511,187
ROVC	$41,741	$41,741	$41,741	$41,741	$41,741	$41,741	$41,741	$41,741
Single-Year Transition								
Revenues	$1,070,362	$956,724	$956,724	$956,724	$956,724	$956,724	$956,724	$956,724
Costs	$572,924	$937,539	$937,539	$937,539	$937,539	$937,539	$937,539	$937,539
ROVC	$497,438	$19,185	$19,185	$19,185	$19,185	$19,185	$19,185	$19,185
Eight-Year Transition								
Revenues	$720,099	$723,841	$779,736	$834,550	$892,352	$954,329	$948,795	$956,724
Costs	$550,632	$598,622	$649,180	$701,328	$755,463	$809,730	$881,187	$937,539
ROVC	$169,467	$125,218	$130,556	$133,222	$136,889	$144,599	$67,608	$19,185

Table 3. Net Present Values for Cow-Calf-Yearling vs. Single- or Eight-Year Transition to Spring-Purchased 600-Pound Stockers, Assuming a 2% Discount Rate and Taxes Paid on ROVC.

	Cow-Calf-Yearling	Single-Year Transition	Eight-Year Transition
NPV (No Tax)			
8 Years	$691,220	$608,566	$857,713
20 Years	$979,180	$779,806	$1,028,954
30 Years	$1,170,370	$893,501	$1,142,648
NPV (Taxes)			
8 Years	$519,825	$444,368	$660,229
20 Years	$775,673	$593,660	$809,520
30 Years	$945,543	$692,782	$908,643

on both the cow-calf-yearling and spring-purchased stocker operation once the transition is complete. On the basis of the prices used in our simulation, the cow-calf-yearling operation can expect to earn a positive ROVC about 87 years out of 100 and a negative ROVC about 13 years out of 100. The 600-pound spring purchased stocker operation can expect to earn a positive ROVC 57 out of 100 years and a negative ROVC 43 out of 100 years. We ran another simulation comparing the ROVC of two operations and found the base cow-calf-yearling operation had ROVC greater than the spring-purchased stocker operation 67 out of 100 years. Consistent with past research, the simulation results clearly suggest that there is more risk for negative and lower returns with the spring-purchased stocker operation than with the base cow-calf-yearling operation.

As noted in table 2, during the transition to the 600-pound stocker operation, the average ROVC will be larger because of the sale of the breeding livestock, and the chance for negative ROVC should be much less than for the stocker operation. We estimated another simulation allowing for price variability in our NPV analysis reported in table 3. The eight-year transition scenario has negative after-tax net present value over the 20-year simulation nearly 17 percent of the time as compared to nearly 8 percent for the baseline cow-calf-yearling operation. These percentages increase to 24 percent and 10 percent for the 30-year simulation. These percentages of negative returns could decrease if a producer were able to avoid having stockers in low-price years; however, it might not be possible to know the price situation before buying stockers. Overall, these results support the notion of the increased risk of the stockers, but the risk of a negative after-tax NPV is less for the transition scenario because of the added income from liquidation of the breeding livestock as compared to stockers only.

What About the Cost of Brucellosis?

These analyses indicate the cow-calf-yearling operation is generally more profitable and faces less risk of negative returns than the stocker operation. The numbers, however, ignore the risk producers in northwestern Wyoming have of contracting brucellosis. Brucellosis can cause abortions in cattle herds, and because of the potential threat to both animals and humans, the federal government will quarantine an infected herd up to 12 months or more. Wilson (2011) estimates the cost of a quarantine can be up to $143,000 for a herd of 400 cows. The switch to stockers eliminates this risk of loss completely, because intact breeding females are no longer on the operation. If you think you are at high risk of contracting brucellosis, it would only take one quarantine event to negate the profitability advantage of staying in a cow-calf-yearling operation rather than transitioning to stockers.

Roberts (2011) estimates the cost of alternative strategies for cow-calf-yearling operations that help reduce the risk of contracting brucellosis by reducing the chance of infected elk being in the same area as the cowherd. In addition to vaccinating your herd, a

relatively more effective means of protecting the cow-herd is to delay grazing in pastures where the risk of contracting brucellosis is high. He estimates that cost to be up to $15,000 per year. Again, these added costs reduce the profitability advantage of the cow-calf-yearling operation relative to the stocker operation, and they are not 100 percent effective in reducing the risk of quarantine.

What Does It All Mean When Considering the Potential Transition?

For the producer who desires to switch to stockers or is forced to switch because of a policy change, a number of issues will likely affect the final decision. First, our results indicate the most profitable transition strategy is to make the switch over a period of years. On average this returns an additional $150,000 more, in today's dollars, in an 8-year period than switching to stockers in a single year – even after accounting for taxes. It is important to remember, however, that stockers are less profitable and face higher risks of negative returns than the typical cow-calf-yearling operation in the northwestern portion of Wyoming.

Our analysis shows that the added income from liquidating breeding livestock and increasing yearlings until the switch is made (year eight in our analysis) provides additional income and reduces the overall risk of loss associated with the transition as compared to stockers alone. On average, our results show the producer could have more total income by transitioning to stockers over an eight-year period than by staying in a cow-calf-yearling operation if he or she plans to retire from ranching in 20 to 25 years or less. If the producer plans to stay in ranching for at least 30 years, the cow-calf-yearling operation earns more total income on average than transitioning to stockers over a period of years. This is only true, however, if the rancher never faces the cost of brucellosis infection or quarantine.

If the risk of brucellosis is relatively high for the producer, those added costs must be weighed against the profitability of staying in the cow-calf-yearling operation. Unfortunately, there is no silver bullet that cures the brucellosis issue for producers in the area and keeps them at the same level of profitability as the cow-calf-yearling operation. When considering whether to switch to stockers, a producer must weigh the profitability of the different operations and transitions with the risks of variable income and being quarantined. This decision is also affected by how long the producer plans to stay in the business and if he or she plans to pass that business along to other family members.

Important Points to Remember

- Switching to stockers over a period of years is the more profitable transition strategy.
- Cow-calf-yearling operations generally tend to be more profitable and less risky than stockers.
- More total income could be available from the eight-year transition to stockers if you are staying in the cattle business for 20 years or less. More total income could be available from the cow-calf-yearling operation if you are staying in the cattle business more than 20 years.
- Costs associated with brucellosis infection and quarantine are high.
- The switch to stockers (other than getting out of the cattle business altogether) is the only 100 percent effective strategy to negate costs associated with quarantine.
- A producer must consider the risks of infection versus profitability and income variability.
- A producer must consider the time horizon for how long he or she plans to ranch.

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