

KEY SUCCESS FACTORS IN COW CALF ENTERPRISE PROFITABILITY

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Abstract

This paper is an investigation of key success factors for determining profitability in the cow calf enterprise using the AgriProfits report indicators for Alberta and Saskatchewan producers. Profitability is defined as return to equity on a per pound calf weaned basis.

Using the AgriProfits key indicators; total production costs, value of production and total labor hours per cow were determined to be closely related to profitability of the cow calf enterprises, having R^2 values of .639, .406, .267 respectively. Other factors closely related to profitability were winter feed costs and fixed costs. Least related are; death loss of calves, weight per day of age and weaning rate.

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Background

A major challenge facing Alberta and North American cow calf producers is the development, understanding, and use of their own farm production cost and returns information. The effectiveness of budgeting, planning and risk management activities increases dramatically for producers who:

- have their own farm and enterprise business analysis, and
- are comfortable with these basic procedures.

Cycle-by-cycle, the primary beef production industry becomes increasingly competitive from a cost control point of view. For the Alberta industry to meet its full potential, it is critical for producers to use their “own farm facts” in making knowledgeable business management decisions.

As producers develop their own management information, they are asking questions about how they can become more profitable using business analysis information. The cow calf industry is truly a commodity business. Producers are recognizing that they are price takers and, as such, are having their margins pressured with every production cycle.

Kent Harrison Brand Manager from the Cargill packing plant at High River packing plant estimates their commodity vs. branded beef program to be 95%-5% of the total beef kill. They (Cargill) are targeting 90% - 10% for the near term with an 80%-20% in the medium term outlook (5- 10 years). With this trend in the packing industry and with the feedlot business being driven by margins, the cow calf sector will also likely remain in the commodity stream. Long-term profitability for the cow calf producer will be driven by the final product demand and the drive to control costs.

For this paper, the measure of success by return to equity per pound of calf weaned will be used. The return to equity provides a method to analyze a return to the owners of the business. The business owners then have at their disposal the return to pay for reinvestment, family withdrawals (family living) or any other draws that are not related to that particular enterprise. By using return to equity we obtain the residual of the business revenue and expenses that are left to the owners of the business for their profit as well as any principal payments.

The choice of per pound weaned reflects the concept of unit cost of production. Each cow enterprise is producing a pound of calf as their output. The choice of weaned is because at this point in time (weaning) the cow calf enterprise can be separated from other aspects of the beef business. This also provides us with a natural separation of the cow calf enterprise with any other enterprises on the farm. By also choosing weaning we then have a way to compare each firm using a common and standard time frame in the production cycle.

Data Description, Methodology

The AgriProfits Survey program is a program initiated and conducted by the Economics Unit of Alberta Agriculture Food and Rural Development (AAFRD). The program is used to gather farm level data that is used for policy and program design work. In the last 3 years Saskatchewan Agriculture and Food has used the AgriProfits approach to methodology and data collection. As such, the data set for this paper will include Alberta and Saskatchewan producers. The data set is drawn from the last three completed fiscal years, 1998-2000. The following table provides a breakdown of the data set that we will be using in this paper.

Table 1 Data Source Breakdown by Year and Province

	Alberta	Saskatchewan	Total
1998	33	30	63
1999	68	48	116
2000	57	14	71
Total	158	92	250

Statistical regressions were calculated to determine if correlations and predictions of profitability (Return to equity per pound of calf weaned) could be made with reliability based on selected AgriProfits measuring sticks (key success factors). Each measure was evaluated on its own merit. Combinations or co-linearity is not considered in this study's analysis.

Table 2 Key Data Descriptors

	Minimum	Maximum	Mean
Cows Wintered	13	596	143.01
Growth (wean wt)	318.50	809.85	566.04
Open Cow %	0.00%	32.35%	7.73%
Length of Calving (days)	33	264	97.89
Death loss of Calves (%)	0.00%	11.54%	2.25%
Wean Weight as % Mature Cow Weight	25.11%	67.49%	44.61%
Total Production Cost / Pound Weaned	\$0.64	\$3.24	\$1.20
Return to Investment	-0.3734%	0.3448%	0.0615%
Total Investment / Cow	522.77	5122.38	2032.62
Pounds Weaned / Cow Wintered	245.00	832.29	537.39
Value of Production / Cow Wintered	183.30	1266.17	720.12
Gross Margin / Pound Weaned	-1.06	1.39	0.39
Return to Equity / Pound Weaned	-2.13	1.10	0.15
Return to Equity / Cow Wintered	-903.44	548.47	87.26

Data Analysis

As mentioned previously, there are two basic avenues to manage cow calf enterprises; those that are related to the production and production inputs, and those related to the financial structure of the enterprise. Using linear regression of these indicators to the profitability measure of return to equity per pound of calf weaned, provides us with the evaluation of “can this measuring stick be used as a predictor of profitability”? If so, is it a reliable one and what might the variation be when using this predictor. Using the regression statistics of Standard Error, R, R squared and adjusted R squared, we will be able to answer these questions.

While there are many ways to manage these indicators there is no right way and producers need to consider their own management skill levels, resources available to them and match these production practices to their individual situations and business goals.

Physical Production Indicators

The AgriProfits program produces a report that provides analysis for the following measures.

- Mature cow weight
- Breeding season days
- Growth
- Open
- Length of calving period
- Death loss of calves
- Calf Weight per day of age (WPDA)
- Wean weight as % mature cow weight
- Pounds weaned per exposed females
- Pounds weaned per cows wintered
- Percent calved in the first two cycles
- Percent conception rate - bred / exposed
- Percent calving rate - live births / bred females
- Percent wean rate weaned / live birth
- Percent calf crop weaned / exposed

These measures provide some indication of how well the cow calf enterprise is performing in terms of its production and production efficiency. Mature cow weight gives us a feel for how physically large the cows are. Often there is belief that big cows produce big calves. It also provides the comparison for interpreting the feed and grazing resources consumed. This comparison also applies to the calf weight per day of age indicator. Producers will wean calves at different ages and such by using the standard of weight per day of age a closer comparison of like animals and performance. The data set did not go deep enough on some indicators for further evaluation. More research into specific management

practices needs to be done in order to separate out practices that increase any one or combination of these factors.

There are production benchmarks referred to as the GOLD indicators. GOLD standing for growth, open cows, length of calving season, and death loss of calves have in the past been used as benchmarking criteria for herd performance. The benchmarks used for these production targets are growth to be measured as a percentage of pounds weaned per mature cow weight being 45% or better, open cows to be less than 5%, length of calving to be determined as less than 65 days, and calf death loss to be less than 2% (Alberta Beef Herd Management Binder, Alberta Agriculture Food and Rural Development 1985)

Other measures include pounds weaned per exposed female and pounds weaned per cow wintered provides for some comparisons of input / output relationships based on the physical production unit per cow.

The other indicators are used for evaluating the fertility and reproductive performance of the herd. A tighter calving period, a higher conception rate, a higher calving rate, and a higher calf crop per exposed all indicate a higher level of reproductive performance.

With these physical indicators the range of statistics showed no large indication that any of these were strongly related to profitability of the cow calf enterprise. The most influential indicator was pounds weaned per cow exposed. This indicator could only explain 5.7% (R^2 of .057) of the variation in profitability. The next most influential indicators were percent calf crop, and pounds weaned per cows wintered with R^2 of .039 and .037. On the other extreme calf death loss could not be related to profitability with a R^2 of 0.00 and an adjusted R^2 of -.004. None of the physical production factors were of any great help in explaining the variability of profitability.

Input Indicators

The AgriProfits program produces a report that provides analysis for the following input measures.

- Animal unit months per cow wintered
- Pasture cost per cow wintered
- Winter feed cost per cow wintered
- Feed, bedding, pasture cost per cow wintered
- Days on aftermath
- Days on pasture
- Days on feed
- Labor hours per cow wintered
- Exposed females
- Cows wintered

Cows need to consume feed whether that is delivered feed, grazing pasture, or grazing aftermath. (Aftermath may be defined as crop residues, typically it involves grazing cereal crop stubble or hay land after the crop has been harvested.) The use of the total winter feed, bedding and pasture also allows for the comparison of the entire feed resource the cow needs for its production. The use of animal unit months provides the ability to compare different grazing qualities based on the cow unit as compared to the physical grazing resource (acres). The measures of days on feed, pasture, and aftermath allow for the comparison and rationalization of different feed systems. Typically a producer that has a high number of days on feed will also have a high winter feed cost, and conversely producers with a large grazing cost will likely have a lower winter feed expense (the reason to use a sum of feed bedding and pasture rather than the separate components).

Labor use on farms is of particular interest especially for smaller and medium farms. The labor indicator for some farms provides a benchmark to allocate to other enterprises (if labor is a restricting factor) to possibly more profitable enterprises.

The physical number of females exposed and wintered provides the comparison of herd size. There is the belief that the larger herds are more profitable and are able to capture economies of scale over smaller herds.

In this set of indicators the strongest relationship with profitability (return to equity per pound of calf weaned) was labor hours per cow with a R^2 of .267 or in other words 26% of the variation in profitability could be related to labor hours. The next two strongest are winter feed cost and cows wintered with R^2 of .193 and .106 respectively. Contrasting the least reliable indicators, days on aftermath and pasture cost per cow wintered were the least related to profitability with R^2 of .038 and .004 respectively.

Financial Indicators

Having dealt with the production and input factors that would leave the financial indicators that include the following:

- Value of production (VOP) per cow wintered
- Total production costs per pound of calf weaned
- Fixed costs per cow wintered
- Gross margin per pound weaned
- Total labor cost per cow wintered
- Total investment per cow wintered
- Operating expense ratio
- Interest cost per total investment
- Pounds weaned per total investment

As mentioned earlier the components of the profitability equation equal total revenue (value of production) minus total costs (total production costs). These

two indicators are calculated on a per pound weaned reflecting the literature review of unit costs of production being pounds of weaned calf. The indicator of fixed costs is included as a method to evaluate the overhead of the cow calf enterprise. Typically these are referred to as machinery and buildings but include other fixed costs as identified in Appendix 2.

Total investment per cow is provided as a method to help identify those enterprises and firms that may have more invested than others. Interest cost per investment provides the producer with an indicator of his debt load (through interest payable).

Operating expense ratio is included to help individual firms understand and evaluate what proportion of each dollar of revenue is used for operating expenses. Producers can use OER as a measure of short-term ability to meet operating production costs.

Gross margin is used to help producers understand what is left over to cover non-cash costs in the enterprise. Pounds weaned per investment combines production with a financial indicator to provide us with an investment - production efficiency measurement.

In this group of indicators (which has the strongest indicators the most closely related to profit) gross margin per pound weaned, operating expense ratio, and total production costs have the strongest relationships with profitability with R^2 values of .894, .726, and .639 respectively. The least related in this group is the interest per total investment ratio with an R^2 .011. Interestingly, this group (even the lowest related) has higher relationships than any of the production indicators.

Success Indicators

Other measures that the AgriProfits reports provide are:

- Return to equity per cow wintered
- Return to investment

While these measures provide different measures of success and have different interpretations or applications they do provide extra information for the producer. Return to Equity per cow wintered has an R^2 of .948 and Return on Investment has an R^2 of .852. Both highly related to return to equity per pound weaned. It is not surprising that either of these two indicators is related to Return to equity. Pounds weaned is the denominator in one and cows wintered is the denominator in the other. In return to investment, the cost of capital interest is included in the denominator.

Summary

In summary there are several indicators that have some relation to profitability and some that seem to have no measurable ability to predict or explain the variation in profitability of cow calf enterprises. The following tables identify (arbitrarily divided into thirds) the highly related, moderately related and those

with little relation to profitability as defined by return to equity per pound of calf weaned.

Table 3 AgriProfits Indicators By Degree of Relationship to Profitability

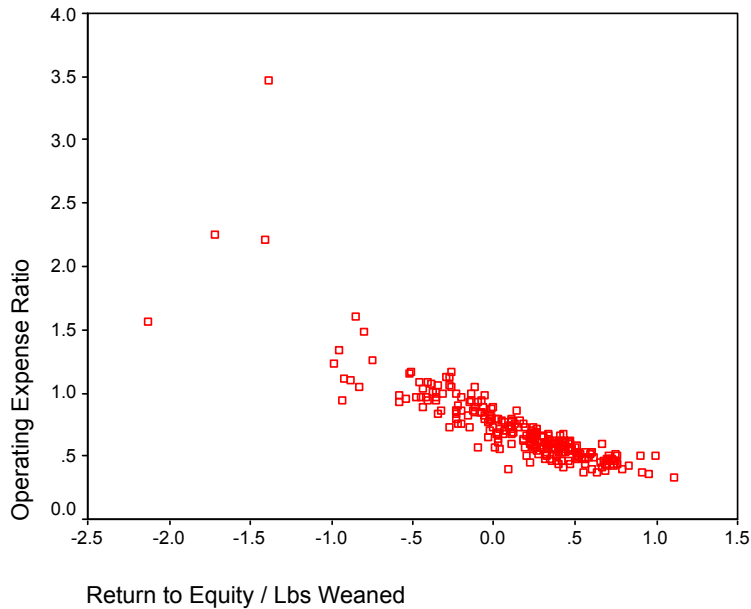
High relationship	Moderate relationship	Low relationship
Return to Equity per Cow Wintered	Females Exposed	Open Cow Percent (%)
Gross Margin per Pound Weaned	Feed Bedding Pasture per Cow Wintered	Length of Calving (days)
Return to Investment	Pounds Weaned per Total Investment	Length of Calving (days)
Operating Expense Ratio	Days on Feed	Wean Weight as Percent of Mature Cow Weight (%)
Total Production Cost per Pound Weaned	Animal Unit Months per Cow Wintered	Conception Rate (%)
Value of Production per Cow Wintered	Pounds Weaned per Cow Exposed	% Calved in First 2 Cycles
Labor Hours per Cow	Days on Pasture	Breeding Season (days)
Total Labor Cost per Cow Wintered	Calf Crop (%)	Interest per Total Investment
Fixed Cost per Cow	Pasture cost per Cow Wintered	Days on Aftermath Grazing
Winter Feed Cost per Cow Wintered	Pounds Weaned per Cow Wintered	Mature Cow Weight
Total Investment per Cow Wintered	Calving Rate (%)	Wean Rate (%)
Cows Wintered	Growth (wean weight)	Calf Weight Per Day of Age
		Death Loss of Calves (%)

Conclusions

There are several measures that are results of different factors or different combinations of factors. The previous example of return to equity per cow being strongly related to return to equity per pound weaned provides this concept.

There are indicators that the producer has no way of managing or controlling directly, (such as return to equity per cow) but there are indicators that the producers can manage or have some influence in. If we look at table 3 using the highly related column list of indicators, the first one producers can have some influence is operating expense ratio. This is the equation of dollars spent on operating costs (excluding interest and depreciation) divided by total value of production. While the producer may not be able to manage this one directly, what the indicator tells us is that this ratio is highly related to profitability. If we examine the scatter graph we can infer through general tendency that as the operating expense ratio increases the lower the profitability of the cow calf enterprise.

Figure 1 Operating Expense Ratio Vs Return to Equity per Pound Calf Weaned



If we look at the next indicator total production cost again this indicator is highly related, though some may argue that producers cannot manage total costs. If we examine the following scatter graph of the data set we can see there is a general linear relationship - that as we reduce total costs profitability increases. There is potential to manage for reducing these total costs one by one.

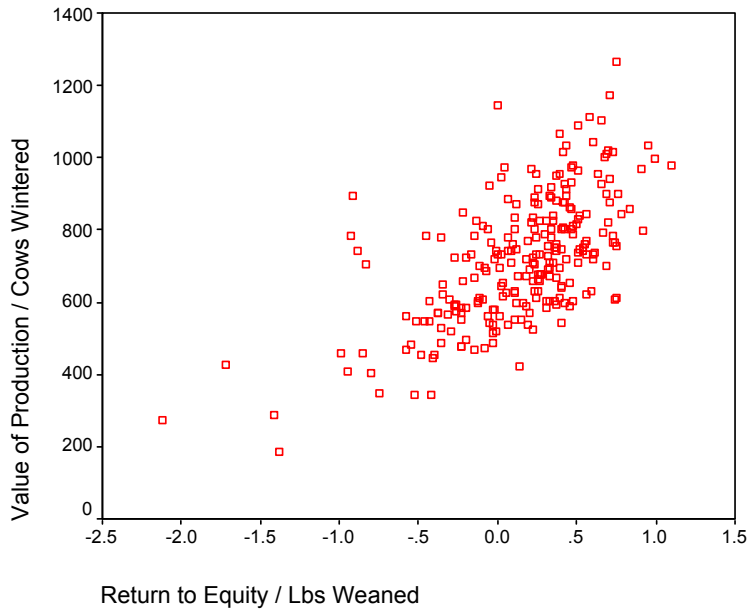
Figure 2 Total Production Costs Vs Return to Equity per Pound Calf Weaned



The third indicator to examine is the Value of Production. While this indicator is a function of price (market price of calves) times the weaned calf weight there still

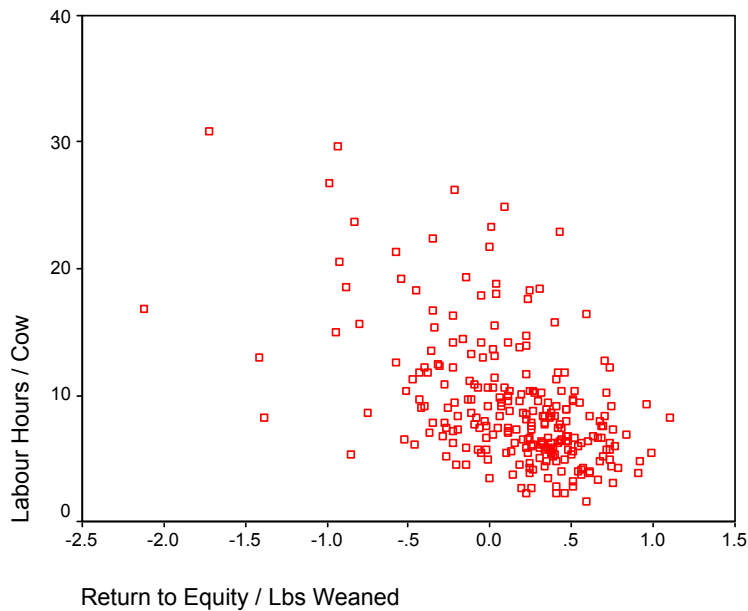
is a strong relationship. The following chart illustrates that as VOP increases so does profitability.

Figure 3 Value of Production Vs Return to Equity per Pound Calf Weaned



The next most related to profitability is one that is quite interesting. The chart for Labor hours per cow suggests that the more hours spent on the cow calf enterprise the less profitable the enterprise may be. Even though the relationship is much looser for this indicator it is one of the pure (not interrelated) indicators we have.

Figure 4 Labor Hours Vs Return to Equity per Pound Calf Weaned



In conclusion there are several indicators within the AgriProfits database that provide strong relationships or predictors of profitability (as measured as return to equity per pound of calf weaned). Several of the indicators are combinations of others indicators or outcomes of managing both the physical and financial aspects of the cow calf enterprise.

There is no one key success factor that can be managed directly or purely that will lead to profitability in the cow calf enterprise. There is however the opportunity to use total production costs as a management indicator for profit. Reducing total production costs should lead to increasing profitability. Jones (2000) suggests that with feed and capital expenses the two most prominent expenses (that make up 76% of the total cost per cow) are arguably the most important to concentrate on. In the AgriProfits data winter feed, bedding and pasture represents \$336 of the \$632 total cost of production (averages). Total fixed costs represent \$79.77 per cow making it the third largest cost per cow behind feed, bedding, pasture and total labor cost. As such to reduce total production cost the first three areas to consider are winter feed bedding combinations, total labor costs, and total fixed costs. Evaluating these to look for potential reductions should be the first step in increasing profitability.

On the other end of the profitability equation is the value of production. It may also indicate a key success factor for cow calf profitability. Value of production is derived by market value price multiplied by pounds weaned. As stated earlier in the paper, cow calf producers are typically price takers and typically are price competitive, as such the real opportunity to increase value of production is increase pounds weaned. It is interesting that none of the traditional production indicators were able to show strong relationships to profitability but when combined with price shows such a strong relationship exists.

By taking the difference between the high cost and low cost group and converting it to a percentage over the low cost number we can gather a relative measure on how far apart the two groups are. For example using cows wintered – the low profit group average was 87.18, the high profit group was 187.45. The difference of 100.12 which divided by 87.18 gives us 115%. Table 4 presents the largest 10 differences.

Table 4 High and Low Profit Group Means

	High Profit Group Mean	Low Profit Group Mean	% Difference Between Groups
Cow Wintered	187.45	87.18	115%
Females Exposed	204.71	95.68	114%
Value of Production / Cow Wintered	901.81	520.90	73%
Interest / Total Investment	0.0036	0.0105	-65%
Operating Expense Ratio	0.4516	1.2194	-63%
Fixed Cost / Cow	52.17	120.85	-57%
Labor Hours / Cow	6.67	14.63	-54%
Total Labor Cost / Cow Wintered	66.59	145.28	-54%
Total Production Cost / Pound Weaned	0.9764	1.8259	-47%
Open Cow %	6.38	11.23	-43%

In general the high profit group was a larger herd size, had higher value of production, had lower fixed costs per cow, used less labor per cow, and had less interest expense per dollar invested (suggesting lower debt).

Comparing this list to the factors that are closely related to profitability we see that value of production, total production costs, labor, and fixed costs are listed in both analysis. It is interesting that open cow % was identified as a large difference among low profit and high profit herds but open cows % showed very little explanation of the differences in profitability. Looking further there are 4 themes or areas that costs can be grouped, the feed bedding pasture combination, labor cost, fixed cost and other operating costs. While considering all the AgriProfits indicators concentrating on the feed bedding and pasture combination would likely provide the greatest economic return. Reducing fixed costs and especially reducing the debt associated with unnecessary fixed costs will also increase profitability. Reducing total costs should be the ultimate goal of cow calf producers.

This paper also confirms the previous findings that the cow calf enterprise's key to success is to reduce cost of production, based on the assumption that cow calf producers produce a commodity in a seller being a price taker marketplace. This suggests that if producers want to remain in the commodity business that they pursue the least cost strategy, or if they want to get out of the commodity business they should follow a product differentiated strategy to remain successful in the long term.