

## BLACK RIVER FARMS

*David M. Currie and Kyle S. Meyer wrote this case solely to provide material for class discussion. The author does not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.*

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Donna and Jim Green looked with dismay at the financial statement summarizing the performance of Black River Farms for the year 2016 (see Exhibit 1). Black River's cow-calf operation had experienced another year of losses. Especially frustrating was that the losses occurred despite the Greens' multiple efforts to improve the farm's efficiency, efforts that were not sufficient to overcome the decline in calf prices since 2014 (see Exhibit 3). The Greens were tired; tired of the constant work required to maintain a herd of cattle, of the vagaries of the cattle market, of struggling to earn a decent living on a farm. If the situation did not improve, the Greens faced the threat of losing the farm that had been owned by the family for three generations. While 2015 had been profitable, it had been the exception rather than the rule for many years. Prices of calves had fallen for two years, leading to losses in 2016.

### COW-CALF OPERATIONS

The cow-calf segment is the foundation of the beef cattle industry. A ranch maintains a herd of cows, each of them expected to wean a calf once a year. Like a human, the gestation period of a cow is approximately nine months. After birth, the cow nurses the calf for another six or seven months until the calf is weaned from its mother's milk. During this time, the cow enters estrus, is impregnated, and the cycle begins again. Thus, once a farm reaches a steady state of operations, a cow can produce a calf each year.

There were more than 750,000 cow-calf operations in the United States in 2007, the vast majority of them with fewer than 50 cows.<sup>1</sup> Cow-calf operators sell their weaned calves to a stocker operator or to a feedlot, where the calves are fattened before being sent to a packinghouse. The end products are the various fresh beef products such as steaks, roasts and hamburgers that are consumed by millions of people around the world.

Revenues and expenses for a cow-calf operation typically are presented on a per cow basis, as shown for Black River Farms in Exhibit 2.

<sup>1</sup> United States Department of Agriculture (April 2011) Small-scale U.S. cow-calf operations, [https://www.aphis.usda.gov/animal\\_health/nahms/smallscale/downloads/Small\\_scale\\_beef.pdf](https://www.aphis.usda.gov/animal_health/nahms/smallscale/downloads/Small_scale_beef.pdf), accessed 9/15/16.

## Revenues

As a rule, cows produce one calf per year. Female calves are called heifers. Most male calves are castrated and are called steers; those that are not castrated become bulls and may be sold or used for future breeding. Weaned heifer and steer calves are sold at prices expressed as dollars per hundredweight (cwt), which is equivalent to dollars per 100 pounds (lbs). Thus, the sale price per pound can be determined by dividing the cwt price by 100.

The average weaning weight of calves at Black River Farms in 2016 was 613 pounds. Weaned calves sold at an average price of \$148 per cwt, as shown in Exhibit 3. Prices generally follow a cyclical pattern: high prices attract producers to raise more calves, but greater supply then leads to lower market prices and producers dropping out of the market. Prices at year-end 2016 were down significantly, the second decline since an unusual peak in 2014.

## Expenses

The major expense associated with cow-calf operations is feeding the cow. A healthy cow requires a variety of forage (primarily grazed grasses), nutritional supplements and minerals so that she remains healthy and produces a healthy, marketable calf. Other expenses include veterinary fees and wages for labor, and the expenses of owning and operating the farm. Subtracting per cow expenses from per cow revenues yields the profit or loss per cow in the cow-calf operation. Exhibit 2 shows that Black River Farms lost \$34.22 per cow on its cow-calf operations in 2016.

## HISTORY OF BLACK RIVER FARMS

Black River Farms was established in the 1930s by George Shadle, Donna's grandfather, and had been in the family for more than eighty years. Although the farm was only marginally profitable during the Depression, profits increased in the 1950s and 1960s as world demand for beef increased. Donna and Jim Green had the misfortune of taking over the farm in the 1980s at a time when calf prices were in a cyclical decline. At the same time, costs of forage increased. With output prices falling and input costs increasing, profits began to decline and became losses around the turn of the century.

In the face of the squeeze on profits, Donna was forced to sell some of the land inherited from her father to generate funds to cover the farm's operating losses. Black River Farms then rented pasturage from adjacent farms to feed the cows during the eight months per year they were turned out to pasture. Donna also did what most other cow-calf operators had done: she focused on producing heavier calves at weaning, which generated more revenue when they were sold. When breeding cows, Donna selected sires based on their ability to produce faster-growing calves. Because faster growth is positively correlated with mature weight and because breeding females came from these same sires, over the years the mature weight of the Black River herd had increased substantially. Donna's experience was part of a national trend that saw average mature cow weights increase to 1350 pounds in 2005 from 1050 pounds in 1975.<sup>2</sup>

Donna had taken other measures to improve efficiency at Black River. She gave cows and calves minerals and dietary supplements to maintain health and productivity. She matched the herd's forage needs with the grass growth cycle in the pastures so that the cows obtained the best possible nutrients at the appropriate

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<sup>2</sup> "Beef Cow Efficiency, Part 1", DVD, The Cattle Show, Hot Shot Video Productions, 2008

time in the breeding cycle. She also incorporated legumes into the pastures and rotated the herd between pastures. Although these steps increased efficiency, they did not stem the losses at Black River.

### ATTENTION TO COW SIZE

One day during the winter of 2015, Donna was cutting a round bale of hay to feed the herd when a thought occurred to her: some of the cows were bigger than others. There might be a relation between the weight of the cow and the weight of the calf it produced. Was it possible that a larger calf was not “worth” what it took to support a larger cow? Because of this idea, she decided to use the 2016 breeding cycle to measure the weight of each cow and the weaning weight of each calf it produced. Perhaps if she had numbers, she might be able to analyze the question of appropriate cow size and manage accordingly.

Donna divided the herd into five weight groups. By coincidence, the 50 head fell into groups of ten around each weight group. The lightest group of cows averaged 1000 pounds, while the heaviest group averaged 1400 pounds. She prepared a table summarizing the average weaning weight of the calves produced by the cows in each weight group (see Exhibit 4).

One night a few months later, Donna and Jim were watching The Cattle Show on RFDtv, which featured a discussion about cow size. Donna wrote down several points that she thought might be important:

- We expect a cow to wean a calf close to 50 per cent of her mature weight every 365 days.
- A key driver of direct costs is the mature weight of the cow. The heavier the cow, the higher the forage, supplement and mineral costs she incurs.
- Experiments at agricultural extension services had recently shown that, on a yearly basis, a heavier cow consumes 547.5 pounds of additional dry matter, 13.56 pounds of additional supplements, and 7.29 pounds of additional minerals for each 100 pounds of additional weight.<sup>3</sup>

Over the next few weeks, Donna and Jim discussed the implications of what they learned from The Cattle Show. One point they were not certain about was the amount of dry matter that their cows consumed. Because cows were in pasture for a portion of the year, it was not possible to determine precisely the quantity of grass they consumed. However, Donna found that it was possible to estimate the amount of dry matter that would be equivalent to a number of acres of pasture. (Dry matter is feed, such as hay, without water. Because grasses consumed in pasture contain water, the weight of hay from pasture must be adjusted to remove the weight of the water. The result is dry matter equivalent. A round bale of dried hay is used to feed cattle during the periods when they cannot be fed sufficiently on pasture.) Donna recorded the amounts of dry matter (see Exhibit 5) and supplements and minerals (see Exhibit 6) consumed by each of the weight classes during the year.

Donna and Jim also visited their accountant to find out what the terms driver and direct cost meant. Their accountant explained to them that *drivers* are the forces that determine revenues and expenses in the cow-calf operation. *Direct costs* are expenses that can be attributed to a specific driver, such as the number of cows or the weight of a cow. Thus, labor was a direct cost that was determined by the number of cows, which was the driver for that expense.

According to the accountant, the driver for expenses is the number of cows. Consequently, financial statements such as Exhibit 2 are prepared by allocating expenses on a per cow basis. However, this interpretation did not make sense to the Greens because it did not include Donna’s observation about cow

<sup>3</sup> “Beef Cow Efficiency, Part 1,” DVD, The Cattle Show, Hot Shot Video Productions, 2008.

size, which was mentioned as an absolutely critical driver on The Cattle Show. Donna and Jim wondered if it was possible to reconcile their observation about weight with the per cow financial statement.

## THE DECISION

Now Donna and Jim were seated at the dinner table, discussing numerous issues:

- What was the appropriate cow size for their herd?
- Which approach best measured the appropriate size: weaning a calf that is 50 per cent of the mother's weight, or comparing the value of a calf to the cost of maintaining the cow?
- What were the drivers in a cow-calf operation? Is the revenue-expense calculation (see Exhibit 2) clear regarding drivers?

**Exhibit 1****INCOME STATEMENTS, 2015 AND 2016 (US\$)**

	<u>2015</u>	<u>2016</u>
Revenues	59,155	45,362
Variable expenses	<u>41,090</u>	<u>32,374</u>
Contribution margin	18,065	12,988
Fixed expenses	<u>15,434</u>	<u>14,699</u>
Net income	<u>2,630</u>	<u>(1,711)</u>

Source: Company files.

**Exhibit 2****REVENUES AND EXPENSES PER COW, 2016 (US\$)**

Revenues per cow per year	
Sale of calves	907.24
Costs per cow per year	
Pasturage rental	122.72
Dry matter	228.33
Supplements	63.18
Minerals	51.25
Breeding	78.00
Labor	71.50
Veterinary	32.50
Marketing	20.68
Utilities & machinery	117.42
Repairs	10.40
Legal & accounting	36.36
Miscellaneous	7.80
Depreciation on facilities	11.02
Interest on equipment	48.63
Insurance	<u>41.67</u>
	941.46
Net revenue per cow per year	-34.22

Source: Company files.

**Exhibit 3****PRICES OF CALVES, 2010-2016, US\$/CWT**

	<u>\$/cwt</u>
12/2016	148.00
/2015	193.00
/2014	303.00
/2013	197.00
/2012	163.00
/2011	157.00
/2010	128.00

Source: USDA, Agricultural prices, dates indicated, <http://usda.mannlib.comell.edu/MannUsda/viewDocumentInfo.do?documentID=1002>, accessed 4/14/17.

**Exhibit 4****CALF WEANING WEIGHTS AS PER CENT OF COW WEIGHTS**

<u>Average cow weight (lbs)</u>	<u>Average calf weaning weight (lbs)</u>	<u>Calf weaning weight as Per cent of cow weight</u>
1,000	585	58.5%
1,100	611	55.5%
1,200	617	51.4%
1,300	622	47.8%
1,400	630	45.0%

Source: Company files.

**Exhibit 5****ANNUAL DRY MATTER (DM) COST PER COW, US\$**

<u>Cow weight</u>	<u>Daily DM intake (lbs)</u>	<u>Annual DM intake (lbs)</u>	<u>Dry Matter (DM) cost</u>		<u>Total DM cost (US\$)</u>
			<u>grazing, 2/3 @ \$0.013/lb</u>	<u>hay, 1/3 @ \$0.52/lb</u>	
1,000	21.0	7,665	66.43	132.86	199.29
1,100	22.6	8,249	71.49	142.98	214.47
1,200	24.1	8,797	76.24	152.47	228.71
1,300	25.6	9,344	80.98	161.96	242.94
1,400	27.0	9,855	85.41	170.82	256.23

Source: Company files.

**Exhibit 6****ANNUAL SUPPLEMENTS AND MINERALS COST PER COW, US\$**

<u>Cow weight</u>	<u>Supplements</u>	<u>Minerals</u>	<u>Total</u>
1,000	52.65	42.71	95.36
1,100	57.92	46.98	104.90
1,200	63.18	51.25	114.43
1,300	68.45	55.52	123.97
1,400	73.71	59.79	133.50

Source: Company files.