An Economic Assessment of Feed Costs within the Cow/calf Sector

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Executive Summary

The most significant costs within cow/calf production are the expenses associated with feed consumption, including both grazed forage and conserved feed. It is not only the cost of the feed itself that is significant but the type of feed delivery and grazing management employed within cow/calf production systems which have considerable economic impact on the business. These feed delivery and grazing management systems vary significantly between operations and have changed considerably over time. However, accurate and comprehensive economic analyses of these various feeding and grazing systems are not readily available to assist cow/calf managers in their decision-making.

Historically, economic analysis of cow/calf operations has not been well defined, particularly in Canada. However, data collected throughout the last decade in Western Canada has provided cow/calf managers with a better general understanding of the economics of production systems. Nevertheless, many issues with respect to consistency and accuracy of economic information collected exist. Standardized data collection is essential to better understand the economic status of the cow/calf sector. Data sets in Western Canada have ranged in size from 17 to near 70 participating operations in a given production year. Considering there are over 32,000 operations reporting beef cattle across Alberta and Saskatchewan, the information is limited in its representation of the industry.

The extensive management strategies that are common across cattle operations result in significant variation in production methods. As a result there is a significant range in profitability from year to year and between operations. Variations in market prices alone have had considerable impact on cow/calf enterprises' overall income and resulting margins throughout the past decade. Based on research conducted by the Western Beef Development Centre (WBDC) cow/calf enterprise profit margins were found to range from a profit of $141 per head in 2001 to a loss of $110 per head in 2008.

The vast majority of cow/calf managers currently do not carry out any economic assessment of production costs or measure of profitability for their business. As a result, the majority of

enterprises fail to attain their full financial success because of the lack of accurate financial information available to assist in the management of the operation.

Forage production is the foundation of beef cattle production in Western Canada. Anecdotal evidence has indicated that approximately 80 per cent of Canada's beef production occurs while animals consume forage. In addition, it is generally assumed that extensively managed grazing systems provide the lowest cost feeding system in a cow/calf operation.

It is estimated that maintaining the entire Western Canadian beef cow herd on stockpiled forage for one more day every fall would result in a potential cost savings of at least $3.1 million to the beef industry. It is for this reason that optimal utilization of available forage resources is key to the economic success of the cow/calf sector.

Because of these potential cost savings, in addition to optimal utilization of forages during the growing season, alternative grazing strategies have become commonly implemented in year-round feeding systems. As a method of reducing winter feeding expenses, systems that extend the grazing season and thereby reduce the amount of mechanically harvested forage required have been explored and implemented.

Initial cost estimations have found that feeding systems such as aftermath grazing, swath grazing, stockpiled grazing and bale grazing can all provide some level of cost saving when compared to a traditional confined feeding system. However, systematic economic analysis of these various feeding and grazing strategies is lacking in many assessments that have been conducted to date. For this reason, there is often an incomplete or inaccurate perception by cow/calf managers of the potential economic impacts of incorporating these strategies into their feeding systems.

It is imperative that cow/calf managers implement feeding and grazing management strategies that effectively make use of available resources rather than basing management decisions on initial economic assessments that may not apply to their individual situation. Current research commonly lacks the economic assessment required to assist in the decision-making process.

Cow/calf managers must consider their own management skill level and resources available, matching their production practices to exploit their individual operation's strengths in order to meet their business goals. Understanding the economic implications of feeding and grazing management decisions is essential to the success of all cow/calf enterprises as the forage resource is their most valuable economic tool.

This initial economic assessment of feeding and grazing system costs within the cow/calf sector has provided some key recommendations for future consideration. These recommendations include:

- a more accurate and standardized economic analysis of research projects including year-round feeding and grazing system costs within the cow/calf sector in Western Canada must be undertaken;
- the development of standardized economic analysis tools for individual cow/calf businesses that allow for consistent calculation of production costs across Western Canada;
- targeting increased research dollars towards further in-depth assessment of innovative feeds, forages, feeding and grazing management systems requiring a specific focus on thorough economic analysis;
- focused allocation of resources for the recruitment and education of future professionals in the field of applied forage and beef economics; and
- the creation of a Saskatchewan Forage and Livestock Round Table to facilitate system-level discussion with a focus on economic analysis, direct future research priorities, and foster stakeholder partnerships.

Introduction

The cost of beef production is primarily influenced by the cost of feed throughout the production cycle. Additionally, the method by which the cow accesses that feed further inflates the production costs incurred by the operation. Feed that is mechanically harvested is considerably more costly when compared to foraging systems that oblige the animal to harvest the feed themselves. When mechanically harvested feed must be delivered to the animal further additional costs are borne by the production system. Additionally, confined pen feeding versus an open field setting adds further costs related to facility repair and cleaning.

The necessity to feed harvested forage during the winter months on the Northern Great Plains is believed to have been first recognized by ranchers following the severe winter of 1886-87. It became clear after the devastating cattle losses that a free range 'Texas style' grazing system was not feasible during the extreme Canadian winters (MacLachlan, 1996).

Throughout most of the next century, beef cows were housed in barns and/or kept in confined pens through the harsh Canadian winters. Conserved forages[1] and grain were delivered daily to animals. With an increased understanding of the metabolic requirements of the animal and the economic implications of feeding strategies, these management practices gradually began to change. Beef cow management became more rigorous and the costly and labour intensive feeding systems became more and more cost prohibitive. Cow/calf managers began to adopt more extensive feeding systems and focused on extending the grazing season. Confined feeding systems are still utilized in some cow/calf operations however these systems are no longer the norm and remain a very labour and capital intensive type of system.

Data collection throughout the last decade has reported that winter feed and forage grazing costs account for 60 – 65 per cent of the total costs associated with cow/calf production in Western Canada (Kaliel, 2004; USDA ERS, 2010). This does not include additional costs associated with feed delivery systems employed throughout the winter feeding period.

[1] Conserved forage is plant material that is mechanically harvested to preserve the overall nutrient quality of the feed.

Forages of all types, whether grazed or conserved in some form, provide the basis for cow/calf production systems in North America (Saskatchewan Forage Council, 2010b). Forage is defined as that part of the vegetation that is available and acceptable for animal consumption, whether considered for grazing or conserved through mechanical harvest (SFC, 2010b). For the purpose of this report, forages are considered to include both perennial and annual vegetation.

The ruminant biology of the beef cow is the main competitive advantage of beef production over other animal protein production systems. The fact that cattle can utilize forage in their diet and that most forage has relatively few competing uses means that effective utilization of forage is key to the long term competitiveness of the beef industry (Peel, 2010). In order for cow/calf production to remain economically viable, managers must strive to maximize the period where the cow is harvesting forage rather than mechanical harvesting and delivery of forage to the cow.

This economic assessment of the feed costs associated with the cow/calf sector was conducted to:

- quantify industry average costs, both historic and current;
- complete an initial economic assessment of feed costs (forage and non-forage based) for the cow/calf sector, primarily in Saskatchewan but also reflective of Western Canada;
- identify industry stakeholders and development of partnerships for further investigation; and
- present an initial report summarizing areas for further investigation.

Economic Assessment of Cow/calf Enterprises

Historic and Current Feed Management Strategies

The Western Canadian cattle industry originated as a northern expansion of the established pastoral system and cattle trade along the north-western tier of the United States (MacLachlan, 1996). Fundamentally, calf production in Western Canada has had more in common with the

labour and capital intensive heartland stock farming[2] techniques than the extensive grazing 'Texas style' ranching (MacLachlan, 1996). Winter feeding and summer hay cutting became part of every Western Canadian rancher's seasonal regimen beginning at least as early as 1886 (MacLachlan, 1996).

Today, grazing management and conserved forage feeding strategies are still based upon the forage production cycle. Traditionally, the winter feeding period for a cow/calf enterprise lasts approximately 200 days and runs from late October to mid-May in Western Canada (McCartney et al., 2000). Beef cows are commonly fed hay, greenfeed[3] or cereal grain silage[4], straw and limited amounts of feed grains, most often barley grain, during this period.

Historically, in Western Canada cows were brought in off pastureland to winter in drylot yards consisting of confined pens and shelters where feed was delivered to the animal daily in the same location throughout the winter feeding period. While the actual cost of the feed accounts for a large portion of the expense of any feeding system, significant costs are also incurred in labour, fuel, utilities, manure removal, machinery, fence and building expenses that are often more difficult to measure. Due to the large variation in management and capital expenses between cow/calf operations there is a significant range in the costs to maintain a beef cow in these types of systems. Historic cost estimations have indicated that total costs vary from $1.50 – over $2.00 per cow per day in traditional confined winter feeding systems.

As part of these 'traditional' management systems, beef cows commonly graze various forages in a pasture setting from mid-May to late October. The duration of the grazing season varies from year-to-year and is highly dependent on environmental conditions, including precipitation throughout the growing season, ambient temperatures and snowfall amounts, which can significantly impact the ability to extend the grazing season into the fall and winter. Cattle managers may begin feeding as early as late September, equating to a grazing period of as short as 120 days and resulting in drylot winter feeding periods as long as 245 days.

[2] Heartland stock farming used capital and labour intensive methods: ranchers cut and dried hay, fenced cattle pastures and winter feed supplies and actively herded cattle to make best use of pasture and forage resources (MacLachlan, 1996).
[3] Greenfeed is annual forage harvested as a whole crop while still green and baled as livestock feed.
[4] Silage is fermented, high-moisture fodder that can be fed to ruminants. It is fermented and stored through a process called ensiling and usually made from annual, though sometimes perennial, crops.

Uncertainty in weather conditions for any given growing season can create significant variations in forage resources and therefore total production costs. Additionally, grazing management, forage species selection and utilization also play a major role in the length of the grazing season and can have significant impacts on the ultimate profitability of the cow/calf enterprise.

Managing feed costs is critical to the profitability of cow herds (Kaliel, 2004). However, lowering feed costs is not just about reducing quantities or utilizing less expensive feed stuffs. It is also dependent on the type of systems and management practices utilized to deliver the feeds. Often, this is where the most significant cost savings can be realized. As a result, many new forages and feeds are being employed by cow/calf enterprises.

Managers are also trying to make optimal use of their existing forage resources by altering or intensifying their management strategies. As a result, cow/calf managers are increasingly focusing on matching their forage resources with the productive cycle of the cow herd, shifting to more extensive feed and grazing systems in an effort to minimize input costs. The Farm Environmental Management Survey (FEMS) conducted in 2006 (Agriculture and Agri-Food Canada, 2007) found the majority of farms in all regions of the country utilized open feeding areas for livestock rather than confined feeding.

Review of Total Cost Structure of Cow/calf Enterprises

Cost of production enterprise analysis involves an examination of total revenue and expense for the entire cow/calf operation. All costs incurred to produce the end product – a weaned calf, are commonly calculated either on a per cow or per pound of weaned calf basis or both. Direct costs include winter feed, bedding, pasture grazing, swath grazing[5], aftermath grazing[6], minerals and supplements and veterinary and medicine (vaccinations, pregnancy checking, etc.) expenses. In addition, yardage costs typically include expenses such as fuel, building and machinery repairs, utilities, custom work, paid labour, management fees, taxes, license, insurance, marketing fees, depreciation, interest, and lease payments.

[5] Swath grazing is annual crop cut while still green (optimum stage depends on crop type) and left in the swath for livestock to graze at a later date.
[6] Aftermath grazing is crop residue, typically cereal crop stubble, grazed after the crop has been harvested.

Numerous researchers have determined the largest cost of maintaining a cow herd relates to the feeds consumed, either in conserved forage, grazing systems or non-traditional feeding systems (Havens et al., 2006; Kaliel, 2004; Millang, 2000; Larson, 2010). Figure 1 illustrates the complete breakdown of all production costs associated with cow/calf enterprises. In the most recent Western Beef Development Centre (WBDC) Cost of Production (COP) data set, winter feed and grazing (including pasture, swath grazing and aftermath grazing) costs accounted for 63 per cent of the total production costs of a cow/calf enterprise (Larson, 2010). Similar results were determined by Alberta Agriculture and Rural Development (AARD) where feed, bedding and pasture costs accounted for 60 per cent of the total production costs of cow/calf enterprises (Kaliel, 2004). The AARD data set consisted of 57 cow/calf producers across Alberta, whereas the WBDC data set consisted of only 18 cow/calf producers from across Saskatchewan.

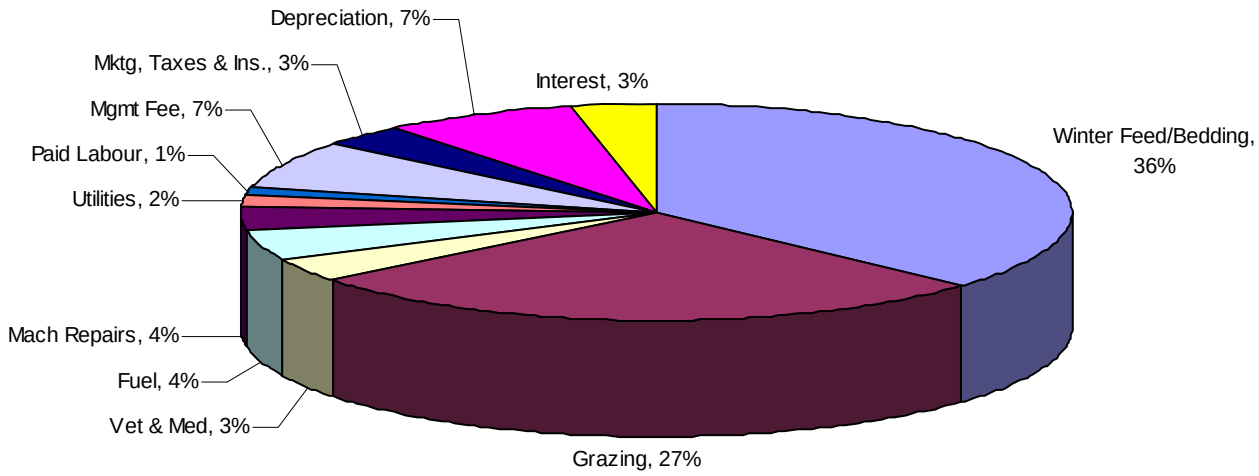

Figure 1. Breakdown of Total Production Costs
(WBDC, 2010)

In Figure 1, the total labour costs associated with the business include both the management fee (defined as the paid and unpaid labour provided to the owner) and paid labour, which accounts for wages paid to hired employees.

It is important to note that feeding and grazing costs vary significantly from operation-to-operation, region-to-region and year-to-year. The specific feeding and grazing systems implemented by each individual manager have considerable impact on the total cost of production for the cow/calf enterprise. Operating costs, labour and available assets are directly related to the feeding and grazing systems utilized. Due to the significant costs associated with feeding the cow, the integrated feeding and grazing system choices made by managers have a very significant impact on the profitability of the cow/calf enterprise.

As mentioned above, traditionally the winter feeding period lasted approximately 200 days. This is defined as the period where managers deliver conserved forages and feed grains to the cow, whether in a confined pen setting or a more open field setting. Typically when cattle are managed with a relatively high number of days on feed, winter feed costs will also be high. Conversely, producers reporting a maximized number of grazing days will likely realize lower winter feed costs.

Low cost producers tend to pay more attention to addressing the nutritional needs of various groups within the herd (i.e. first calvers, mature cows, etc.) providing more opportunity to target animal nutrient needs (Kaliel, 2004). Feeding the entire herd as one group instead of feeding in separate groups results in managers targeting the 'average' cows' needs and often leads to over-feeding, under-feeding and waste of feed all at the same time.

Historic and Current Cow/calf Sector Profitability

Profitability in any business is determined by total revenue minus total expenses. Both revenue generated and costs associated with producing the product have significant influence on the profit margin of a business.

Cow/calf producers are typically price takers and can have minimal influence on cattle price fluctuations and therefore the overall revenue generated for their product. While Millang (2001), determined that there is no one key success factor that will lead to profitability in the cow/calf enterprise, reducing total production costs will most likely lead to increasing profitability. Jones (2000) further commented that the two most prominent expenses are feed

and capital expenditures and consequently are the two most important variables to concentrate management efforts upon to ensure profitability.

The cow/calf sector is truly a primary commodity business. Producers at this level experience significant pressures on profit margins that can not be passed down through the production chain, as is possible with other production levels. Historically, cow/calf production has captured very small positive economic returns and commonly losses are incurred.

Since the turn of the century the beef cattle industry in Canada has experienced a period of significant economic challenge as a result of market access, domestic and international regulations, currency inflation, environmental conditions (drought, flooding, etc.), rising input costs and a severe global recession. The plethora of issues that have severely hampered economic returns throughout the last decade has not been encountered previously in recorded history. Incidentally, the cow/calf manager had little to no ability to address the issues negatively impacting the business. Significant influence, however, can be made by fully understanding the economic standing of the business and making sound financial-based management decisions.

Cow/calf enterprises are extremely dynamic, with no two operations implementing the same strategies or utilizing the same resources. Profitability in the cow/calf enterprise is a function of environment, cost management, production and resource management and often the cow/calf sector's contribution to the whole farm enterprise.

Historically, economic analysis of cow/calf operations has not been well defined, particularly in Canada. Production costs and returns for cow/calf operations have been recorded by the United States Department of Agriculture (USDA) as early as 1982. Although it is recognized that differences exist between cost structures in Canada and the US, similarities in cow/calf production between the Northern States and the Prairie Provinces warrant the examination of this information for comparative purposes.

Table 1. Historical Average Annual Cow/calf Feed Costs, Western United States

Feed	1982-89 (US$ per cow)	1990-95 (US$ per cow)
Grain	$8.76	$5.67
Harvested Forages	$38.01	$91.84
Pasture	$40.48	$113.99
Total Feed Cost	$102.81	$234.99
Total Production Cost[7]	$436.49	$610.82

Adapted from: United States Department of Agriculture, Economic Research Service

The data presented in Table 1 includes survey information gathered from cow/calf producers with more than 20 beef cows from across the Western United States. This data was collected under the Agriculture Resource Management Survey (ARMS) using a multi-phase, multi-frame, stratified, probability-weighted sampling design. The farms surveyed are derived from the National Agricultural Statistics Service (NASS) list allowing for a considerably large dataset generating statistically reliable information.

Feed costs in the Northern States increased significantly in the 1990's and have increased even more drastically since that time. As a percentage of the total production costs, total feed costs accounted for 24 per cent during 1980-89 and rose to average 39 per cent of total production costs during the period 1990-95. In more recent data, the USDA, Economic Research Service (ERS) reported that total feed costs averaged $431.38 per cow in the Northern Great Plains in 2009 while total production costs had increased slightly to $642.49 per cow, resulting in feed costs accounting for 67 per cent of the total production costs in 2009.

Although Western Canadian data has not been collected for as long as that in the US, valuable information is still available for both Alberta and Saskatchewan during the last decade. This data provides some insight into Western Canadian cow/calf enterprise profitability. The data collected to date in Western Canada has been gathered from volunteer cooperating cow/calf

[7] Total production costs include winter feed, bedding, pasture, veterinary & medicine, breeding fees, marketing, fuel, machinery & building repairs, utilities, custom work, operating interest, paid labour, unpaid labour, lease payments, taxes, license, insurance, depreciation, and paid capital interest incurred by the cow/calf sector.

operations which has limited the overall size of the data set and does impact the validity of the data. Data sets have ranged in size from 17 to near 70 participating operations in a given production year. Considering that the 2006 Statistics Canada Census data reported over 12,000 farms with beef cattle in Saskatchewan and over 20,000 farms with beef cattle in Alberta, the data set must be considered to be limited in its representation of the industry. Additionally, concerns over the different methods with which the information has been collected has limited the comparative validity of various data sets. Cow/calf economic data needs to be collected under a standardized process to allow for accurate analysis and comparison.

Table 2. Saskatchewan Cow/calf Enterprise Average Economic Measures

Year	Revenue ($ per Cow)	Production Costs ($ per Cow)	Profit Margin ($ per cow)
2001	$725.52	$584.11	$141.42
2002	$573.06	$650.53	-$77.47
2003	$535.39	$601.17	-$65.78
2004	$476.62	$553.14	-$76.52
2005	$651.85	$581.87	$69.68
2008	$462.65	$573.54	-$110.89

Adapted from: Western Beef Development Centre, COP Data

Table 2 shows the total revenue and total expenses collected in the Western Beef Development Centre's (WBDC) Cost of Production (COP) project that has been conducted seven years out of the last decade. The data set is completely random with operations of varying sizes from across Saskatchewan participating in the project. The number of cooperating cow/calf operations participating in the project has ranged from a low of 17 in 2004 to a high of 67 in 2002.

Working with the cooperating cow/calf enterprises, the WBDC is able to calculate the total cost of producing a weaned calf and the income generated from the operation. As can be seen in the table above, throughout the last decade drastic variations in revenue have been reported. The highest income was recorded in 2001 at just over $725 per cow, while in 2008 income had fallen to $462 per cow, a drastic variation in revenue of $263 per cow.

As a result of this considerably lower revenue, cow/calf managers in Western Canada have focused on minimizing their overall costs and have dropped their total production costs from a high of $650.53 per cow in 2002 to a low of $553.14 per cow in 2004 during the midst of significant market uncertainty. It is important to note that 2002 saw a widespread drought across Western Canada causing significantly reduced forage supplies and increased feed prices. As can be seen, these types of unpredictable environmental impacts can have significant economic implications for cow/calf manager.

Revenue for cow/calf enterprises is generated from weaned calves, cull cows, cull bulls, cow/calf pairs and bred cows and heifers. That being said, the major revenue stream for a cow/calf enterprise is the weaned calf, traditionally marketed in the fall of the year. Figure 2 outlines the average monthly price for a 550 lb feeder steer during the prime marketing months of October, November and December. Variations in market prices have had considerable impact on cow/calf enterprises' overall income and resulting margins throughout recent years.

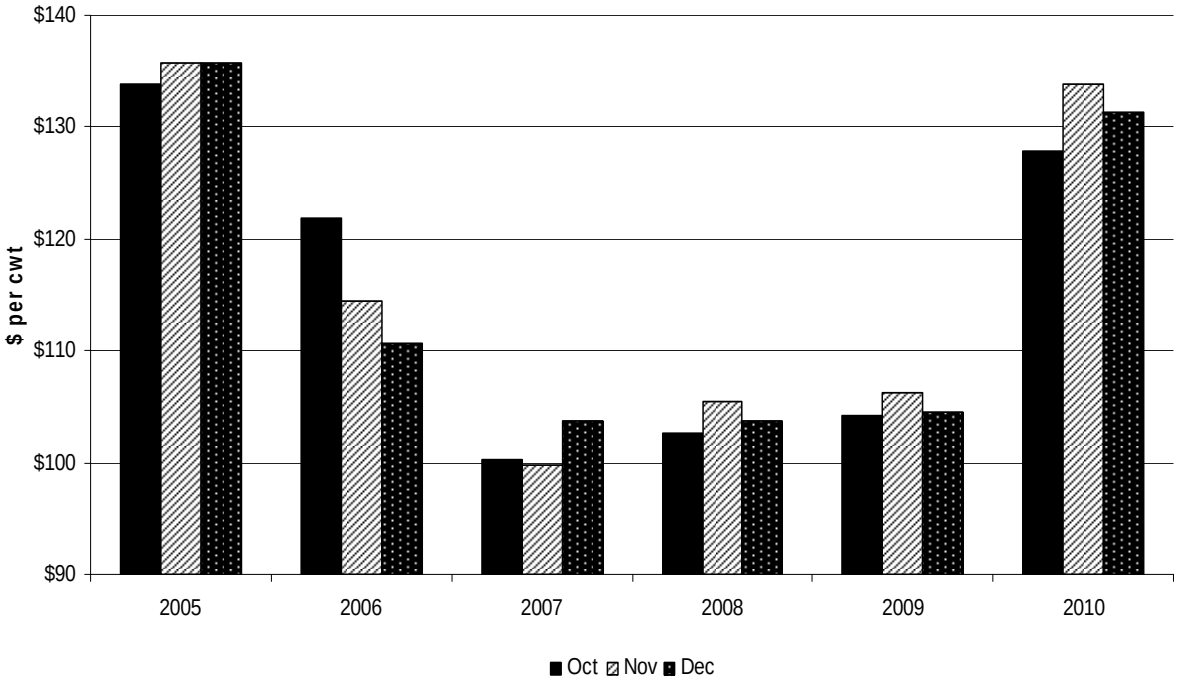

Figure 2. Average Monthly Western Canada 550 lb Steer Price – October-December
(CanFax 2010)

Millang (2001) stated that while total production costs in a cow/calf enterprise do not vary as significantly as revenue from year-to-year, it has been found that reducing total production costs does increase profitability (Millang, 2001). Low cost cow/calf enterprises have consistently been more profitable and more risk-proof than higher cost operations (Kaliel, 2004).

Based on the WBDC COP project, cow/calf enterprise profit margins were found to range from a high of $141 per head profit in 2001 to a loss of $110 per head in 2008. While these numbers provide some insight into the profitability of cow/calf enterprises in Western Canada, it is extremely important that caution is used in interpreting these values generated from such a small data set.

Not only are there limitations due to sample size, there is a need to standardize and accurately report the profitability of cow/calf enterprises. One of the most confusing and controversial topics in the analysis of the profitability of a beef cattle enterprise is the determination of the value of assets on the balance sheet and in the income statement (Dunn 2002).

Both financial and economic analyses are commonly used as measures of profitability and they value assets differently resulting in different outcomes. Financial analysis values assets at their cost or depreciated value (book value), whereas economic analysis values assets at their market value (price at which an asset trades in a competitive market environment). Dunn (2002) noted that it is inappropriate and confusing to mix these methodologies. It is essential that when conducting analysis of cow/calf enterprises or production or management systems within the enterprise that knowledge of the definitions and an understanding of how the measurements are to be calculated be completely understood in order for correct use and application of the findings.

Historic and Current Forage & Feed Grain Prices

There is no formal marketing structure for forages in Western Canada. The vast majority of forages, both for grazing and conserved through mechanical harvesting, are 'home-grown' or produced and utilized for livestock within the same operation. The majority of conserved forages that are sold for livestock consumption are marketed directly at the farm gate to livestock operations in the vicinity.

Considering that conserved forage and grazed forage are the largest single cost of a cow/calf enterprise, it is essential that producers be cognizant of the market prices of these forages and the fluctuations within the markets. That being said, the vast majority of cow/calf producers historically produce their own forages and often do not measure the costs associated with producing this feed. Kaliel (2004) reported that over 90 per cent of cow/calf producers surveyed obtain some or all of their forages from home-grown sources and only 53 per cent of those who produce home-grown feeds have measured the costs associated with this production.

In contrast, feed grains have a very structured marketing system and producers can more readily access supplies and determine current market price. This makes estimating cost and the decision to source grain as a feed resource much easier than conserved feeds such as hay, silage or green feed. In contrast to the vast majority of forages being home-grown, Kaliel (2004) found that 17 per cent of managers purchased all their grain and 44 per cent sourced a combination of home-grown and purchased grains. A significant number, 39 per cent of managers, did not feed any grain to their cow herd.

Conserved Forages

The majority of cow/calf enterprises in Western Canada utilize some amount of conserved forage in some form during the winter season. The most common type of conserved forage is baled perennial hay. In Alberta, over 90 per cent of cow/calf enterprises were found to use baled forages as a significant roughage source during the winter (Kaliel, 2004).

Table 3 outlines average conserved forage prices over the last three growing seasons in Saskatchewan. Availability, largely driven by annual local weather conditions, varies significantly from year-to-year and region-to-region. As a result prices also fluctuate significantly from year-to-year and region-to-region.

Bulky conserved forages tend to be less economically transportable than feed grains and therefore cost of transporting these conserved feeds is most often prohibitive. It is for this reason that conserved forage prices vary significantly from region-to-region.

Table 3. Saskatchewan Conserved Forage Average Prices - $ per tonne

Forage Type	2007/08	2008/09	2009/10
Grass Hay	$55	$91	$96
Alfalfa			
1st Cut	$57	$100	$110
2nd Cut	$64	$114	$131
Mixed Hay	$54	$89	$93
Straw - Cereal	$34	$45	$48
Green Feed	$44	$86	$95

Adapted from: Saskatchewan Forage Council (2010a)

Greenfeed refers to annual crops harvested prior to maturity and baled as feed for livestock. As reported in Table 3, greenfeed prices fluctuate similarly to hay prices depending upon availability. Similar to other forages, greenfeed is commonly grown within the livestock operation or is harvested as a means to salvage a damaged cereal crop for forage.

Silage is commonly made from both perennial and annual forages. More commonly utilized in feedlot rations, some cow/calf enterprises do utilize silage as the main source of roughage. Kaliel (2004) found 35 per cent of cow/calf operators' in Alberta utilized silage as a significant roughage source. The major annual crop used for silage is barley, but other suitable annual and perennial crops are also utilized (SFC, 2010b).

Similar to other conserved forages, silage is often home-grown, however some cow/calf enterprises do purchase silage off-farm. Due to the high moisture content, transporting silage significant distances is not economically feasible. Because the main source of silage is barley, market prices for silage are commonly calculated based off the current barley grain market. Purchasing standing crop for silage is generally priced at eight times the current barley price per bushel to determine the price per tonne. Alternatively, barley silage in the pit is priced at 12 – 12.5 times barley price per bushel (Robinson, 2004). This price equation is typically based on a moisture content of 65 per cent.

Feed Grains

While the majority of cow/calf enterprises in Western Canada utilize some form of conserved forage as roughage for a portion of the winter feeding period, not all managers utilize feed grains as a feed source. Kaliel (2004) found 61 per cent of cow/calf enterprises in Alberta fed grain to their cow herd at some point. Supplementation of grains often depends on winter temperatures, cow condition, roughage supplies and quality, market prices and availability of other feed sources with inclusion of grains varying from year-to-year.

With the expansion of the ethanol industry in North America, feed grain prices have become significantly more volatile due to higher demand for this commodity. The feed grain produced in the greatest quantity globally is corn and therefore the market price of this commodity significantly impacts all other feed grain markets. Figure 3 shows the historic corn price in the US from 1975 through 2009. Prices have traded significantly higher since 2007, a direct implication of the increased demand for corn due to ethanol production.

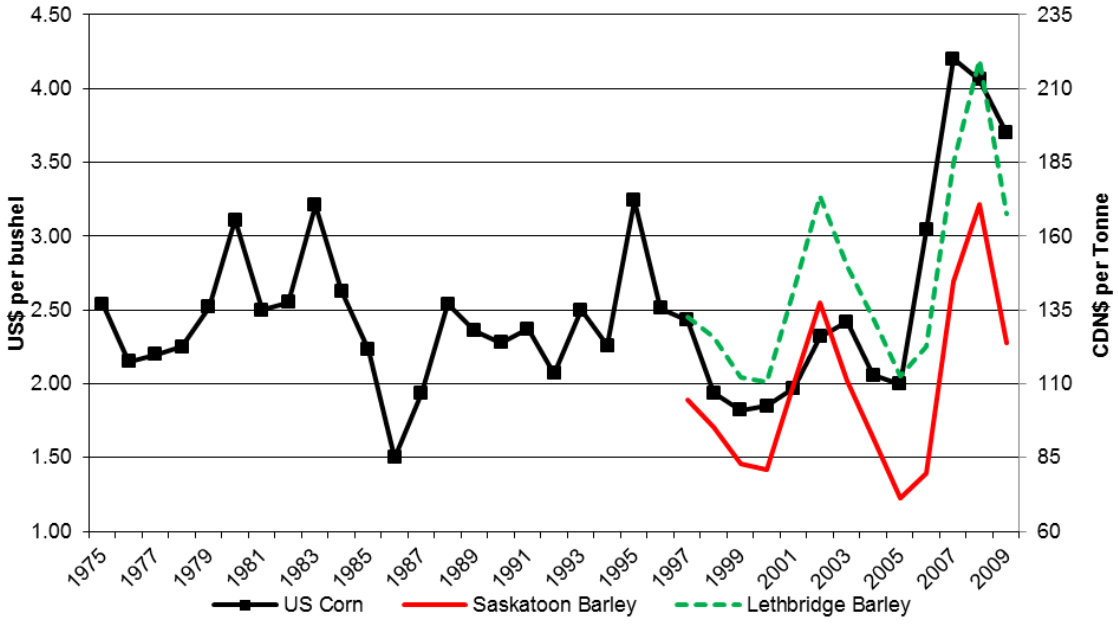

Figure 3. Average Annual Feed Grain Prices in US and Canada
(USDA, NASS, Saskatchewan Agriculture, CanFax, 2011)

The most common feed grain utilized by cow/calf enterprises in Western Canada is barley. Figure 3 also illustrates the annual feed barley prices in Alberta and Saskatchewan. It is clear that there has been a similar price response for barley as compared to corn. Although prices have averaged lower in the last two years there are many reasons to believe this new higher price level will be sustained for feed grains globally.

Due to the close proximity to supplies, barley grain is traditionally less expensive in Saskatchewan than Alberta. Barley prices, like all feed prices, are driven by regional supplies and demand. However, North American and global feed grain supplies and demand also impact grain prices in Western Canada. As is illustrated, barley markets have followed the recent price increases of other feed grains. These increased prices have made feed grain supplementation to beef cows less economically feasible and will place even more importance on forages as a feed resource in the future for cow/calf managers.

Additionally, feed wheat, oats and damaged grains are often utilized as a feed source depending upon regional supplies and market prices. However, these markets are often also similarly impacted by the higher price level of other feed grains limiting their cost-effectiveness as well.

In an attempt to continue to provide supplementation but reduce the input cost associated with using feed grains, pellets[8] and/or grain screenings[9] are often provided to cattle. Table 4 shows average pellet and screening prices in Saskatchewan over the past three years.

Table 4. Saskatchewan Average Pellet and Screening Prices - $ per tonne

Forage Type	2007/08	2008/09	2009/10
Screenings(chaff)	$31	$42	$34
Fortified Grain Pellets	$180	$152	$145

Adapted from: Saskatchewan Forage Council (2010a)

[8] Pelleted feed is formed into a small, densely packed, concentrated form that provides ease of handling, reduced dust and waste and a standardized nutrient composition.

[9] Grain screenings are the remnants that remain after grain has been passed over a cleaning screen and often contain small, broken or shrunken kernels, weed seeds and chaff. The nutrient content of this product is often extremely variable between batches.

In addition to supplementing the bred cow, feed grains or alternative supplementation may be provided to calves while on pasture. In Alberta, 26 per cent of cow/calf managers reported offering creep feed[10] to their calves (Kaliel, 2004).

Grazed Forages

Effective utilization of pasture acres within grazing management systems is essential to maintaining the economical viability of cow/calf enterprises. Costs associated with grazing forage systems have been reported to account for 27 per cent of the total production cost of a cow/calf enterprise (Figure 2). Every day that a beef cow can remain grazing, a financial saving can be realized (McCartney et al., 2000).

Many cow/calf managers own the land that their stock grazes, and therefore determining a fair market value of that forage resource can be difficult. As part of the Saskatchewan Forage Council's (SFC) study, 'The Value of Saskatchewan's Forage Industry: A Multi-Level Analysis', estimated custom grazing and pasture rental rates for both privately and government owned land are reported.

As part of the SFC study, rates for grazing land owned or managed by government agencies were reported to range from $0.40-0.55 per cow per day (SFC, 2010a). In addition to the pasture resource (i.e. forage, water, fence) this also usually includes animal management. Additional costs for things such as calves grazing, breeding, minerals, necessary animal health products and treatments and land tax are also included in that rate. The option to utilize public lands for grazing is not readily available or accessible to all producers but does provides an economic advantage to those who have access to this resource; however management strategies may need to be altered as a result.

More difficult to quantify are grazing rates on private land. In the survey conducted by SFC, grazing rates were found to range from $0.40-$1.10 per cow/calf pair per day (SFC, 2010a). Variation in rates was largely attributed to the differences in services provided by the landowner. For example, some agreements include animal management while others do not.

[10] Creep feed provides supplemental nutrients only to nursing calves, usually in the form of grain, protein supplements or commercial calf creeps. Only calves are allowed access, restricting access by cows.

The report concluded an average of $0.75 per cow/calf pair per day is reasonable for situations where the landowner is providing fenced pastureland and the livestock owner is responsible for animal management.

A least cost feeding system is potentially attained when cow/calf managers focus on managing their grazing systems. Optimal utilization of available forage resources is key to the economic success of a cow/calf operation. Between 70 – 80 per cent of livestock managers across the Prairie Provinces reported utilizing rotational grazing[11] as a means of optimizing pasture productivity (AAFC, 2007).

Low yielding pastures, whether grazed in the vegetative or dormant stage, result in lower stocking rates or reduced number of grazing days as compared to more productive pastures (Havens et al., 2006). These pastures result in higher yardage costs due to the fact that the costs associated with pasture maintenance and management are spread over fewer units of production (Havens et al. 2006). Therefore, it is in the best interests of cow/calf managers to effectively and efficiently manage grazing systems as the forage resource is their most valuable economic tool.

Recent Advancements in Grazing and Feeding Strategies

Alternative Feed Sources

As quantified above, costs associated with forage, feed and feeding systems are the largest contributors to total cost of production in a cow/calf enterprise. Numerous innovative or alternative feed sources and feeding strategies have been explored and utilized for cow/calf feeding systems in an effort to reduce these costs. That being said, valid economic assessment of such alternative feed sources and feeding management strategies are often lacking.

[11] Rotational grazing improves and maintains pasture productivity, soil health and biodiversity through more intensive management with periods of rest during the growing season as opposed to season-long grazing (AAFC, 2007).

Much of the research to date has involved alternative feeds that can be used to supplement beef cows on pasture as a way of extending the grazing season and utilizing lower quality stockpiled forages[12] or supplementing aftermath grazing of annual crop stubble.

Chaff collection is one method that has been explored as a means of supplementation on pasture or during the winter feeding period. Chaff is collected during harvest of an annual crop through slight modifications and additional equipment to the combine. The chaff is either left in the field or hauled to an alternative location. It has been determined that this type of feeding system provides adequate nutrients to meet the beef cow's maintenance requirements (Kelln et al., 2007). Chaff can potentially be an economical feed supply in a mixed farming operation but close attention needs to be paid to the cost of harvesting and feeding chaff.

The expansion of the ethanol industry in North America has resulted in the use of ethanol by-products such as wheat dry distillers grains (DDGS) and corn DDGS in ruminant diets. In livestock rations, distillers grains can be used as an energy or protein source to partially offset the demand-driven increase in the price of grains (Coltrain, 2004). Most of the present literature on the availability of distillers grains is primarily focused on nutrition. Historically, during periods when there is a shortage of protein, wheat DDGS trade at values closer to other protein sources such as canola or soy meal. During times of abundant protein availability, wheat DDGS will compete with feed barley for pricing (Boaitey, 2010).

The dominant feedstock used for ethanol production in Western Canada is wheat, making up approximately 70 per cent of the total feedstock utilization (Boaitey, 2010). Boaitey (2010) found that wheat and corn DDGS generally have a positive effect on beef cattle and hog diets by reducing costs. Feeding DDGS in cow/calf feeding systems was not analyzed. Much of the research has been conducted on corn ethanol by-products and within the feedlot system however initial research has explored the potential for inclusion of these by-products in more extensive cow/calf feeding systems.

[12] Stockpiling refers to management that defers grazing of dormant forage until later in the fall and winter. Depending on the animal and type of forage that is stockpiled, part or all of the nutrient requirements can be met with stockpiled forage.

Van De Kerckhove and Lardner (2008) found that in an extensive grazing system, wheat DDGS was an acceptable supplementation source. A detailed and thorough economic analysis of this alternative feed source was not conducted. However, an initial cost assessment found that supplementing cows on stockpiled pasture with wheat DDGS was $0.26 per head per day cheaper than supplementing with a commercial pellet (Van De Kerckhove and Lardner, 2008). During the same trial, cows that received no supplementation while grazing stockpiled pasture, gained body weight and improved body condition and had the lowest estimated cost of all feed systems at $0.75 per head per day.

Alternative Feeding and Grazing Management Strategies

Extending the grazing season by utilizing various management strategies has been found to reduce the amount of time that livestock need to be fed mechanically harvested feed. In turn, this reduces a number of the costs associated with many feeding systems utilized in cow/calf production. Depending on the system being implemented, all or a combination of the following cost variables may be reduced:

- feed;
- labour;
- fuel;
- machinery cost and repair;
- utilities (power, natural gas);
- manure removal; and
- custom work (swathing, baling, etc.).

Because of the lower costs associated with grazing systems, alternative grazing strategies have been explored and implemented by many managers. Grazing for extended periods of time does result in significant reductions in winter feeding costs.

Stockpiled grazing and swath grazing are fall and winter grazing strategies typically used in the Western US and Canada by beef producers to increase the number of total grazing days each season. While these strategies have been found to reduce the cost of feeding hay, unpredictable weather conditions, such as rain or snow accumulation, may have a significant impact on forage quality, forage utilization, and subsequent animal performance.

Swath grazing commonly involves seeding a cereal crop in mid-June and swathing the crop in the soft dough stage prior to a killing frost. Beef cows then graze the swaths during the fall and/or winter months in an effort to minimize the number of days feed needs to be delivered to the cow. Beef cows have successfully grazed swaths through snow as deep as 45 centimetres (McCartney et al., 2000). As cow/calf mangers continue to look for ways to effectively reduce feed costs, more and more crops are being considered for swath grazing.

Swath grazing costs include the seed, seeding, crop inputs, and swathing. Typically, access to swaths is managed utilizing electric fence in order to minimize waste. Swath grazing provides an alternative method for extending the grazing season into the winter with lower feed costs, reduced labour costs, lower stored feed costs and manure hauling costs than cows wintered in a traditional winter feeding system on roughage (McCartney et al. 2000).

Stockpiling pasture is a form of deferred grazing and is another method of extending the grazing season. Forage grown during the spring and summer is stockpiled or set aside for fall, winter or spring grazing. This eliminates harvesting, hauling and feeding costs of conserved forages and reduces manure handling costs (Dick et al., 2008). Depth of snow cover may limit grazing of standing forage in certain regions, however stockpiled forages can still be utilized in the late fall and early spring when vegetative growth is not available. Supplementation may need to be provided in order to meet the cow's nutritional needs.

In addition to stockpiled and swath grazing strategies, other alternative winter feed management strategies have been implemented in an effort to reduce overall cost of production in cow/calf enterprises.

More and more producers are delivering conserved feed to beef cows in a more open, pasture setting, only bringing cattle into corrals during winter storms when shelter is required or when easy access to handling facilities is required (i.e. during calving). While this still requires the labour, fuel and equipment costs of delivering feed each day or two to the herd, manure removal and maintenance costs are significantly reduced in an open field setting.

Bale grazing involves either placing a large number of bales in a pasture or field setting in the fall or allowing bales to remain where situated when deposited from the baler. Cows then access feed directly at the source. Access to feed is often controlled with electric fencing. Commonly, managers provide access to a new set of bales every two to five days. The longer the rotation cycle, the greater the amount of feed provided access to at once and the more feed that is left as a nutrient source in the field (MAFRI, 2008).

Some benefits of bale grazing include potentially reduced equipment costs as tractor use is concentrated to one period in the fall rather than every day or two in winter, lower operating costs, reduced manure removal costs, and improved land fertility (MAFRI, 2008). Although there are some cost savings, the cutting and baling costs and often hauling or placement of bales are still being incurred resulting in higher costs as compared to animals grazing standing forage.

Extending the grazing season and reducing the amount of forage that is mechanically harvested is by far the most effective way to reduce total production costs. Based on the limited cost analysis for various grazing and feeding strategies, the overall impact of reducing mechanical harvesting and feeding has been estimated. Based on assumptions made by Havens et al. (2006), maintaining Canada's entire beef cow herd on stockpiled forage for one more day in the winter would result in a potential cost savings of $3.8 million to the Canadian cow/calf sector. Similarly, maintaining just the Western Canadian beef cow herd for one more day on stockpiled forage would result in a $3.1 million saving.

Table 5 outlines the various costs for grazing alternatives compared to a traditional 200 day feeding system. This information is based on estimates for these types of systems and is only used for comparison purposes. Many operations will utilize a combination of one or more of these practices depending on their operation and resources available. While this gives a general summary of the estimated costs associated with these types of systems, actual costs vary significantly from operation to operation and it is recommended that cow/calf managers calculate their own costs for any given feeding strategy being considered. It is also essential that future research into alternative feeds and feeding strategies include a thorough economic analysis.

Table 5. Cost Analysis of Grazing Alternatives Compared to 200 Day Winter Feeding System

System	Total Cost per Cow per Day	Yardage Cost per Cow per day	% Savings*	Savings per day	Savings per cow
Traditional Feeding (Hay/Straw)	$1.75	$0.87-$0.94			
Straw/Chaff Buncher	$0.72 or less	$0.32	59	$1.03	$206
Swath Grazing	~$0.91	$0.19	48	$0.84	$168
Stockpiled Grazing	$1.02 or less	$0.36	42	$0.73	$146
Bale Grazing	$1.35	$0.40	23	$0.40	$80

Source: Havens et al., 2006
* savings reported as compared to Traditional Feeding

As can be seen from Table 5, straw/chaff buncher, swath grazing, stockpiled grazing and bale grazing all provided some level of cost savings when compared to a traditional feeding system. Savings ranged from $0.40 to $1.03 per head per day.

Note that caution should be exercised when utilizing these numbers as they are based on industry estimations combined with survey data. These cost estimates and potential savings are somewhat inconsistent and further support the need for comprehensive economic analysis of the various feeding and grazing systems being explored and considered for cow/calf operations.

According to Havens et al. (2006), over $0.73 per cow per day can potentially be saved when utilizing a stockpiled grazing system compared to feeding cows in a traditional winter feeding system. Based on these assumptions a cow/calf enterprise consisting of 250 cows could potentially save $182.50 for every day the grazing period is extended with stockpiled forage and $5475 in total saving potential if the grazing period is extended by one month. These cost estimates for stockpiled grazing are considered to be extremely conservative and are not standardized therefore the savings could potentially be higher and will be dependent on the current fiscal position of the cow/calf operation.

It is not typically the cost of the winter feed alone that is the major expense during the winter feeding period; it is the also system that is utilized to deliver the feed.

Table 5 clearly illustrates that extensive systems typically have lower yardage costs than more intensive feeding or grazing systems. It is important to accurately assess all costs associated with the feeding and grazing system. Feed and yardage costs will vary depending on the cost to produce the forage. If yields are significantly reduced due to drought, overgrazing, etc., the cost of the grazing system increases considerably. This is why production and economic management must be considered collectively and not in isolation.

It is important to note that there is far from consensus on the value obtained from extending the grazing season. This reality warrants further economic analysis to accurately quantify potential cost savings of the various grazing and feeding strategies utilized within Western Canadian cow/calf production systems. Manske (1998) questioned whether the cost of winter pastures due to lost calf production is greater than the potential feed savings and concluded that the best strategy is that which efficiently captures the protein and energy produced on the specific cow/calf operation. He found that the value of additional pounds of calf production on summer pasture was greater than the cost savings from reserving the pasture for winter grazing.

It is clear that there is a need for cow/calf managers to determine feed and grazing management strategies that effectively use their existing resources rather than basing management decisions on initial research and economic assessments that may not apply to their situation.

As was stated earlier, cow/calf managers have become more conscious of the costs associated with winter feeding and the opportunities in extending the grazing season in Western Canada, however there is still considerable room for improvement by researchers, industry stakeholders and cow/calf managers. Significant changes in management practices have occurred such that managers are implementing one or multiple strategies to reduce confined feeding days (AAFC, 2007).

Table 6 reports the percentage of livestock managers that are utilizing methods of extending the grazing season in the various regions across Western Canada. As can be seen, the southern parts of Alberta and Saskatchewan within the Brown soil zone report the largest per cent of livestock operations utilizing strategies to extend the grazing season. The Brown soil zone is a large cattle producing area in Canada, with 5,225 farms reporting almost 1.7 million head of grazing

livestock (AAFC, 2007). Sixty-nine per cent of the farms in the Brown soil zone report beef cattle as their primary commodity (AAFC, 2007).

Table 6: Practices Used to Extend the Grazing Season Across Western Canada

Type of Extended Season Grazing	Per cent of Farms Extending Grazing Season			
	Brown Soil Zone	Dark Brown Soil Zone	Black Soil Zone	Boreal Plains
Early Spring Forage	37%	30%	21%	17%
Late Fall Forage	26%	25%	20%	18%
Swaths	22%	27%	24%	19%
Stockpiled Growth	38%	36%	24%	16%
No Extended Grazing	21%	22%	26%	31%

Adapted from: AAFC (2007)

While the Brown soil zone has a large number of farms with a considerable number of grazing livestock in a small area, the Black soil zone and Boreal Plains have significantly more farms and cattle. The Black soil zone reported almost 12,500 farms with over 2.8 million head of grazing livestock and the Boreal Plains reported more than 10,800 farms with 2.5 million head of grazing livestock (AAFC, 2007). While these areas report the largest number of grazing livestock in Canada, these regions have the smallest percentage of farms utilizing various methods of extending the grazing season. While climate does play a factor in the ability to extend the grazing season, it is clear that there is ample opportunity to better understand the potential for extended grazing, specifically in these regions of the country.

Recommendations

Greater focus needs to be placed on measuring and evaluating the costs associated with the feed consumed by a beef cow, whether during the winter feeding period or in a grazing system. Intuitively cow/calf managers understand that feed, whether grazed or conserved forages, is their largest production cost. However, in order to accurately assess if management strategies or feeding systems are economically viable, financial and economic analysis of the enterprises' initial cost of production must be measured and ultimately potential cost saving methods analyzed.

Significant research has been conducted on the potential alternatives to winter feeding and methods of extending the grazing period in Western Canadian cow/calf operations. However, oftentimes a thorough economic analysis is lacking when conducting forage and feed research. Ultimately, for any innovative feed, forage or management strategy to be effective, economic benefits or challenges must be clearly outlined. Therefore, it is recommended that a planned thorough economic analysis be included in all future forage and feeding research proposals. It is also recommended that a more complete economic analysis of the feed costs in the cow/calf sector in Western Canada, including an expanded economic analysis of recent advancements in feeding and grazing strategies, be undertaken.

The majority of cow/calf managers do not perform any economic assessment of production costs or measure of profitability. As a result, the majority of cow/calf enterprises fail to attain their potential financial success. An initial quantification of the impact that forage and feed costs have upon the cow/calf enterprise can lead to securing financial success. Analysis tools that allow for consistent and ongoing collection of the necessary data to complete individual cow/calf economic analysis need to be created and promoted both within the cow/calf sector and the entire forage/beef industry.

There exists a significant shortage of trained professionals in the field of applied forage and beef economics in western Canada. In order to fulfill the increased research requirements that are aforementioned, additional recruitment and training of professionals in the area of applied forage and beef economics is essential. Resources, at all levels, need to be targeted to ensure that the capacity within Western Canada of skilled professionals with direct expertise in this area is significantly expanded.

Future Investigation

Considering that feeding the beef cow accounts for the major costs associated with cow/calf enterprises, there is a considerable lack of economic analysis of existing and potential forages, grazing and feeding strategies. It has been identified that forage and livestock producers, if not one in the same, are intrinsically linked. Forage value is derived through utilization by livestock and livestock are dependent on forage production.

Fundamentally, higher feed grain prices have put a new focus on the forage-utilizing capability of beef cattle and will create a paradigm shift in production practices that utilize more forage resources. The flexibility of the ruminant beef animal is the greatest advantage of the beef industry in the future. However, in order to fully capitalize on this advantage, targeted research dollars towards forage production and feeding and grazing management systems that also include a specific focus on economic analysis are necessary.

Much of the current research focused on forage production and animal performance lacks the economic component that is necessary to determine the effectiveness of any new forage species/variety or grazing or feeding strategy. This gap in forage economics has meant that the largest economic component to profitable cow/calf enterprises, feeding and grazing management strategies, have not been fully researched or understood.

Additionally, while economic analysis of cow/calf enterprises in Western Canada has been occurring since the late 1990's, limited information exists with respect to the size of the industry and the importance of such measures to the individual success of businesses. While this type of analysis has raised awareness of the importance of certain costs associated with cow/calf production, industry averages based on very small sample sizes fall far short of providing adequate information for the industry.

Comprehending the complete economic components of the enterprise is essential in making any production or financial management decision and need to be better understood by both industry and researchers in order to further improve the long-term competitiveness and viability of the cow/calf sector in Western Canada. Economic analysis must be integrated into the initial planning and design of all future forage and beef production research projects as opposed to the current tendency to evaluate as an addendum to many projects.

Industry Stakeholders and Potential Partnerships

In order for the forage and livestock industry to fully capitalize on the future for potential growth, improved strategies, and ultimately increased cost savings, it is essential that there be an expanded understanding of the forage/feed/livestock interface. Stakeholder partnerships must be developed and strengthened for the benefit of the entire industry.

Current industry stakeholders include:

- provincial and national cattle associations
- provincial and national forage associations
- Western Canadian forage and beef researchers
- feed and forage research networks
- Western Canadian research funding agencies
- provincial and federal governments

While partnerships have begun to be formed between forage and livestock industry leaders at both the provincial and national levels, more effort needs to be made to meet the ever increasing needs of maintaining competitive feed, forage and livestock sectors in Western Canada.

It is imperative that livestock and forage industry leaders collaborate on the growth potential that can be achieved through cooperation. It is recommended that a forum be solidified for ongoing discussion between livestock and forage stakeholders. This will allow for exploration of possible synergies and necessary focus areas to ensure that all stakeholders are contributing to the future development and improvement of economically viable feeding and grazing strategies in the cow/calf sector. It is recommended that a Saskatchewan Forage and Livestock Round Table be struck to facilitate discussion, prioritize and direct future research, and foster stakeholder partnerships.

Conclusions

Feeding and grazing systems make up approximately 60-70 per cent of the total production costs of cow/calf operations in Western Canada, of which two-thirds is the cost of winter feed and bedding, while pasture accounts for the remaining one-third of the equation. In order to capture consistent profits, cow/calf managers need to focus on reducing total costs, concentrating on feed, forage, grazing and feeding systems.

Even though feeding and grazing systems are the largest contributor to production costs, there are significant gaps when it comes to economic analysis of forage, grazing and feeding research. In addition, many cow/calf managers do not conduct economic assessments of their business, leaving them extremely vulnerable to ever-growing losses. In order for the cow/calf sector to regain some competitive advantage, significant effort needs to be placed on the financial measures of the business, both at the individual business level and the research level.

Effective utilization of all forages in grazing and feeding systems will be required for the cow/calf sector to remain competitive and economically viable over the next decades. Initial estimates indicated that over $3.8 million in savings could be captured for each day that grazing is extended for the entire Canadian beef herd. Thorough economic analysis of existing and future feeding and grazing strategies needs to be undertaken to accurately assess the economic impacts these systems have on the entire cow/calf enterprise. It is recommended that a stronger emphasis be placed on economic analysis as it relates to cow/calf production management and specifically, feed and grazing system costs. Understanding the costs associated with all forage resources is essential for cow/calf managers' financial success. Forages have the potential to be a cow/calf operation's most valuable economic tool.

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Appendix A

Glossary of Terms

Capital Costs costs incurred in the purchase of land, buildings, construction and equipment to be used in the production of goods or the rendering of services.

Direct Costs expense items that are directly related to production activity such as grazing, feed and health costs.

Economic Analysis a method of analysis that values assets at their market value and evaluates an entry or exit strategy for a business.

Financial Analysis a method of analysis that values assets at their cost or depreciated value (book value) and evaluates managerial efficiency.

Fixed Costs production costs that do not change when the quantity output produced changes.

Operating Costs recurring expenses which are related to the operation of a business, or to the operation of a device, component, piece of equipment or facility.

Variable Costs part of production costs that change according to how much output it produces. In the long run, most costs can be varied.

Yardage Costs an expression of indirect costs including ownership (depreciation, housing, insurance and interest costs) and operating costs of facilities, repair and maintenance of machinery and equipment, fuel, labour, management, utilities, property tax and general and administrative costs. These costs are often charged as head days fed or grazed. The "yardage concept" is most commonly used for grazing cattle and custom fed cattle.