



# Cow-Calf Standardized Performance Analysis (SPA)<sup>1</sup>

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What is now known as Integrated Resource Management (IRM) began as Integrated Reproductive Management in the early-to-mid 1980s. It was later broadened to recognize the interrelated nature of all production, marketing, and financial decisions. With industry support, the National Cattlemen's Beef Association commissioned Texas A&M University to develop computer software to begin addressing the management information needs of the IRM concept. Standardized Performance Analysis (SPA) was developed with input from National Cattlemen's Beef Association staff, cattle producers and educators. This fact sheet discusses the key components of and the performance statistics generated by cow-calf SPA Software and their application in making decisions within the IRM framework.

With Cow-Calf SPA, the cow-calf enterprise is isolated within the whole farm or ranch so its financial performance can be evaluated. Production and financial data are integrated into key performance measures. In a diversified operation, it may be difficult to accurately identify all costs and allocate them to different enterprises (cow-calf, stockers, wheat, grain sorghum). However, it is important to be as thorough as possible and consistent from year to year so that data is realistic and comparisons are valid.

## What is SPA?

SPA is not an individual cow performance or selection system, nor is it a record keeping system. SPA is an analytical tool, providing performance and cost reference points for the individual farm or ranch. In addition, if data are submitted to the national database, comparisons can be made with other herds for a given fiscal year.

With Cow-Calf SPA, the cow-calf enterprise is isolated within the whole farm or ranch so its financial performance can be evaluated. Production and financial data are integrated into key performance measures (Figure 1). Sample SPA production and financial summary statistics are shown in Table 1.

Financial and production data may be maintained either in handwritten record systems or in computerized systems. This information is then summarized for use in SPA. In a diversified operation, it may be difficult to accurately identify all costs and allocate them to different enterprises (cow-calf, stockers, wheat, grain sorghum). However, it is important to be as thorough as possible and consistent from year to year so that data is realistic and comparisons are valid.

## Reasons for Completing a SPA Analysis

Ranchers often get caught up in day-to-day activities and fail to assess the ranch's overall financial or physical conditions and ongoing performance. Managers may even rely on tax returns for information about how the business is doing financially. Tax returns are seldom a reliable indicator of overall financial performance. Disastrous profitability problems can go undetected for years if Schedule F tax forms serve as the sole source of information about ranch financial performance. SPA analysis can assist the farm manager in:

- Determining the profitability of the ranch.
- Identifying areas where the ranch business has excelled, as well as opportunities for improvement.
- Making more informed decisions relative to marketing, investment, and production.
- Formulating goals and monitoring progress toward goals.
- Comparing the ranch investment performance to other alternatives.
- Developing employee incentive programs.
- Monitoring and controlling costs.
- Establishing the competitiveness of the total business, as well as individual enterprises.
- Evaluating present resource use and identifying areas for change.
- Meeting information needs of multiple owners, lenders, and/or advisors so that their knowledge and skills are more effectively used.

In addition, a great deal of personal satisfaction and reward is gained by the increased understanding of the business. A warning: one year's SPA analysis will not allow a producer to do all of the above. With one SPA analysis, the producer builds a base for better management decisions and

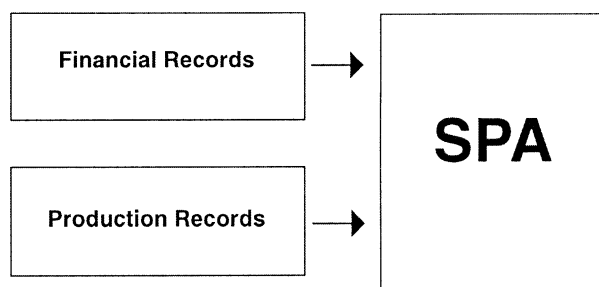


Figure 1. Building Standardized Performance Analyses.

<sup>1</sup> Revised from earlier versions by Damona Doye and Sally Northcutt, former beef breeding specialist, OSU and James McGrann, Extension Economist Emeritus, Texas A & M University.

**Table 1. Financial and Production Performance for TX/OK Cow-calf Producers.**

<i>SPA Performance Measure</i>	<i>Top 25%</i>	<i>Second 25%</i>	<i>Third 25%</i>	<i>Low 25%</i>	<i>Average</i>
Total Raised/Purchased Feed Cost (\$/cow)	\$87	\$97	\$115	\$106	\$102
Total Grazing Cost (\$/cow)	85	100	88	134	102
Total Pre-tax Costs (\$/cow)	428	466	516	752	540
Net Pre-Tax Income (After Withdrawals) (\$/cow)	156	22	-73	-296	-46
Percent Return on Enterprise Assets (ROA)					
Cost Basis	8.0%	2.4%	-3.1%	-7.8%	0.1%
Market Value	6.1%	2.1%	-2.5%	-5.7%	0
Break-even Economic Cost of Weaned Calf Production (\$/cwt) <sup>1</sup>	93	110	125	191	129
Total Investment per Breeding Cow (Cost Basis, \$/cow)	\$3,153	\$2,193	\$3,003	\$5,440	\$3,423
Pregnancy Percentage (based on pregnancy tested herds)	89.7	88.6	88.6	88.7	89.0
Calving Percentage	83.8	85.3	82.9	83.0	83.8
Calf Death Loss	2.4	2.1	2.4	4.3	2.8
Weaning Percentage	84.0	83.3	80.5	79.0	81.8
Average Weaning Weight, lb.	537	531	513	515	525
Pounds Weaned per Exposed Female	453	443	417	410	431

<sup>1</sup> Economic costs include the opportunity cost of land, raised feed and equity capital. Land opportunity cost, for example, is the estimated rental rate that would be paid for owned land. Opportunity cost of capital is the rate of return that one would expect to earn on that capital in an alternative investment.

improved profitability, and new ideas for record keeping are formed. With several years of analyses, the producer can monitor improvement in financial and production statistics to verify progress made and get a truer picture of the ranch's performance and potential. Accurate financial and production records are essential for the SPA analysis.

## Production Information Required

Many producers already collect much of the necessary production information: descriptive, marketing, production, and reproduction data. Fall and spring calving seasons should be evaluated separately in two SPAs for an operation. More specific requirements are outlined below.

### Descriptive and Marketing Data

- Descriptive information about the farm or ranch includes details about the size of the herd. The number of breeding cows inventoried at the beginning of the fiscal year includes mature cows as well as heifers of breeding age.
- Beginning and ending dates for the various production seasons are needed: breeding, pregnancy testing (if conducted), calving, and weaning dates. Data for calves weaned in the fiscal year of interest are used in the SPA.
- The number of grazing and raised feed acres (owned and leased land) used by the cow-calf enterprise are itemized by forage type. The market value of raised feed that is fed during the fiscal year is used. Also, the quantity of

feed that is fed to breeding cows during the fiscal year is needed.

- Production and market values are entered for all weaned calves including market calves, retained ownership calves, and replacements. A value is assigned based on current market price and net pay weight.
- Value of cull sales (cows and bulls) are entered for the year.

### Production and Reproduction Data

The key information needed for this section is the number of females exposed for breeding. Number of exposed females is adjusted for various transfers of females throughout the production cycle. The adjusted number of females exposed is used for many of the performance measures. Additional data needed includes:

- Cow and calf death losses.
- A count of all calves weaned (steers, heifers, bulls).
- Pregnancy testing data and the within-year calving distribution (optional).

Reproduction performance measures based on exposed females include: calving percentage, calf death loss, calf crop or weaning percentage, calf death loss based on calves born, pregnancy percentages, pregnancy loss percentage, female replacement rate percentage, and calving distribution.

Production performance measures include: average age at weaning (months), actual weaning weights averaged by steers/bulls, and heifers, and pounds weaned per exposed female.

In addition, the grazing and raised feed acres and feed fed measures are summarized.

Accurate cattle inventory records for the fiscal year analyzed are essential. Inventory items are necessary for the breeding, pregnancy testing (optional), calving, and weaning sections of SPA.

## Financial Information Required

Financial data required includes: descriptive, marketing, opportunity cost and financial statements. The financial information required conforms with recommendations of the Farm Financial Standards Council. Descriptive data identifies the farm, its geographic location, enterprises included in the operation, and the fiscal year for which the analysis is being conducted. Marketing data documents predominant methods for selling and pricing livestock, for example, cash price at auction or contract price with feedlot. The opportunity cost section is used in estimating economic costs associated with non-real estate equity where the opportunity cost is the value of the resource in its next best alternative use, for example, the three-month-treasury bill rate.

Most of the detailed information required in SPA comes from ranch financial statements. Two balance sheets listing all that is owned and all that is owed are required, one for the beginning and one for the end of the accounting period. Both cost and market values are needed for all assets listed in the balance sheet. The cost basis of assets is the book value (original cost minus accumulated depreciation); market value is the value of the asset at the time the balance sheet is developed. An accrual income statement is also needed. This can be developed by using a cash flow statement and accrual adjustment information, including gains and losses on sales of breeding livestock (purchased and raised), changes in inventories (livestock, feed, etc.), updated depreciation schedules (machinery, livestock, buildings and improvements), cattle sales and transfers summary for the fiscal year, loan repayment schedule (principal and interest payments), and IRS tax forms. Both the balance sheet and the income statement entries require the user to allocate the appropriate percentage of each item to the cow-calf enterprise.

The most important attribute of all data entered is that it be as accurate and complete as possible. Any assumptions made should be documented so that future analyses can be compared appropriately.

**Note:** Other OSU publications may be helpful in developing financial statements and accumulating the data needed for a SPA analysis. See OSU Extension Fact Sheets AGEC-571, "Developing a Cash Flow Plan" and AGEC-572, "Developing a Balance Sheet." For information on financial record keeping alternatives, see OSU Extension Fact Sheet AGEC-302, "Information Systems for Oklahoma Farmers." For information on how to maintain farm financial records with Quicken, a commercial record keeping software program for home or business, contact the Department of Agricultural Economics, Oklahoma State University, Stillwater, OK 74078-0505 or see <http://www.agecon.okstate.edu/quicken>

## SPA Results

The summary reports generated by SPA include measures of both financial and economic performance expressed in a

variety of ways, for example, per breeding cow or per hundredweight of calf weaned (Table 1). Some sample statistics generated on a per breeding cow basis include:

- Investment per breeding cow.
- Debt per breeding cow.

Sample statistics calculated on both a per breeding cow and per hundredweight of calf weaned include:

- Total raised/purchased feed cost.
- Gross cow-calf enterprise accrual revenue.
- Total cow-calf enterprise operating cost.
- Total financing cost and economic return.
- Net income.
- Percent return on enterprise assets (ROA).
- Unit cost of production or economic break-even price.
- Rate of economic return on owned real estate investment.

Production and financial measures are calculated using standardized guidelines to assist producers in making comparisons over time. The SPA measures allow producers to document existing practices and their impact on performance. The rigor associated with completing an analysis may result in an overhaul of record keeping practices, and result in greater discipline with respect to keeping those records. Because regional averages for statistics in reports are available, producers will have a yardstick by which to measure their competitiveness.

## SPA Production and Reproduction Measures

The evaluation of reproductive efficiency requires analysis over an entire production cycle. The cycle begins when the females are exposed at the start of the breeding season; it ends when the calves which were conceived during the breeding season are weaned. Production cycles will overlap since females are exposed prior to weaning a calf from the previous cycle. When reporting reproductive efficiency measures, the analysis applies to the year that the calves are weaned. For example, the data for 2010 would be based on the number of females actually exposed in 2009 in a spring calving herd.

## Pregnancy Percentage

Pregnancy percentage is an indicator of breeding performance in the herd. This measure has more meaning if it is kept by female age group since rebreeding may be a problem for certain age groups. Pregnancy percentage may also indicate the adequacy of the nutritional program, since reproduction is influenced by nutrition.

**Pregnancy Percentage** = (Number of Females Exposed that are Diagnosed as Pregnant) ÷ (Number of Females Exposed That Are Pregnancy Tested) x 100

Accurate computations require the following adjustments to the number of females actually exposed during the breeding season:

- Subtract the number of exposed pregnant females sold or transferred out between breeding and pregnancy diagnosis.
- Add the number of exposed females or pairs purchased for the herd between breeding and pregnancy diagnosis. Include purchased females (pairs) that are diagnosed as

pregnant or exposed. Do not count purchased females (pairs) that are open.

- All death losses of exposed females should remain in the exposed female numbers. Females that are intended to be culled and sold, but remain in the exposed female herd during the breeding season, are subtracted from the exposed number when sold.

Some cautions about the pregnancy percentage measure are:

- Use this value only in comparisons of similar operations.
- A low value may indicate a problem, but it does not explain the cause of the problem.
- Environmental stresses will cause year-to-year variation in the pregnancy percentages.
- This value applies only to production systems that routinely diagnose pregnancy through rectal palpation or ultrasound technology
- Adding exposed females may influence the pregnancy percentage.

## Calving Percentage

Calving Percentage is a good indicator of breeding performance and gestational management in the herd. An important part of computing calving percentage is deriving the number of females exposed. Percentages may have more meaning when computed by female age group, such as first-calf heifers.

**Calving Percentage** = (Number of Calves Born ÷ Number of Females Exposed) x 100

All "term" calves born should be included in the number of calves born even if they are dead on arrival. Accurate computations require the following two adjustments to the number of females actually exposed during the breeding season:

- Subtract the number of exposed pregnant females sold or transferred out between breeding and calving.
- Add the number of exposed females or pairs purchased between breeding and calving.

Again, the calving percentage should be used only in comparing similar operations. The measure may indicate an existing problem, but it does not pinpoint the cause. Environmental influences may cause year-to-year variation in calving percentage. Also, the percentage does not describe the distribution of calving birth dates during the calving season.

## Calf Death Loss

Calf death loss statistics can shed light on the herd health program, calving environment, nutrition, and breeding program. Calf death loss should include any calves lost at birth plus any calves that die prior to weaning. Again, deriving the number of females exposed is critical.

**Calf Death Loss Based on Exposed Females** = (Number of Calves Which Died Prior to Weaning) ÷ (Number of Females Exposed) x 100

**Calf Death Loss Based on Calves Born** = (Number of Calves Which Died Prior to Weaning) ÷ (Number of Calves Born) x 100

The type of operation, extensive versus intensive, should be considered when comparing calf death losses across herds. Likewise, the age make-up of the cowherd should be considered in any across-herd comparison. Finally, the calculations do not distinguish between calf death loss at birth versus death loss during the suckling period. More detailed records may be justified in cases of high calf death loss to determine the cause of premature deaths.

## Calf Crop or Weaning Percentage

Calf crop percentage is one of the most important measures of production performance as it measures the overall reproductive rate of the herd. In addition to reflecting embryo mortality and calf death loss, this percentage may provide some insight on how well cows are matched to their production resources and other factors. The computations for calf crop percentage are as follows:

**Calf Crop or Weaning Percentage** = (Number of Calves Weaned) ÷ (Number of Females Exposed) x 100

To accurately compute calf crop percentage, adjust the number of females exposed during the breeding season:

- Subtract the number of exposed pregnant females sold or transferred out of the herd between breeding and weaning.
- Add the number of exposed females or pairs purchased between breeding and weaning.
- Subtract the number of calves purchased and grafted on females from the number of calves weaned.

Additional points to note:

- All death losses of exposed females should remain in the number of exposed females.
- Females that are intended to be culled and sold, but remain in the exposed female herd during the breeding season, should be subtracted from the exposed number when sold.
- The exposed females that were intended to be bred, but are later culled when diagnosed as open, must remain in the exposed number.
- Do not include purchased grafted calves that are nursing cows in the number of weaned calves.

As with other performance measures, comparisons are valid only between herds with similar calving season management systems and environments. While the calf crop percentage is a good indicator of total herd output, nutritional adequacy, and husbandry practices, it does not account for excessive use of inputs (fed and non-fed).

## Pounds Weaned per Exposed Female

Actual weaning weights are usually evaluated by individual management or contemporary groups, such as steers, bulls, heifers, creep and no-creep calves. Use of actual average weaning weight is limited by management plans for calving and weaning. Actual weaning weights are not standardized to a given age. The influence of production environment and feed resources may be evident in long-term trends. In addition, comparisons between operations are difficult, as pasture conditions and management influence weaning weights.

Pounds weaned per exposed female is one of the key production figures every cow-calf operator should know for

each calf crop. By evaluating weaning performance on an exposed female basis, this measure becomes a tool to help producers optimize growth rate and reproductive rate.

**Pounds Weaned per Exposed Female** = (Total Pounds of Calves Weaned) ÷ (Total Number of Females Exposed)

The value reflects herd reproductive rate, calf death loss, the overall nutritional environment, and the genetics for growth and maternal performance. Age at weaning and the calving distribution impact pounds weaned per exposed female, making the measures more valuable for the individual operation and year-to-year comparisons. Comparisons between farms or ranches are less meaningful if production systems vary widely.

## SPA Financial Results

The overall financial performance and position of a business or a single enterprise within a business is evaluated through measures of liquidity, solvency, profitability, financial efficiency, and repayment capacity. No single measure is sufficient for evaluating a business's financial position and performance. Several measures must be tracked over time to provide a true perspective.

Profitability measures the financial performance of the farm or enterprise over a period of time, which is generally one year. Net income and the rate of return on assets are measures of profitability. Solvency measures the ability of the firm to retire debts if all of the business assets are sold. The equity/asset ratio or percent equity is one measure of solvency.

## Investment per Breeding Cow (average asset value)

Investment figures are expressed on a per cow basis. The value of the assets used in supporting the cow-calf enterprise is divided by the number of breeding cows. The average asset value is calculated by adding the asset values at the beginning and ending of the accounting period (generally a calendar year) and dividing by two. Two columns of averages are reported, one for cost basis and one for market value. The cost basis for asset values is based on the price paid for the asset less accumulated depreciation, except for raised breeding livestock, where the cost is its base value.<sup>2</sup> The market value reflects the value that owners can receive for their assets on a specific date (for example, the beginning of the accounting period). When evaluating the performance of an individual business over time, the cost approach to valuing assets provides more meaningful statistics since it is not influenced by fluctuations in market prices that create unrealized capital gains or losses. Market values are more meaningful for comparisons across ranches, such as those in different geographic regions or different production systems.

<sup>2</sup> A base value is selected to approximate the full cost of raising the breeding animal to each stage in its life cycle, for example, replacement heifers, first calf heifers, and cows. As individual or groups of animals move through categories in their normal life cycle, their individual value is the base value established for that particular category (for example, replacement heifers). When multiple categories are used to identify the life cycle of a breeding animal, there are multiple transfer points with a change in valuation as the animal shifts from one category into another, for example, from replacement heifer to first calf heifer. See also AGEC-323, "Valuation of Raised Breeding Livestock."

The assets whose values make up the total investment per breeding cow are sorted into two categories: current and non-current. *Current* assets are assets that will be converted to cash, sold, or consumed within one year. Examples of current assets include weaned calves, hay and feed inventories, and supplies on hand. *Non-current* assets include livestock, machinery and equipment, real estate (land and improvements), and other assets which will not be converted to cash in the current year.

Machinery and equipment depreciate over time, lowering their cost basis eventually to salvage value. Sometimes used machinery and equipment can be sold for more than its "book value" which could make the market value higher than the cost basis. Assets such as land typically appreciate over time and are generally expected to have a higher market value than cost basis, particularly if land was inherited with a low cost basis. Machinery and equipment costs per cow and real estate costs per cow will be higher for ranches in which many assets are owned rather than rented or leased.

*The Total Investment per Breeding Cow* is the sum of the values of current and non-current assets. High investment costs per cow are not necessarily bad. The key to whether high investment costs are justified is whether the income generated is sufficiently high to yield a rate of return on assets comparable to other operations. Higher values for total investment per cow are expected if high prices are paid for assets (breeding stock, vehicles, machinery, equipment, land), if new rather than used vehicles or machinery or equipment is purchased, if most assets are owned rather than leased or rented, and if the assets are under-utilized (too few cows are run for a given set of assets). In purebred operations, per cow costs for livestock (cost and market basis) are expected to be higher than in commercial operations.

*Debt per Breeding Cow* is the sum of operating non real estate and real estate debt attributed to the cow-calf operation plus deferred taxes (taxes that would be incurred if assets were liquidated)<sup>3</sup>. This figure sums the amounts borrowed to buy feed, purchase breeding livestock, and purchase pasture land for grazing, etc. Debt is not inherently good or bad. The earnings generated by the assets purchased with debt must exceed the cost of borrowing (interest payments) for the use of debt as a financing tool to be beneficial. Higher debt levels increase financial risk and expose the business to greater negative impacts from adverse production and market factors. Debt per breeding cow is useful for individual businesses to monitor over time but is not a useful comparison across operations. This measure is often higher for younger operators who have borrowed money to start a farming operation.

*Equity to Asset or Percent Ownership* reflects the financial position with respect to debt and assets assigned to the cow-calf enterprise. Equity equals assets minus debt. For a business, the equity to asset ratio could range from 0 (the business is technically insolvent since debt equal assets) to 1 (assets are unencumbered by debt). For an individual enterprise like the cow-calf enterprise, debts may equal or exceed the value of assets (the equity to asset ratio can be negative) if the enterprise is being subsidized by other enterprises or off-farm

<sup>3</sup> Deferred taxes that would result from the sale of assets should be considered as liabilities in developing debt figures. Using current market value for assets without considering deferred taxes would suggest more potential income than exists; that is, the value that would be realized if the business is liquidated is generally less than the market value of the assets due to the tax liability on gains.

income. The cow-calf enterprise equity/asset ratio indicates the proportion of the farm assets owned or financed by the owner's equity capital. If the ratio exceeds 0.5 (or percent equity exceeds 50 percent), the owner is supplying a greater percent of the total capital in the enterprise than the creditors.

## Financial and Economic Performance

Financial costs are the actual accounting costs for the cow-calf portion of the business. Examples of financial costs are cash costs (rents, purchased feed, veterinary expenses, interest, etc.) plus non-cash costs such as depreciation on purchased breeding livestock, machinery, equipment, vehicles, and buildings. Economic costs differ in that they also include the opportunity cost of owned land and equity capital in the enterprise plus the net potential sales value of raised feed. The opportunity cost of owned land is the income that it could have generated if it had been rented out, for instance, \$12 per acre for native pasture.

*Total Raised/Purchased Feed Cost* is the sum of purchased feed costs, accrual adjustments in feed inventories and bills payable, machinery, equipment, and other expenses associated with feed production. Costs differ between production systems and regions. Costs on a ranch will vary over time due to weather, pasture availability and condition, and the condition of cattle. Feed costs are important to monitor because they are generally a significant portion of the total expenses.

*Total Grazing Cost* is the sum of machinery, equipment and other expenses for grazing land maintenance and real estate costs (lease payments, mortgage interest payments, depreciation, property taxes, etc.). The cash lease rate for owned real estate is used to approximate the "economic" real estate cost, which could have been earned by renting the land out (as compared to what was earned in cow-calf production).

*Gross Cow-Calf Enterprise Accrual Revenue* is the sum of sales, changes in inventory values and capital asset adjustments, both cash and non-cash value changes. Specifically, gross revenue includes raised weaned calf sales, the value of calf inventory changes, the base value of the calves transferred into raised replacement stock, gains or losses (relative to their base value) on sale of culled replacement and breeding stock, increases in the base value of the quantity transferred into raised breeding stock, non-cash transfers of weaned calves out of the enterprise (to another ranch with separate management, but within a single corporation), farm consumption, and other revenue.<sup>4</sup> Both the change in value of raised breeding livestock, resulting from either movement to a category having a higher base value or from an increased number of raised replacements and the income or loss from the sale of animals are included in income.

*Total Cow-Calf Enterprise Operating Cost* is the sum of direct and indirect operating costs, including costs associated with raised and purchased feed, grazing, cow-calf production, and overhead which are the things not easily allocated to the previous categories. Direct costs associated with cow-calf production can include the ranch truck, labor, fuel, and oil, commissions, insurance, veterinary and medicine, breeding fees, depreciation on vehicles, purchased breeding livestock,

<sup>4</sup> In years where there is a change in the base value of one or more categories of raised breeding animals, the income or loss resulting from that change is included on the income statement. Excessively conservative or inflated base values will distort adjustments to cash basis records. See "Financial Guidelines for Agricultural Producer: Recommendations of the Farm Financial Standards Council (Revised)," [www.fisc.org](http://www.fisc.org), for more detail.

and depreciation on barns. Since total cow-calf enterprise operating cost is on a pre-tax basis and is not influenced by debt structure, it is a useful comparison across operations. The cost of raising replacement breeding animals are often included in expenses.

*Total Financing Cost and Economic Return* is actual interest paid on real estate and non-real estate debt plus changes in accrued interest. Financing costs are highly variable between operations depending on the debt structure and loan repayment terms. Operators who finance their operation through retained earnings and do not borrow money will have total financing costs of zero.

*Total Pre-Tax Cost Before Non Calf Revenue Adjustment* is the sum of all pre-tax operating and financing costs.

*Net Pre-Tax Income (after withdrawals)* is net farm income (pre-tax) less family living withdrawals. Pre-tax figures are used since taxes paid are highly variable between operations, depending on other personal and business financial situations. Net farm income is the return to unpaid operator and family labor and management and the owner's equity capital. It is calculated by subtracting all farm operating expenses incurred from gross farm revenues. Because accrual accounting procedures are used, net farm income also reflects the gain/loss resulting from the sale of assets as well as changes in the values of inventories. In a profitable operation, net farm income is positive and hopefully, sufficiently large to compensate the owner for family labor, management, and equity conditions. Profits are needed over time to replace assets such as breeding livestock, machinery and equipment, and pay family living expenses.

*Percent Return on Assets (ROA)* is an index of profitability. ROA is the net enterprise income from operations plus total interest expenses, minus family living withdrawals, divided by the average of total enterprise assets, and multiplied by 100. The higher the value, the more profitable the enterprise. Some limitations do exist. For instance, if two farms have the same net farm income but one leases land or other assets (the value is not included in owned assets), the ROA for the operation with leased assets will be significantly higher simply because of the way the assets are controlled. If the ROA exceeds the cost of debt financing or average interest rate, then borrowed capital is being used profitably in the business. If the ROA is less than the interest rate on the loan (the cost of debt financing), then increasing debt will further decrease equity. If operators do not include a value for family labor in the expense section or assign a portion of family living expenses to the cow-calf operation, this causes the ROA to be inflated.

## Unit Cost of Weaned Calf Production (Break-even Economic Cost)

*Total Non-Calf Revenue* is the sum of revenues generated by the cow-calf enterprise in addition to sales from calves weaned. Non-calf revenue includes gains or losses on cull cow or bull sales, the increase in base value of quantities transferred into raised breeding stock, and farm consumption.

*Total Calf Pre-tax Cost (Non-calf Revenue Adjusted)* is a value derived for use in comparison to an average price for cull sales and other non-calf revenue, resulting in a break-even value. If a producer does not include a value for their labor in costs of production or assign a portion of family living expenses to the cow-calf operation, the break-even price is understated.

## Economic Return

*Rate of Economic Return on Real Estate Investment at Market Value* attributes all net economic income to the real estate investment. If the rate is below an expected rate of capital return, it means the real estate investment might earn more outside the cow-calf enterprise. The statistic is not calculated and will read N/A if some land is leased.

## What Has Been Learned from SPA Data

High calf prices can hide a multitude of management sins. Low calf prices often force a closer look at production and financial practices. Looking at production costs may be painful, but it is the first step in looking at the farm or ranch as a collection of potential profit centers and determining which parts are coming up short. Cost-saving measures can be identified once the high cost items are noted. Production systems can be better matched to the resource base.

Because the “standardized” results are developed using common definitions and reporting techniques, producers can compare their costs of production. Herds in the database include both commercial and purebred operations, as well as fall and spring calving herds.

Comparisons of average financial and production statistics for low- and high-cost producers in Texas and Oklahoma are summarized in Table 1. Data is sorted into quartiles by net income (\$/cow). Producers with the highest net income are labeled Top 25% (high income), followed by Second 25%, Third 25%, and finally Low 25% (low income). Highlights from analysis of the results include:

- Feed costs are generally the highest annual variable cost associated with the cow-calf production enterprise.
- Significant differences exist in total feed and grazing costs between low- and high-income producers.
- High income producers average cost of production is \$428 per cow compared to \$752 per cow for low income producers.
- High income producers typically have less invested per cow in all asset categories (current assets, breeding livestock, machinery and equipment, and real estate) than low income producers.
- The high income producers' average cost of production is \$93 per hundredweight compared to \$191 per hundredweight for low income producers.
- Average weaning weights as well as pounds weaned per exposed female are higher for high income producers than low income producers.

Other analysis of SPA data (not shown in Table 1) has shown that costs of production are highest on average for herds with less than 50 cows and lowest for herds with more than 500 cows. While small herds can be profitable, it requires superior management to control costs. High-cost producers typically have higher debt levels per cow than low-cost producers. And, average weaning weight and profitability are not correlated.

The most profitable producers tend to have higher pregnancy, calving, and weaning percentages than low profit producers. Also, the calf death loss differs only slightly between the profitability levels.

Average weaning weight in the most profitable herds was 537 pounds compared with 515 pounds in the low profit herds. This pattern is also evident when reproductive success

is accounted for at weaning. Average pounds weaned per exposed female is 453 pounds for the more profitable herds compared to 410 pounds for low profit operations.

Some producers assume that increased weaning weight ensures increased profitability for the cow herd. The cow-calf manager must determine the appropriate level of growth for an individual herd. Matching cow size to the available production resources as well as striving for uniformity of size has favorable management consequences. Beef producers must use information on genetic relationships between mature size and other growth traits to select replacement heifers and control cow size. For example, selection for increased yearling weight to an extreme may result in mature cows that are too large. With limited forage and feed resources, this cow type may not have acceptable reproductive success. This result impacts earnings as well as cost per breeding cow. To be a sustainable operation, breeding stock selection must consider resource limitations that impact the optimal growth and cow size.

## Value of SPA Results for Individual Producers

“Measure, then manage” is a SPA project motto. Cow-calf SPA software condenses a large amount of production and financial information into convenient summaries and ratios for analysis. SPA results are most useful when annual results are available for year-to-year comparisons. SPA results can be used to do the following:

1. **Identify areas of concern** by documenting costs of production and identifying which costs can be managed. SPA measures are most useful in directing managers to ask the right questions to solve business financial problems.
2. **Develop and/or adopt tools to decide what to do.** The tools may include financial and production records, financial statements (cash flow statement, income statement, balance sheets), budgets (cash flow and enterprise), reports comparing actual to budgeted values.

What are the high-cost categories? Where are costs high relative to producers in the most profitable bracket? Comparing individual results to state and national averages may indicate that a specific cost component is high. The following notes are intended to stimulate thinking about potential causes of problems, evidenced through SPA results. No one idea is appropriate for all cases. Review the ideas given a situation and follow up with resource people with the appropriate expertise.

## High feed costs?

- Buy purchased feed in bulk rather than in sacks.
- Save money buying feed rather than raising it (or vice versa). Is marketing hay or feed raised through the cows the best use for it? If hay is high quality, could it be sold in a specialty market and an adequate replacement be bought at a lower cost?
- Re-negotiate rental rates (cash or share rent) if they are higher than average rental rates for comparable tracts in the region.
- Reduce dependence on feed (reduce stocking rate; consider grazing rotations, overseeding, or limit-grazing cool season forages).

- Use chemicals on raised feeds only when it is economically advantageous.
- Shop around for the best supplemental feed values. Consider alternative supplement sources.
- Try to anticipate needs, and buy hay early in the season when prices are low.
- Avoid extremes in cattle size and milk production.
- Match cattle production cycle to forage resources, both in terms of availability and nutritive quality.
- Use a systematic approach in evaluating a herd nutrition program.
- Sort cows based on nutritional needs and feed accordingly.
- Minimize feed wastes through storage and feeding practices (for example, feeding hay in racks or rings).

Fact Sheets from OSU that provide further information:

- PSS-2071, Sod Seeding Small Grains
- PSS-2570, Reducing Winter Feeding Costs
- PSS-2584, Forage Budgeting Guidelines
- PSS-2585, Forage Legumes for Oklahoma
- NREM-2869, Management Strategies for Rangeland and Introduced Pastures
- NREM-2870, Drought Management Strategies
- PSS-2901, OSU Agronomic Services Procedures for Soil, Forage & Water Testing
- ANSI-3010, Supplementing the Cow Herd
- ANSI-3017, Feeding High Protein Range Cubes

### High grazing costs?

- Match the cattle production cycle to forage resources (availability and nutritive quality).
- Re-negotiate rental rates (cash or share rent) if they are higher than average rental rates for comparable tracts in the region.
- If the forage base includes annual pasture, use chemicals only when it is economically advantageous.
- Soil test improved pastures to determine when fertilizer is needed.
- Search for least cost weed control methods.
- Improve grazing management. Is stocking rate optimal?
- Renovate and improve pastures.

Fact Sheets from OSU that provide further information:

- PSS-2570, Reducing Winter Feeding Costs
- PSS-2584, Forage Budgeting Guidelines
- NREM-2869, Management Strategies for Rangeland and Introduced Pastures
- NREM-2870, Drought Management Strategies
- PSS-2871, Stocking Rate: The Key to Successful Livestock Production

### High investment costs per cow?

- Sell unnecessary machinery, vehicles, cows, and other assets that do not contribute to profits.
- Emotional attachments to assets, cows for instance, can be costly. Does the herd size justify the machinery and equipment? Is the bull/cow ratio close to the optimum?
- Consider leasing rather than owning assets. Could grass be rented for less than it costs to own it? Leasing rather than owning may increase flexibility.

- Custom-hire if it is cheaper than owning machinery and providing labor (or hiring labor to do it).
- Do not try to “keep up with the Joneses” and avoid “new paint”. Defer new investments and consider buying used rather than new machinery, equipment, or vehicles.
- If the enterprise is profitable and resources are available, consider increasing the size of the herd to spread fixed investment costs over more cows.
- Manage heifers so they will have longevity in the herd. Replacing cows can be expensive.

### High cattle costs?

- Use preventative medicine and practices to reduce “emergency” costs or losses.
- Plan vehicle use to minimize mileage.
- Shorten breeding/calving seasons and time between calves.

Fact Sheets from OSU that provide further information:

- ANSI-3260, Planning Calendar for Beef Cattle Herd Health
- ANSI-3358, Disease Protection of Baby Calves

### High interest costs?

- Shop around for the best deal.
- Lock in low interest rates for long-term loans when the opportunity arises.
- Use cash surpluses to pay down debt.
- Schedule loan repayments at times when crop and/or livestock sales are expected.
- Negotiate for lower rates if you have a good record keeping system and can provide financial statements for the lender.
- Minimize new borrowing.

### High overhead costs?

- Consider increasing the size of the herd to spread overhead costs over more cows (if the enterprise is profitable).

Fact Sheets from OSU that provide further information:

- AGECE-217, Understanding, Allocating and Controlling Overhead Costs

**Note:** Weigh potential revenue losses associated with changes to reduce costs to make sure it is the right decision.

### Low pregnancy percentage?

- Be sure that cows have an adequate forage and/or nutritional plane.
- If cows are not settling, increase surveillance during breeding, evaluate cow condition during critical periods, and conduct breeding soundness exams on bulls.
- Build cattle with high fertility through systematic breeding, culling, and grouping.
- Control the breeding season. With continuous calving systems, a cow that does not calve in a given year may go unnoticed for awhile, meaning that unproductive cows typically stay in the herd longer than is desirable.
- Maintain effective herd health program.



## Low calving percentage?

- Dead calves that are carried to term are included in the numerator for this calculation. A calving percentage significantly lower than the pregnancy percent suggests reproductive disease.
- As low pregnancy percentages contribute to a low weaning percentage, see also items under that heading.
- Be sure that cows have an adequate forage and/or nutritional plane.

A Fact Sheet from OSU that provides further information:

- Circular E-869, Management of Beef Cattle for Efficient Reproduction
- VTMD-9123, Immunizations for Oklahoma Cow Herds

## Low weaning percentage?

- A weaning percentage lower than the calving percent suggests dystocia, scours, clostridial diseases, respiratory disease, or losses due to theft, predators, or road kill.
- Practice systematic breeding and culling to increase calving ease and consider grouping females to monitor difficult births.
- Use preventative medicine and practices to reduce death losses.
- As low pregnancy and calving percentages contribute to a low weaning percentage, see also items under those headings.

A Fact Sheet from OSU that provides further information:

- ANSI-3358, Disease Protection of Baby Calves

## Low weaning weights?

- Use genetic selection and crossbreeding to improve uniformity of the cow herd/calf crop.
- Increase quality of grazed and harvested forage by utilizing forage tests and harvesting in a timely fashion.
- Be sure that cows have an adequate forage and/or nutritional plane.
- Shorten the breeding season.
- Set calving dates to capitalize on high quality forage production.
- Evaluate balance between forage production capacity and stocking rate.

Fact Sheets from OSU that provide further information:

- ANSI-3021, Spreadsheet to Estimate Returns From Creep Feeding
- ANSI-3011, Feeding Cattle on Grass
- ANSI-3159, Expected Progeny Difference: Background on Breeding Value Estimation
- ANSI-3160, Expected Progeny Difference: Growth Trait EPDs
- ANSI-3161, Expected Progeny Difference: Maternal Trait EPDs
- ANSI-3162, Expected Progeny Difference: Use of EPDs

## Additional Notes....

Again, weigh changes in costs and returns to make sure a decision is the right one. The local extension office is a good

source of information on all of the above subjects and can provide copies of the mentioned fact sheets.

Annual SPAs may raise "red flags" signaling a decline in the financial performance of the business. The first red flag is typically a negative cash flow. This may be a temporary problem if the operation is being expanded and/or new assets purchased. If negative cash flows persist, it can lead to economic losses. If the ranch does not generate an economic profit, then the assets could be earning more somewhere else. For example, if cows cannot pay market value for raised feed fed, the land on which the feed is raised could be rented out for more than it is earning in the cow-calf enterprise.

A more serious red flag is if the financial net income is negative. This signals that equity capital is being consumed. Each year that production continues with financial losses, equity is being consumed, leading to increasingly lower values for net worth. For ranches to survive in the long run, a positive return to labor and management, as evidenced by a positive net income and rate of return on assets, is essential. Equity increases in a viable business should result from retained earnings rather than capital contributed from off-farm jobs, inheritances, and appreciation in asset values.

Being aware of these signals and monitoring performance on an ongoing basis allows producers to correct problems before they get out of hand. Completing a SPA requires a commitment of time and energy but provides better information for management than either financial or production records can do alone.

Cost of production is only one part of the profit equation. Producers should also study marketing practices and alternative marketing options. Could an above break-even price be locked in using contracts or futures markets? Would profits increase by retaining ownership through a stocker or feedlot phase? Are there specialized markets? For instance, could "natural" beef be targeted? Are there other possible sources of revenue, such as hunting leases?

Cash shortfalls can occur even if an enterprise is profitable. They can be a temporary problem associated with debt servicing, building of inventories, etc. Negative net cash flows over time are likely to be signals of more serious problems including lack of profitability. Negative values for accrual net income indicate that the enterprise is currently not profitable. In this case, changes are needed in operations. Look at altering production practices, marketing, feeding, land management, cost control, or all of the above.

## To Complete a SPA Analysis...

SPA focuses on financial results from a fiscal or accounting year and production records associated with the calf crop weaned in that year. For most producers, the fiscal year coincides with a calendar year. A set of farm financial statements supplemented by tax records and a depreciation schedule will supply the financial information needed to complete a SPA.

Reproductive measures are based on a full production cycle, beginning when all breeding age females are exposed to the bulls (or artificially inseminated). The cycle ends when the calves are weaned. To make accurate comparisons from one calf crop to the next, or between management groups or herds, these performance values are based on the number of exposed females (cows and first-calf heifers). Thus, cow numbers are needed for the period when the mothers of calves

being weaned were exposed. Individual calf weights are not required.

The initial SPA analysis may require some time and effort. Collecting the production and financial data is usually time consuming the first time an analysis is completed if records are in poor shape. However, when committed to improving management practices and interested in exploring SPA capabilities further, there are several options:

1. Producers familiar with production and financial standards and who are computer users may order the SPA software from Texas A&M by contacting Stan Bevers at s-bevers@tamu and complete their own analysis.
2. Producers who would like assistance in completing an SPA may contact the local Extension educator-agriculture, area agricultural economics specialist, or Damona Doye, OSU Extension Economist, at 405-744-9813 or damona.doye@okstate.edu to express interest in a SPA workshop or individual assistance. Workshops are conducted upon request for five or more interested producers in an area.

## Summary and Conclusions

SPA is a set of guidelines and standards to encourage uniform data collection, calculation, analysis, and reporting of production, reproduction, marketing, economic, and financial indices of a cow-calf enterprise. SPA is a tool for business-minded producers who wish to improve production and financial efficiency and more effectively use their resources. SPA uses data to produce standardized performance information for management decisions. It does not replace the need for good financial and production records. Completing a SPA often points out deficiencies in a ranch's existing management information system. SPA will improve competitiveness of an individual operation if the manager uses the information to change the production and management system.

Using SPA is a process, not an event, for producers who have participated. The first SPA for a ranch serves as a baseline. Each additional year that a SPA is completed further documents the ranch management's financial and production track record. Change has to take place if completing SPA is useful to producers. Areas where many cow-calf producers can reduce production cost include:

- Minimize investment in depreciable assets such as machinery and vehicles.
- Monitor and control purchased feed expenses.
- If a small producer, buy replacement females and use terminal cross bulls.
- Avoid expensive seed stock production and purchase replacement animals.
- Minimize investment in horses if the cows are expected to pay their expense.

- Don't overstock grazing land.
- Develop and integrate systems to manage all resources including wildlife.
- Have a controlled breeding season that will optimize grazing land use, minimize purchased feed, and result in high reproduction.
- Use proper health practices to ensure sound herd health and allow participation in marketing alternatives.
- Avoid industry fads that are not cost effective.
- Don't spend money to reduce IRS taxes if the investment is not a sound one that will increase after tax profits long run. It does not make sense to spend a dollar to save ten, fifteen or even thirty cents.
- Have a bank account for the ranch separate from the personal account.
- Location and other amenities are important in acquiring land to realize appreciation in value. If a goal of land ownership is to cash in on expected increases in value, focus on attributes other than grazing potential.

The large differences in herd performance validate the necessity to measure and manage for performance. Ranchers can begin the process by completing SPA. Making a commitment to business management can be a significant step. Measuring and monitoring progress toward specific written goals, using the analysis to identify areas for change, and focusing on implementation. Measuring performance motivates managing for performance.

## References

**Farm Financial Standards Council:**  
[www.ffsc.org](http://www.ffsc.org)

**Texas A&M SPA Website:**  
[agrisk.tamu.edu](http://agrisk.tamu.edu)

**OSU Farm Financial Management Resources:**  
[www.agecon.okstate.edu/ffmr.asp](http://www.agecon.okstate.edu/ffmr.asp)

AGEC-751, Developing a Cash Flow Plan  
AGEC-752, Developing a Balance Sheet  
AGEC-753, Developing an Income Statement  
AGEC-302 Information Systems for Oklahoma  
AGEC-323, Valuation of Raised Breeding Livestock  
CR-3279, Cow-Calf Production Record Software

## The Oklahoma Cooperative Extension Service

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The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

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- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
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- It utilizes research from university, government, and other sources to help people make their own decisions.
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