



Improving the Performance of the Nova Scotia Grass Fed Beef Sector from a Value Chain Perspective

Report

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Executive Summary

The term Value Chain Management (VCM) describes a process where businesses situated along the value chain purposely work together to attain sustainable competitive advantage. In developing closer strategic relationships businesses acquire the ability to learn and accelerate the pace of innovation in line with consumer demands, leading to improved financial performance.

The purpose of this project is to assist Nova Scotia's beef industry acquire the protocols, knowledge and skills required to profitably produce, process and market grass fed beef, thereby enabling the establishment of a sustainable initiative. It achieved this through characterizing the current state of the Grass Fed Beef (GFB) sector from a "gate to plate" value chain perspective, and identifying gaps that must be addressed to establish a sustainable GFB initiative. The findings enabled the project team to propose actions that can enhance the competitiveness of Nova Scotia's beef industry.

The research identified that approximately 800 – 1,000 GFB cattle are produced annually in Nova Scotia. While markets clearly exist for GFB, they are generally niche and underdeveloped. It also identified that GFB production can be a more challenging endeavour than the production of grain/corn fed beef. Adhering to a forage diet can also add little value from a consumer perspective, though considerable cost to the overall production system. This is because relying on one type of feed (forage) requires specialized knowledge on how to produce and manage; slower growth rates due to forage not containing the same levels of protein or starch; lower economic returns due to slower growth rates, extended housing requirements, along with the costs of reseeded pasture and conserving forage; and growth rates, forage-based diets, and the lack of marbling associated with GFB are among the factors which can significantly impact taste and eating quality.

Additional challenges that must be overcome for GFB to become a realistic and economically viable sector of Nova Scotia's beef industry include:

- No verifiable cost of production data currently exists for grass fed beef
- Risks associated with forage only diet in an area impacted by variable weather
- The lack of a consistent or recognized GFB production program
- No basis for establishing a basis to measure and continually improve performance
- Producers' viability (albeit slim) only exists by selling directly to consumers
- Many processors are wary of GFB due to inconsistency in quality and supply
- The lack of a defined marketing program and verifiable GFB brand
- The lack of a recognized grading and pricing grid for grass fed beef

The report and supporting appendixes propose a coordinated production system that can benefit participants from along the value chain by:

- Providing the ability to benchmark production and associated factors, including quality
- Enabling them to establish and maintain constructive business relationships
- Enabling them to establish and maintain a presence in the target market(s)
- Proposing a continual improvement program to reduce costs and increase revenue
- Establishing a scalable business model, resulting in larger markets and economies of scale
- Enabling production of consistent quality branded product, resulting in increased consumer loyalty and market differentiation

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1 Purpose and Objectives

The purpose of this project is to assist the province of Nova Scotia to acquire the protocols, knowledge and skills required to profitably produce, process and market grass fed beef, thereby enabling the establishment of a sustainable initiative. It achieved this through characterizing the current state of the Grass Fed Beef (GFB) sector from a “gate to plate” value chain perspective. The project’s objectives were to detail the effectiveness and efficiency of current operations in relation to the expectations of beef consumers, and factors found to impact value chain performance: particularly at the farm, processing, distribution, and retail or foodservice. The findings enabled the researchers to propose a series of actions for establishing a closely-aligned value chain that was economically viable, thereby enhancing the long-term opportunities facing Nova Scotia’s beef industry.

This report contains headline findings from an exhaustive study that used primary and secondary research to triangulate findings that would enable the researchers to propose an effective way forward. The secondary included reviewing current grass fed beef initiatives occurring in Canada and elsewhere, and identifying factors that determined of cost effective production of grass fed beef valued by consumers. The primary research included interviews with 18 Nova Scotia beef producers, 5 processors, and 6 industry experts to map, measure, and analyze the current state value chain. . Intercept interviews and surveys were conducted among 1,006 Nova Scotia beef consumers. Detailed information is contained in the attached Appendixes and available on request.

1.1 Value Chain Management

The term Value Chain Management (VCM) describes a process where businesses situated along the value chain purposely work together to attain sustainable competitive advantage. In developing closer strategic relationships businesses acquire the ability to learn and accelerate the pace of innovation directly in line with consumer demands. This flows from the involved businesses possessing the ability to continually improve the efficiency and effectiveness of operations performed within and between the businesses that together comprise the value chain.

The red meat industry is a unique industry. It constructs, deconstructs and converts products as they move along the value chain. For the most part, the traditional beef industry is a commodity based sector, with a significant number of market and consumer factors impacting the degree of effectiveness and efficiencies that can be extracted. Many of these factors have the potential to impact consumers’ perception of beef, by influencing the quality, safety and consistency of attributes which determines consumers’ satisfaction and willingness to pay.

1.2 Methods and Activities

The project reflects the DMAIC approach (Define, Measure, Analyze, Improve and Control). DMAIC is a proven method for improving a value chain’s performance in relation to the target market(s) by implementing processes and management systems that enable the involved business to make informed management decisions. This and the ability to monitor the effectiveness of management decisions along the entire value chain enable the participants to continual improve performance.

The project was undertaken in six phases:

Phase 1 – Define

The first phase of the project defined the present chain's structure and the nature of current operations. This includes the relative impact that inputs (genetics, feed, etc.) and processes have on determining consumer-recognized quality and value, and the profitability of the businesses that together comprise the value chain. It also identified relationships between processes currently performed along the entire value chain and how they could be managed more effectively to continually improve performance.

The consumer research defined the relative importance of specific attributes associated with grass fed beef (e.g., sensory attributes, food safety, traceability, human husbandry/slaughter practices), along with their willingness to pay. The research will be conducted among consumers purchasing beef from three distinct venues: retail, foodservice, and farmers markets.

Phase 2 – Measure

Once the present structure and nature of the sector was quantified, its performance and capacity to produce grass fed beef was evaluated. This enabled the researchers to identify relationships between activities occurring at multiple points along the value chain to be quantified and managed effectively, leading to continual improvements in performance. It also enabled the development of a COP model in excel that was fairly rudimentary though effective.

Phase 3 – Analyze

The third phase of the project saw the researchers analyze quantitative and qualitative data collected during the Define and Measurement phases to identify the root causes of challenges faced by the businesses that together comprise the value chain. The results produced specific insights into where along the value chain the most effective improvements can be made over the short, medium and long term.

Phase 4 – Improve

The three previous phases of the research produced insights that enabled the research team to determine practices that will lead to improvements in a specific value chain's (and wider industry's) performance. Reference is made to the anticipated impact that differing structure and governance practices will have on the final participants' ability to continually improve value chain performance, by cost effectively producing beef for which target consumers are willing to pay.

Phase 5 – Control

The final phase of the research used the extensive research findings to propose governance practices and key performance indicators that will enable the eventual ability to validate, document and control processes, resulting in the ability to continually improve performance and profitability.

1.3 Report Overview

As all successful value chain initiatives begin and end with consumers, the body of the report commences by presenting headline findings from the extensive consumer research conducted in February 2013. Intercept interviews were conducted among 562 consumers shopping in retail stores located in Truro, Bedford, Wolfville, and Truro. Farmers market and on-line surveys were conducted

among 300 consumers that purchase grass fed beef directly from Nova Scotia farmers. A combination of intercept interviews and on-line surveys were conducted among 145 foodservice consumers.

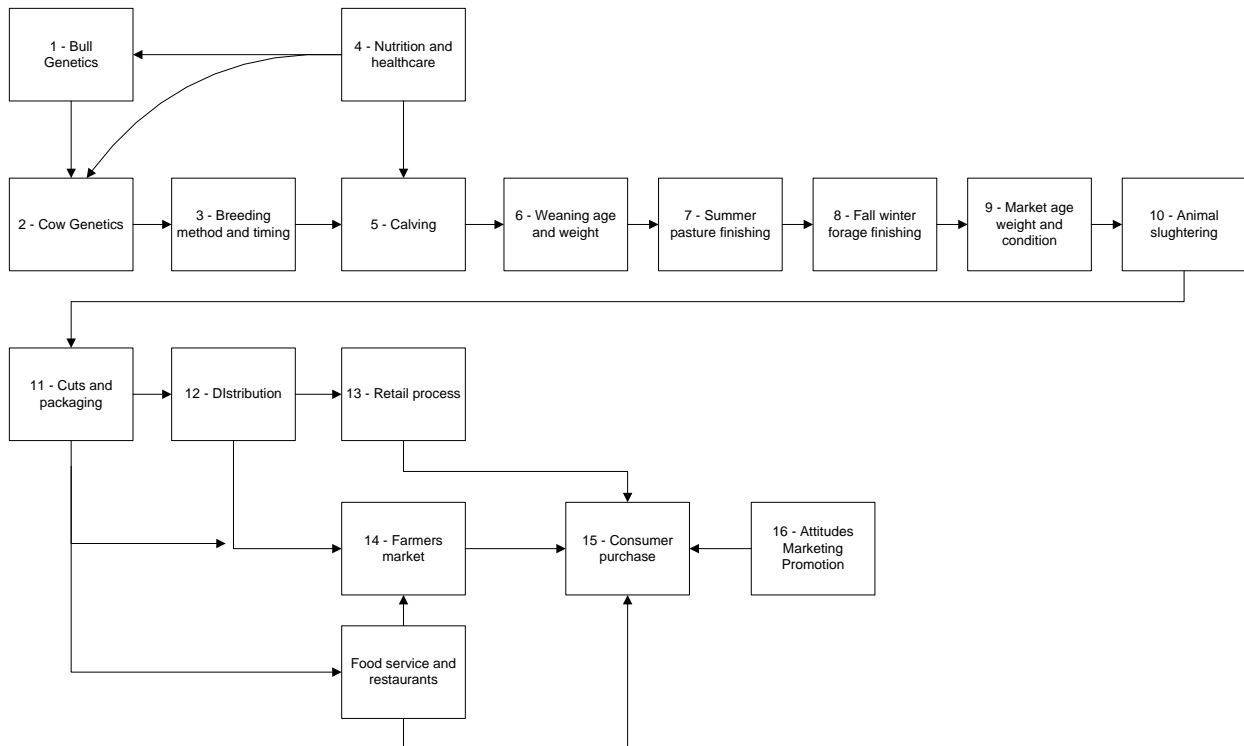
Subsequent sections of the report present research findings, gaps identified in current capability or performance compared to grass fed beef (or related) initiatives that the secondary research identified as being among “best in class”, and potential means of addressing gaps. Section 3 details findings from interviews conducted with Nova Scotia beef farmers and the resulting analysis.

Factors described include production protocols, the nature/incidence of on-farm management systems, pasture and forage practices. Section 4 presents findings from interviews conducted with beef processors operating in the Atlantic region and the resulting analysis. Included in this section is a summary of how grass fed beef is currently marketed in Nova Scotia. The report ends by summarizing findings and presenting a model that would enable Nova Scotia to more cost effectively produce grass fed beef.

1.4 Value Chain Map

Presented below in Figure 1-1 is a schematic of the sector level value chain analyzed for this study. The primary differences in route to market occur after processing, with a number of producers retaining ownership and marketing beef that they had produced directly to consumers through farmers markets or on-line (through a website). The chain encompasses a maximum of fifteen steps. The sixteenth step relates to consumers’ attitudes. This partly stems from how GFB is presently marketed and promoted.

Figure 1-1 Value Chain Schematic



Section 2 of the report encompasses steps 13 – 16; Section 3 encompasses steps 1 – 9; Section 4 encompasses steps 10 – 12. The report concludes with Section 5, which proposes a means for motivating and enabling participants from along the value chain to enhance their long term financial performance. Appendixes are provided to help expedite this process and implement a GFB initiative.

2 Consumer Research

This section contains headline findings from a more thorough review of findings contained in the PowerPoint entitled “Improving the Performance of the Nova Scotia Grass Fed Beef Value Chain Consumer Research Report – *Interim Final*”. The proposal that forms Appendix E includes analyzing the data further, to support the development of an extensive and effective marketing campaign and value chain initiative. The unique information contained below, in the aforementioned PowerPoint, and from subsequent analysis can greatly assist the development of Nova Scotia’s beef industry.

2.1 Purpose and Methodology

The purpose of the consumer research was to support the development of a closely aligned and sustainable GFB value chain initiative through identifying and measuring correlation between Nova Scotia beef consumers’ socio-economic status and:

- Attributes associated with quality
- Attributes associated with credence
- Attributes associated with health and nutrition
- Willingness to pay for the above attributes, and why

The research was conducted research among consumers purchasing beef from three distinct venues [retail, direct from farmers at markets or online, foodservice] and was conducted using a combination of intercept interviews and online. The survey used a combination of Likert Scale questions, along with discrete choice and conjoint analysis methodologies to identify drivers of consumer behaviour across the overall population and identify segment of the market where the greatest opportunities reside for marketing GFB. Utilizing a combination of delivery method and methodologies enabled the findings to be triangulated, resulting in greater certainty that the insights accurately reflect drivers of consumer behaviour. The chosen methodology was also designed to identify messages that resonate with specific markets, thereby enabling development of an effective marketing strategy and protocols that result in the production of beef that contains attributes for which target consumers are willing to pay.

The research was conducted in Truro, Halifax, Wolfville and Bedford on Thursday, February 7; Friday, February 8; Friday, February 15; and Saturday, February 16. This combination of locations, dates, and distinct days of the week ensured that the research encompassed the maximum array of consumer demographics. The sample size and statistical margin of error are presented below in Table 2-1.

Table 2-1 Sample Size and Statistical Margin of Error

	Proposed Sample	Actual Sample	Statistical Margin of Error (95% Confidence Level)
Total	1000	1007	+/- 3.0
Retail	600	562	+/- 4.1
Farmers Markets	300	300	+/-5.6
Food Service	100	145	+/- 8.1
Retail and Farmers Market analysis is also split out by:			
<i>Ground Beef</i>		539	+/- 4.2
<i>Steak</i>		325	+/- 5.4
Sample population based on 2012 Nova Scotia population (948,695) http://www.gov.ns.ca/finance/statistics			

2.2 Headline Findings

The findings showed that the respondents shop at a wide array of retailers. Many also commonly buy directly from producers [predominantly at farmers markets and online]. A large segment of consumers also consume beef at restaurants. Females aged under 50 are more likely to choose grass fed beef (GFB) than males, largely due to health and environmental/ethical considerations. A strong positive correlation was also found to exist between whether someone possesses university level education and their propensity to choose GFB. Individuals from households containing no one aged under eighteen years of age also appear more likely to purchase GFB, particularly steak.

While the comparative importance of specific attributes differ slightly by meal occasion, the research identified that regardless of the consumer demographics and place of purchase /consumption, the majority of consumers place the greatest importance on sensory attributes (taste, tenderness, appearance, etc.). The consistency of these attributes is also critically important. That same holds true for upper and lower quartiles of the population further emphasizes the importance that all consumers place on choosing beef exhibiting consistent of eating quality.

When asked about relative importance of attributes related to method of production, grass fed did not rank highly as an important driver of most consumers' purchase decisions. In a number of cases the concept of grain fed ranked even lower. More important are attributes that are associated with grass fed beef production. They include that the beef contains Omega 3 and Vitamin E, is hormone free, and antibiotic free. Anecdotally, the research showed however that many consumers do not directly connect these attributes with grass fed (versus grain fed) production. Organic production received the lowest ranking in terms of its importance as a driver of consumer behaviour.

In relation to provenance, local scored a higher overall ranking than product of in Nova Scotia. Though neither were considered critically important. The influence of provenance appears to stem from it appearing to offer consumers assurances about the authenticity of the beef that they choose to purchase. The most respondents did not explicitly associate provenance with added value further emphasizes the importance of quality and consistency to engendering consumer choice.

The comparative importance of price was evaluated through questions designed to elicit insights into consumers' willingness to pay (WTP) for attributes associated with either beef *per se* and or

specifically grass fed beef. To provide a context with which respondents could readily connect, the research focused on consumers WTP for ground beef and strip loin steaks. The findings show that consumers' WTP for GFB is not significant compared to regular (grain/corn fed) beef, and that price appears to have a greater influence on determining consumer choice for steak than ground beef. The highest willingness to pay revolved around lean ground beef [particularly when combined with Omega 3, Vitamin E, and naturally raised]. Though even this was not statistically higher than the prices that consumers would be expected to pay for regular beef.

While greater analysis is required, these initial findings suggests that reducing production costs will have considerably greater influence on determining the long-term sustainability of a GFB initiative than the ability to secure premiums from the marketplace.

3 Production

The background research identified that approximately 800 – 1,000 grass fed beef (GFB) cattle are produced annually in Nova Scotia. It also identified that GFB production can be a more challenging endeavour than the production of grain/corn fed beef. Adhering to a forage diet can also add little value from a consumer perspective, though considerable cost to the overall production system. This is because relying on one type of feed (forage) requires specialized knowledge on how to produce and manage; slower growth rates due to forage not containing the same levels of protein or starch; lower economic returns due to slower growth rates, extended housing requirements, along with the costs of reseeding pasture and conserving forage; and growth rates, forage based diets, and the lack of marbling associated with GFB are among the factors which can significantly impact taste and eating quality. Producers also face greater weather related risks due to its impact on the quality on grass when grazing and forage for winter feed.

Differences in costs associated with summer versus winter production also discourage producers from establishing a year-round finishing program, which is critical to establishing a significant market presence. Differences in the taste and appearance of regular (grain/corn fed) and grass fed beef can discourage consumer support and loyalty. These and other challenges have discouraged producers from producing grass fed beef *per se*.

The most effective means of combating these risks is through implementing defined management processes relating to breeding, production, grazing and forage management, nutrition, and health. Defined protocols are also critical to collecting continuous and measurable data that can be used to develop then monitor management decisions, leading to continually improvement in financial performance. The need for producers to establish and abide by defined management processes also stem from age, genetics and growth rates directly impacting taste and eating quality – which are the greatest impediments to consumer loyalty towards grass fed versus grain/corn fed beef.

The research identified a distinct variation in producers' experience, capabilities and attitude; with three categories of grass feed beef (GFB) producers appearing to exist. They are:

1. Believe in GFB, have established a business case that they believe works for them, and make objective business decisions based on (limited) data and processes;

2. Believe that GFB is the right thing to do, are not commercially minded, make subjective decisions, and do not know whether their operations are financially viable;
3. Freeloaders who have identified a market opportunity and reported to be selling commodity beef as GFB.

The differences between the categories of producers are presented below in Table 3-1.

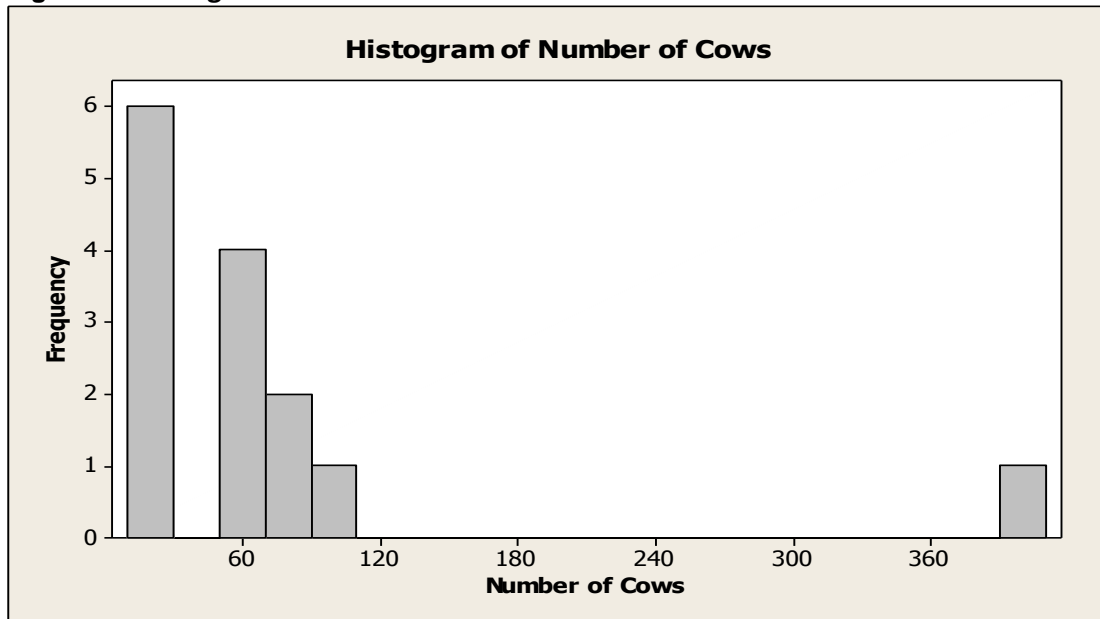
Table 3-1 Difference between Categories of Producers

Driving Philosophy	Committed to GFB	Know COP	Management capabilities	Measurable processes	Consistency in finishing	Economic viability
The GFB business case	Yes	Somewhat	Moderately sophisticated	Some, usually rudimentary	Have a target range	On balance, yes
GFB is right thing to do	Generally	No	Largely unsophisticated	Few, if any	Can be wide ranging	Highly unlikely
The market opportunity	No, will freeload	Not for GFB	Are good marketers	Few, perhaps purposely?	Can be wide ranging	Trade GFB and commodity beef

As can be seen above, none of the respondents had a defined management process for producing GFB. Neither do they have a defined grazing and forage management plan, or nutrition program. The processes, plans and programs that do exist vary widely in their structure and sophistication. While producers do not definitively know their cost of production (COP), the most sophisticated and business minded had a good idea of COP and were managing their costs reasonably well. The extent to which many producers' business model is financially viable is also questionable due to them owning forage production equipment and their own bull, even though their operations are generally small. It should be noted that a direct correlation was not found to exist between the size of operation and the sophistication of management capabilities or processes. In fact, instances were found where the opposite occurred.

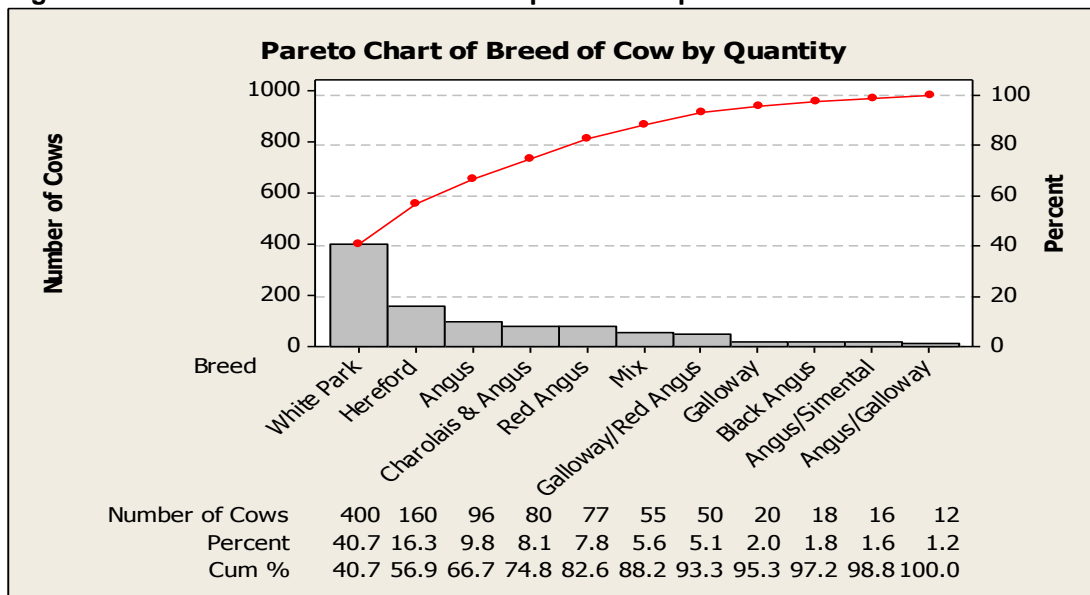
Presented below, Figure 3-1 shows the size of breeding operation among producers of grass fed beef or who are interested in producing grass fed beef. The majority of operations already producing, or interested in producing grass fed beef, number seventy cows or less. The primary implication that this has for mounting an economically viable grass fed beef industry include that establishing a market presence that extends beyond niche will rely on producers cooperating, to continually reduce costs of production and securing added value through producing the necessary volume of consistent high quality beef. It also has implications for current management capabilities, the capacity of infrastructure, and resources available to a future initiative.

Figure 3-1 Histogram of Herd Size



Genetics have a significant impact on the financial viability of any operation. Figure 3-2 separates the number of cows presented above by breed, and the percentage that each breed represents across the overall population sample. Most of the breeding cows are medium framed early maturing British breeds that are suited to a grass and forage diet. Due to growth rates and size at finishing, questions remain about the appropriateness of the most numerous breed (White Park) for establishing a financially viable grass fed system. It should however be noted that a definitive answer what not forthcoming on whether the White Park are purebred, hybrid, or their exact number.

Figure 3-2 Incidence of Breeds across Respondent Population



Establishing a coordinated grass fed beef initiative that is able to penetrate the mainstream market will rely on producing a year-round supply of consistent high quality cattle. Table 3-2 presents the

current breeding cycle by breed, dam number, and month. Production largely follows the traditional model of calving in the spring to maximize the suckling mother and calf's time on fresh grass.

Table 3-2 Estimated Calving Cycle

Breed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Charolais & Angus	12	12						12	12	15		12
Angus							5	40	40	5		
Red Angus	3	3	15	16	3	3	3	3	3	3	3	3
Angus/Simental									8	8		
Angus/Galloway					6	6						
Angus	5	6	5									
Galloway					10	10						
Galloway/Red Angus	2	2	9	9	9	9	2	2	2	2	2	
Hereford				15	15				15	15		
White Park				100	100	100						
Mix			27	28								
Total	22	23	56	168	143	128	10	57	80	48	5	15
% of total	3%	3%	7%	22%	19%	17%	1%	8%	11%	6%	1%	2%

The research identified that most breeding cycles do not take fluctuations in market demand into account. Extended breeding cycles tend to only exist among producers that are direct marketing beef to consumers year-round.

As noted in the introduction, distinct differences exist in the existence and sophistication of nutrition programs. Distinct differences also exist in the incidence and application of defined health programs. The effectiveness of nutrition and health plans has distinct impact on feed conversion rates, costs of production, consistency in finishing, returns (prices of finished cattle), and therefore overall viability. They also have a distinct impact on meat quality, particularly taste and tenderness. They also affect the colour, nutritional composition, and shelf-life of beef.

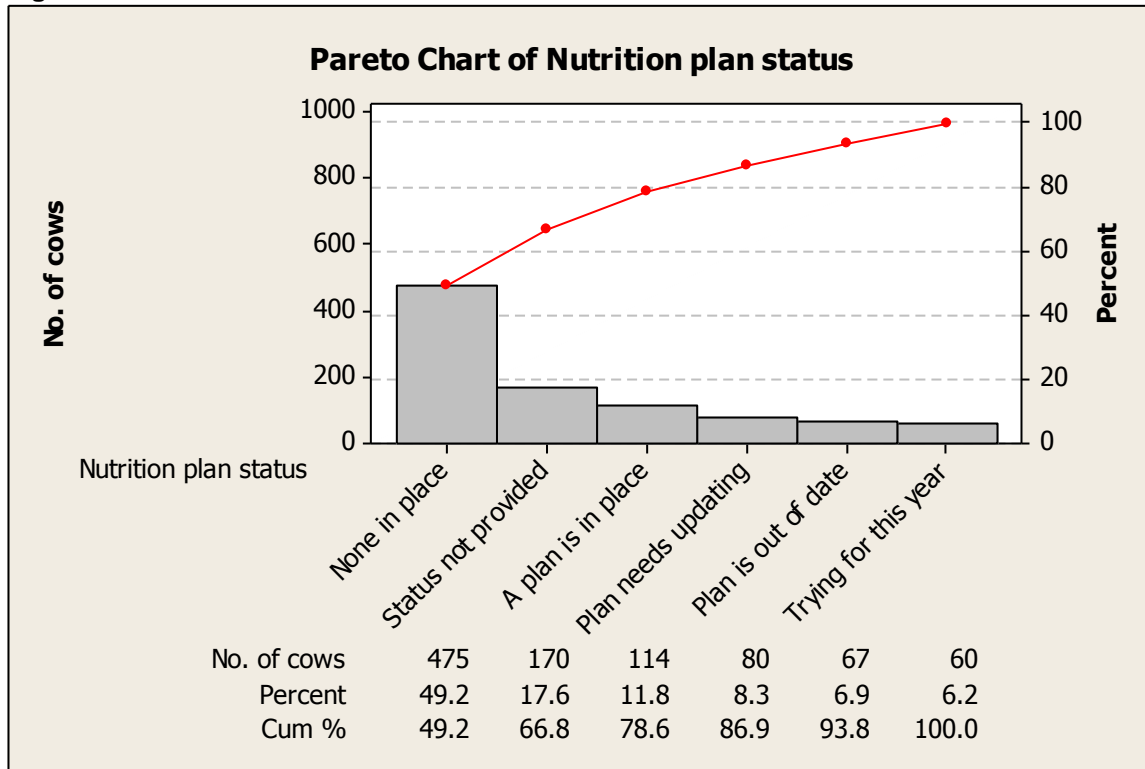
Shown below in Table 3-3 is the incidence of arguably the most basic of health programs: vaccination and de-worming practices. Distinct differences were found in respondents' health programs. Most producers treat only the cow or calf, a sizeable percentage treat neither.

Table 3-3 Incidence of Vaccination and De-worming Practices

		Cow	Calf	Treat both Cow & Calf	Treat neither Cow nor Calf
De-worm	Yes	5	7	3	
	No	5	5		5
Vaccinate	Yes	5	5	3	
	No	7	7		5

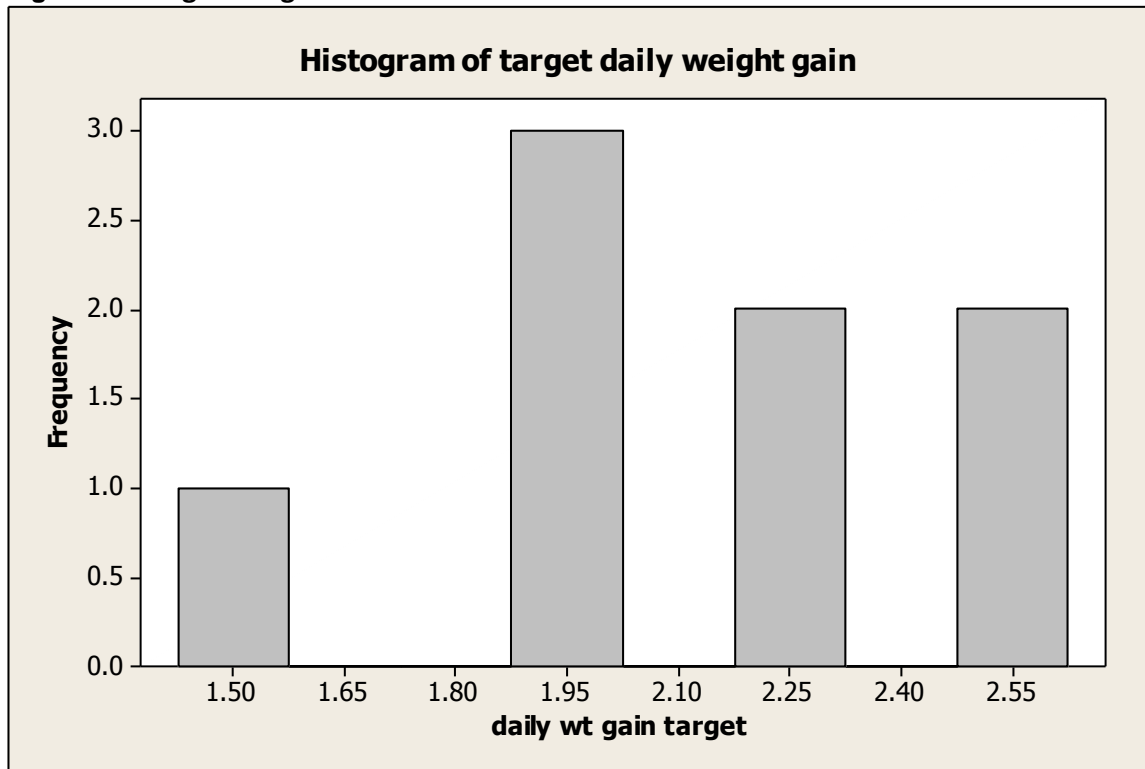
Shown below in Figure 3-3 is the incidence of nutrition plans and the number of cows effected. In over 50% of instances nutrition programs do not exist or are outdated. The largest herds are among those not possessing a defined nutrition program for cows or calves. The identifier “status not provided” signifies the lack of a clear response, suggesting that one does not exist. If correct, approximately half of the grass fed beef produced is impacted by their feeding decisions being based largely on assumption.

Figure 3-3 Incidence of Nutrition Plan



Given the findings so far described in this section of the report, it is not surprising that the daily live weight gain targeted by producers varies considerably. It must be emphasized that this is only an estimation, because only a few of the respondent producers actually measure or track live weight gain. Even fewer analyze trends to guide decisions that will lead to improvements in performance. Figure 3-4 presents targeted live weight gains. No correlation exists between herd size, the targeted rate of gain, or the incidence of measuring gain and using the resulting data to make effective management decisions.

Figure 3-4 Target Weight Gains



3.1 Summary of Findings

The findings show that significant opportunities exist to improve the performance of Nova Scotia operations producing (or interested in producing) grass fed beef; to the degree that it appears doubtful whether most operations are presently financially viable. That some operations appear to be financially viable, albeit marginally, appears due to producers selling directly to consumers through farmers markets or over the internet. Their viability rests on securing the margins that would otherwise be secured by distributors, retailers, and/or foodservice operators. Presented below in Table 3-4 are the gaps in performance that must be addressed to improve respondents' financial viability, and how present gaps could be addressed.

Table 3-4 Gaps in Performance and Proposed Methods to Address

Identified Gaps	Proposed Methods to Address
Lack of sharing of knowledge and experience between producers	Establish a safe unintimidating environment for producers to share information and learn
Production risks associated with GFB greater than those associated with grain/corn feed beef	Establish a program that enables producers to mitigate risks associated with grazing and forage
Lack of a definitive cost of production model that enables producers to benchmark their individual performance across parameters	Develop a user-friendly excel model that producers can use to monitor their entire operations and reduce production costs
Fragmented production base for GFB and resulting impact on the consistency of and consumer recognized value for GFB	Establish a core group of producers that are committed to producing high quality GFB through abiding by pre-agreed protocols
Producers' overhead costs impacted by owning forage and other farm equipment	Explore how and which producers are suited to collaborating in areas such as forage production
Lack of knowledge and insights into the effectiveness of current breeds and genetics	Identify the traits with breeds which determine animals' suitability for a GFB program, and using AI to quickly and effectively bolster performance
Lack of defined health protocols and practices	Establish health protocols and practices suited to producing GFB in Nova Scotia
Lack of defined nutrition plans and practices, inc. grassland and forage management	Establish nutrition protocols and practices suited to producing GFB in Nova Scotia
Birth, production and finishing does not necessarily match market demand	Establish program that assists producers to plan (and be rewarded) for timing production in line with market demand

4 Processing

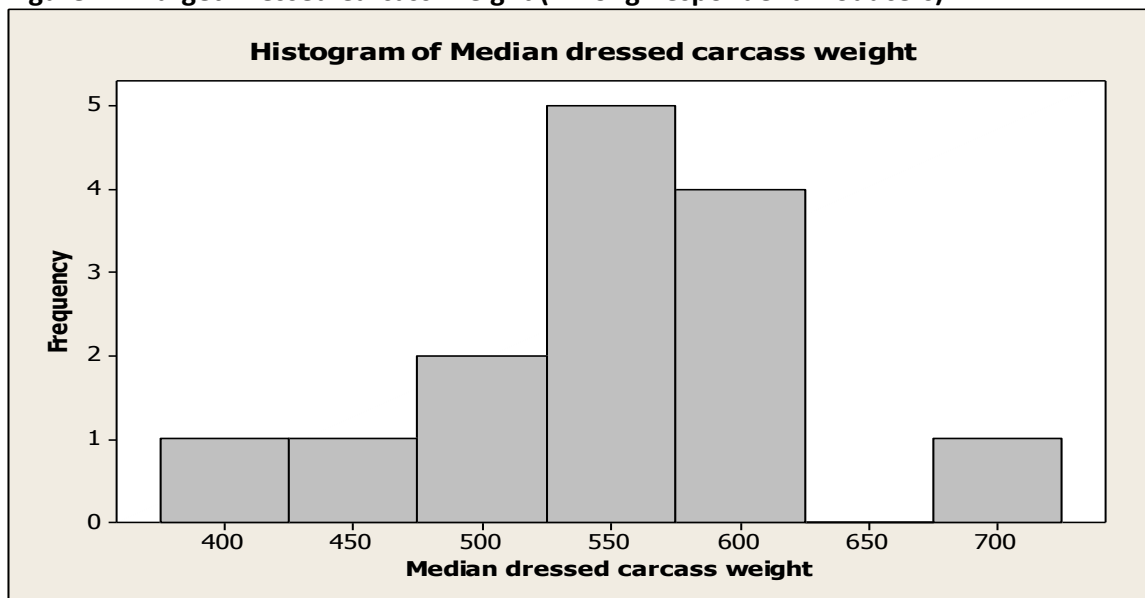
The following information was gathered through interviews conducted with five processors, four industry experts, and reviewed literature on factors affecting the effectiveness and efficiency of processing grass fed beef. One GFB producer operates a mobile processing facility, though the financial viability of this service appears questionable and has not been included in the analysis.

Six critically important findings resulted from interviews conducted with processors of Nova Scotia beef. They are:

1. Variations in the size, quality, and consistency of grass fed beef have discouraged processors from committing to participate in a dedicated GFB initiative;
2. The lack of a federally-inspected processing facility that is committed to a GFB program has impacted GFB producers' ability to access larger retail and foodservice markets;
3. The majority of GFB is processed by small independent processors whose practices (inc. cutting and aging) vary, resulting in inconsistencies in size, appearance, tenderness, and taste;
4. Protocols do not presently exist for grading GFB;
5. Processors currently handle very little beef that meets the GFB protocols proposed by NSDA;
6. The sixth is that most processors do not differentiate between GFB and 'regular' beef when marketing to their customers and consumers, because they see insufficient demand or supply.

The majority of GFB are slaughtered at between 18 and 24 months of age, though it is common for cattle to be 24+ months old when killed. The variability that exists among animals produced by Nova Scotia's GFB sector is shown below in Figure 4-1 Producers' target carcass weights vary by 300lbs. This results in significant differences in carcass composition (grade and quality), yield, and return (value) per animal. It also results in significant differences in processing costs and killing/butchering as a percentage of the overall cost of production.

Figure 4-1 Target Dressed Carcass Weight (Among Respondent Producers)



Presented below in Table 4-1 is the median dressed carcass weight identified for each breed of cattle produced by respondents. The majority are situated in the 500-600lb range. The outliers include White Park, whose suitability for a GFB initiative was questioned, and Hereford.

Table 4-1 Median Dressed Carcass Weight

Breed of Cow	Median weight
Charolais & Angus	575
Angus	600
Red Angus	450
Angus/Simmental	Not reported
Angus/Galloway	550
Angus	450
Galloway	550
Galloway/Red Angus	525
Hereford	700
Mix	525
White Park	500

These factors impact the financial viability of processors. They also impact the value that producers can derive from producing GFB.

Information Sharing

The current situation appears to be both an outcome and a determinant of little proactive or formal communication occurring between the majority of GFB producers and processors. The information most commonly exchanged between producers and processors was price and weight. In the case of producers who market their beef directly to consumers, the primary information shared was cost per head. Due to the lack of an effective GFB grid, most cattle are not formally graded.

Marketing

Three of the responding processors stated that they purposely do not differentiate the GFB that they process. This is due to their inability to verify the authenticity of GBF and costs associated with segregating grass fed versus regular beef. Four of the processors stated that they also did not differentiate GFB because they did not perceive a market opportunity, and that they perceived natural and antibiotic free was more important to their customers and consumers than whether the cattle had been fed a 100% forage diet. Their decisions also reflected a belief that a common profile or market presence had been established for GFB, which they could leverage to their advantage.

Another factor impacting processors' commitment to a GFB initiative is the ability to maximize carcass value. Only by marketing the entire carcass as differentiated or value-added products are they able to capture the estimated 10+% premium over the wholesale price of commodity beef that many GFB producers say is required for them to be financially viable.

4.1 Summary of Findings

The findings show that significant opportunities exist to improve the performance of processors handling GFB produced in Nova Scotia. Presented below in Table 4-2 are the gaps in performance that must be addressed to improve respondents' financial viability. It also proposes means for addressing factors found to impact performance, or that discourage processors from committing to become involved with a GFB initiative.

Table 4-2 Gaps in Performance and Proposed Methods to Address

Identified Gaps	Proposed Methods to Address
Little formal or verifiable information exists on the grading of GFB	Establish a grading grid specifically designed for GFB. Consider including unique metrics relating to eating quality, such as sheer test scores
Variations in cutting and handling practices	Establish carcass cutting and aging protocols
Variation in age, weight, carcass composition, quality, and yield, which is exacerbated by a lack of proactive constructive communication occurring between processors and producers	Establish cost of production model and protocols that enable producers and processors to optimize slaughter age/weight/yield through sharing continuous and measurable data
Little market presence exists for GFB produced in Nova Scotia	Establish a working group of producers and processors that engages with a third party to establish a brand and marketing strategy, that is supported by verifiable production and processing protocols
Fragmented and informal pricing, and inability to project supply of GFB	Strike a group of producers and processors who possess the ability to project volumes of GFB and establish a benchmark pricing grid for GFB

5 Moving Forward

The report now moves to proposing a model that the secondary and primary research suggests will enable committed participants from along the value chain to establish a grass fed beef (GFB) initiative that is sustainable and economically viable.

Presented below in Table 5-1 are risks that the value chain analysis identified as being present in Nova Scotia's grass fed beef sector. The extent to which they could negatively impact the sector's opportunities and the long-term success of the proposed initiative are conveyed in colours (green, yellow, red). Green represents relatively minor though important factors. Yellow represents factors that will impact any initiative's opportunities to expand beyond its present largely niche market. Red represents factors that could prevent GFB from becoming an economically viable endeavour.

Table 5-1 Value Chain Risks

		Impact on GFB initiative		
		Low	Medium	High
Probability of occurrence	High	<ul style="list-style-type: none"> In ability to secure retail shelf space in chain stores 	<ul style="list-style-type: none"> Cost of expanding infrastructure Producers not collaborating and sharing information Variation in carcass weight Lack of processor capacity Lack of effective grazing management 	<ul style="list-style-type: none"> Limited consumer demand for GFB, and current amount untested Unknown costs of production Production costs not managed Producers willing to sell below COP Meat processors uncommitted to GFB Low Quality of pasture and/or forage Inconsistent ineffective management
	Medium		<ul style="list-style-type: none"> Lack of year round supply No federally inspected processor in NS Suboptimum genetics 	<ul style="list-style-type: none"> Limited availability of GFB animals Inability to meet same level of tenderness as traditional beef Lack of grading standards for GFB
	Low		<ul style="list-style-type: none"> Lack of nutrition plans Variation in vaccination and de-worming 	<ul style="list-style-type: none"> Poor pasture and forage may necessitate feeding corn

The sustainability of a GFB initiative will rely upon it possessing the structure, capabilities, and governance required to mitigate these risks. Most of the risks relate to cattle production, and stem from the ineffective management systems that currently exist on most if not the majority of farms. The specific issues that an eventual GFB system must address to be sustainable, are therefore:

- There presently exists no verifiable COP data, or method of benchmarking across farms
- The risks associated with forage only diet in an area regularly impacted by variable weather
- Lack of consistent and effective in production methods
 - Including breed, feed: pasture and forage management, health program
- No foundation on which to measure, monitor and continually improve performance
- Producers' viability (albeit slim) only exists by selling directly to consumers
- The only "local" federal slaughter facility and facility with any capacity is ABP
- Large processors are wary of committing to GFB due to inconsistency in quality and supply
- Lack of a defined marketing program, brand, and market presence
- Lack of a recognized and effective grading/pricing grid for grass fed beef

5.1 Proposed Value Chain Model

The model proposed below in Figure 5-1 reflects the eight determinants of success that are shared by the vast majority of commercially successful and sustainable value chain initiatives, including those identified in the literature review. They are:

1. Start off small;
2. Possess a clearly-defined and articulated vision;
3. Possess restrained ambition;
4. Led by effective leaders and champions;
5. Defined roles, responsibility, accountability by measurement;
6. Maintain the motivation to continually improve;
5. Establish and maintain effective relationships;
6. Implement effective communication strategies;
7. Establish ability to create, share, & protect value;
8. Participants experience things together.

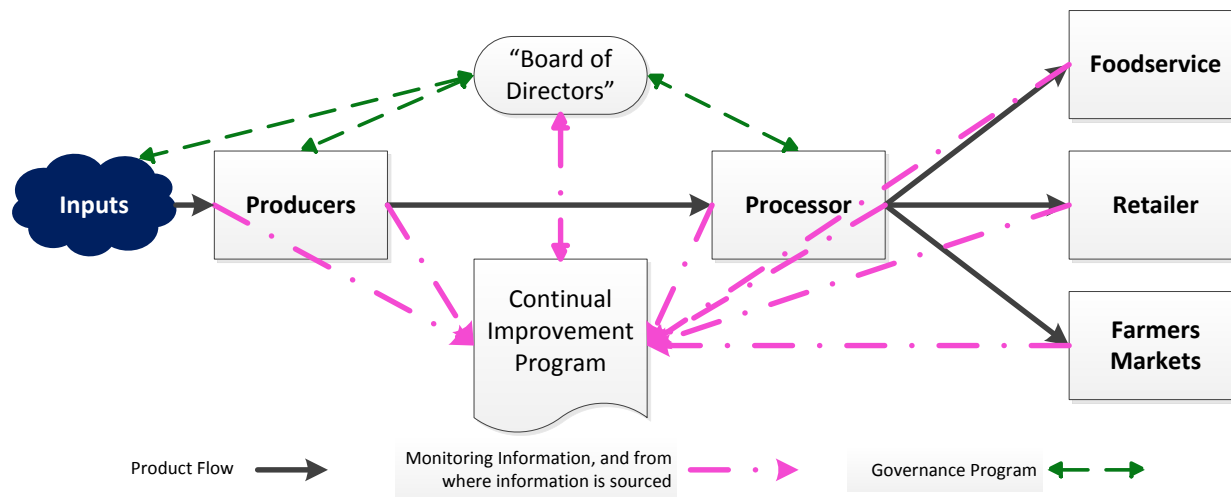
The model also reflects the proven benefits that producers can derive from establishing a collaborative profit-generating entity with likeminded peers. They include:

1. Provides a single commercial interface when working with processors, retailers and other customers, and service companies including suppliers of genetics;
2. Provides greater bargaining power when negotiating with other members of the value chain, and the ability to maintain constructive business relationships;
3. Focuses the participants on the importance of product quality, messaging and promotion, and fully engaging in the process of developing solutions to challenges faced in the market;
4. Acquiring the resources required to engage professionals who possess clear market-orientated objectives;
5. Possessing the ability to benchmark production costs and effectiveness, and implement actions that led to continual improvements in financial performance;
6. Enable them to establish and maintain a strong presence in the target market(s);
7. Establish basis from which to expand, resulting in greater economies of scale;
8. Enable production of consistent quality branded product, resulting in increased consumer loyalty and market differentiation.

The materials contained in Appendixes C and D have been prepared to assist individuals through the process of systematically establishing the GFB initiative described below. The literature review identified that keeping the value chain as short as possible and only involving people possessing the required attitudes are critical determinants of success. So too is establishing the means to monitor and continually improve performance through collecting continuous measurable data. The physical value chain that we propose is comprised of three links: producers, a processor, and the end market. To capture the greatest possible value through maximizing carcass balance, the initiative will eventually supply three markets: retail, foodservice and farmers markets. A fourth entity, a group that acts as a Board of Directors, will oversee the initiative by determining its strategic direction and implanting processes that determine its operation. This includes determining production protocols (including whether a 100% forage diet is stipulated from the outset, or this is something that the members work towards over a given timeframe) and the governance structure used to enforce decisions, leading to continual improvements in performance.

Figure 5-1 illustrates the initiative's proposed structure, how it will be coordinated, and the primary sources of information used to make informed management decisions.

Figure 5-1 Proposed Initiative's Structure



Presented below in Table 5-2 is the composition of each of the four group's belonging within the proposed Nova Scotia Grass Fed Beef Initiative (NSGFBI), along with their roles and responsibilities.

Table 5-2 Composition and Governance Arrangements of Participating Groups

Factors	Producers	Processor	Marketers	Board of Directors
Composition	Only producers that possess business acumen & attitudes that support collaboration	Initially 1 processor, with professional attitude & history of abiding by commitments	Supply consumers identified as preferred target markets	Four farmers One processor One retailer One foodservice Perennia / NSDA
Responsibilities	Abide by pre-determined protocols Monitor & report performance	Commits to develop and abide by grading and pricing grid Monitor & report carcass performance	Commit to market and merchandize GFB according to agreed standards & pricing	Establish & equally enforce objective governance model and brand across the entire group
Performance metrics	KPIs: daily gain, age, grade, health status, accurate records, on time delivery of animal, tenderness	Consistency of cut, tenderness, accurate & timely reports on carcass performance, timeliness of payment	Record keeping, sales volume, sales value, feedback on market dynamics	Overall NSGFBI performance, abide by terms of reference, professional management
Finance	Paid on quality/ pricing grids that reflect market value	Pay producers on agreed pricing /payment grid	Abide by pre-agreed payment schedule, do not discount	Ensure financial arrangements are viable & healthy

Rules on expansion	Can only join if recommended by two current members & approved by Board	Exclusive access to use NSGFBI brand in specific markets Other processors can apply to use NSGFBI in their market, if abide by protocols	Annual exclusivity to NSGFBI brand in specific markets.	Defined terms of reference, elected by members, and set duration for time on Board
Branding	Pay 1% check-off on sales of live animals	Collect 1% check-offs from purchase of finished animal	Pay a 1% check-off of final market value (retail, etc.)	Invest funds in marketing & research

Detailed below in Table 5-3 are suggestions of the factors that should be considered when designing and implementing the NSGFBI's governance system.

Table 5-3 Factors to Consider in Establishing Appropriate Governance System

Production protocols
<ul style="list-style-type: none"> • Define / manage most cost-effective production method: e.g., silage feed lot; • Pasture management: including soil test, seed varieties, fertilizer program; • Forage management: including tests, storage, feed practices, supplements; • Genetics: preferred breed(s) and traits, promote AI to improve genetics; <ul style="list-style-type: none"> ○ AI can reduce COP and increase carcass value, to point that it far outweighs costs. • Target live weight gain: when/how measured, how reported, by stage of life; • Feed practices: including supplements, by stage of life, by season; • Health practices: by stage of life, by handling process, how reported; • Traceability: outcome of reporting arrangements and systems; <ul style="list-style-type: none"> ○ Potential system for aiding traceability and monitoring farm / animal performance, to increase profitability, is System Integration's "Farm Track".
Pricing grid / incentive system
<ul style="list-style-type: none"> • Calculated on objective measurable KPIs, target margins, estimated end market value; <i>system is not based on COP+ or commodity markets</i>; • Premiums and penalties calculated on estimated loss of revenue and/or associated costs incurred by other members of the value chain; • Arrangements include upper and floor prices, subject to adherence to health and management protocols; • Check offs collected at multiple points along the value chain are collected to support marketing, market and production related research, verification of GBF program;
Grading
<ul style="list-style-type: none"> • Based on objective measures associated with grass fed beef • Incorporates sheer test: <i>linked to enforcement of production and handling practices?</i>

Market position / brand message
<ul style="list-style-type: none"> • High incidence of grazing and conserved forage in diet produces beef that contains different (healthier) fatty-acid composition to grain fed cattle; • Highlight sensory characteristics that appeal to the targeted consumer market (e.g. lean); • Highlight consistent high quality meat produced through natural means; animal welfare, family farms, local, raised in Nova Scotia;
Management training
<ul style="list-style-type: none"> • Deliver tailored marketing, production, quality management workshops to entire chain; • One of the participating farms is chosen on a two year rotation as the basis for training designed to improve farmers' business skills, including financial management;
Extension and program support from Perennia / NSDA
<ul style="list-style-type: none"> • Pasture management • Forage management and nutrition program • Establishing, measuring, reducing COP • Breeding programs • Marketing materials • Quality management (process improvement, business relationships) • Professional governance and management training

Appendix E proposes that the project team uses the knowledge acquired from this project and their value chain management expertise to support the establishment of a GFB program in Nova Scotia. They will guide and mentor a core group of likeminded producers, implementing processes that will enable long term improvements in the initiative's performance to be achieved, and building the management capacity required for the initiative to be financially sustainable.

Appendix A: Factors Determining Success of Grass Fed Beef Initiatives

1 Introduction

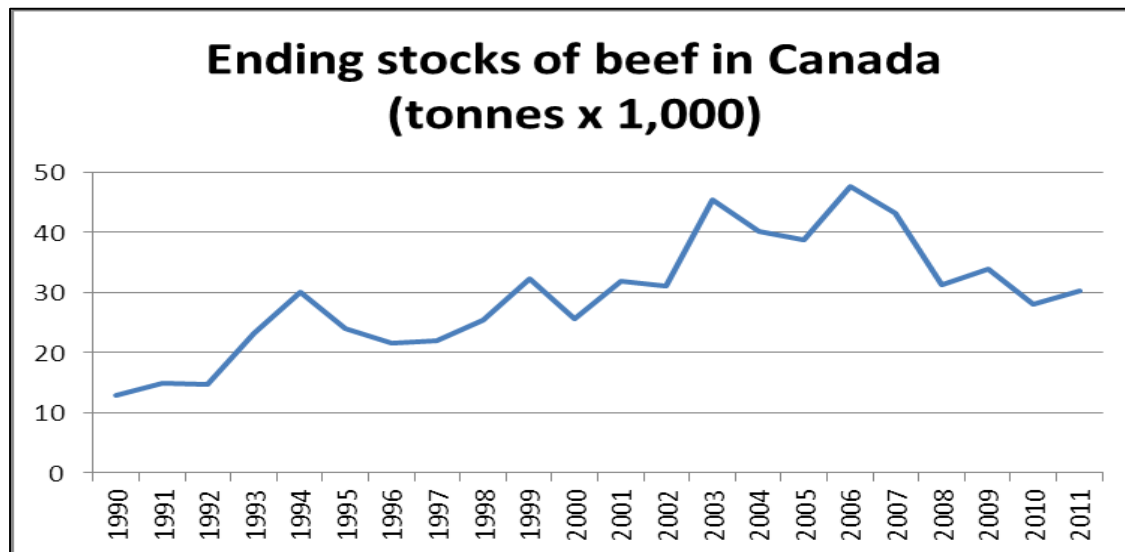
This literature review provides insights into the factors that will determine the economic feasibility of establishing a grass fed beef program in Nova Scotia. It begins by providing an overview of the local industry in relation to the overall Canadian industry. It then describes factors impacting consumer interest in grass fed beef and establishing an economically viable system. It then describes grass fed red meat initiatives that are generating greater market-derived returns for producers than commodity beef.

The initiatives that are included in this review represent some of the most innovative and competitive operations in their respective markets. Many of these value chains have embraced the five keys of value chain management, and have leveraged working partnerships to maximize revenues while streamlining costs. There is a specific emphasis on initiatives producing grass fed beef, the benefits achieved, and the costs associated. While Livestock Marketing now primarily markets lambs, it successfully applied the same approaches to market beef and has remained at the forefront of animal marketing in the UK for twenty years. The review concludes by presenting two possible scenarios for consideration.

1.1 Overview of Nova Scotia's Beef Industry

The total amount of available beef in Canada has fallen since hitting a high in 2006, in order to restore the ending stocks of beef to what they currently were, new beef products need to be considered as a viable option beside the traditional commodity grain-fed beef that dominates Canada's beef industry. Figure 1 outlines the ending beef stocks in Canada from 1990-2011.

Figure 1: Ending Beef Stocks in Canada (1990-2011)



Source:

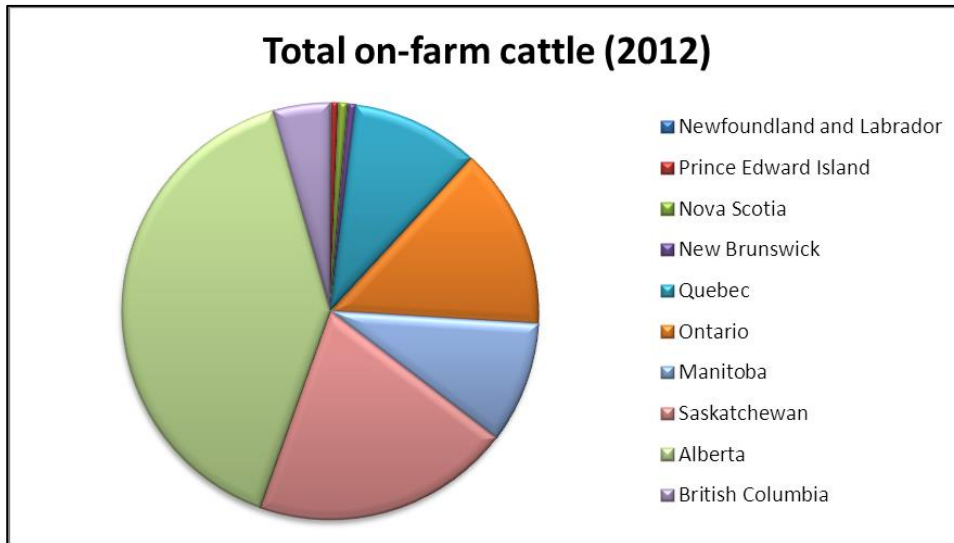
CANSIM

This decline can be attributed to many factors, including the recent recession and consumers switching from beef to meats perceived to be less expensive. The recent trend in healthy eating may have spurred consumers into given up red meat altogether.

Cattle Statistics

While the Nova Scotian beef industry is not the epicentre of Canadian beef production, it is important to understand the relative size of the industry compared to that of other Canadian provinces. Figure 2 below shows the total number of on-farm cattle by province in 2012, Nova Scotia is the dark green section.

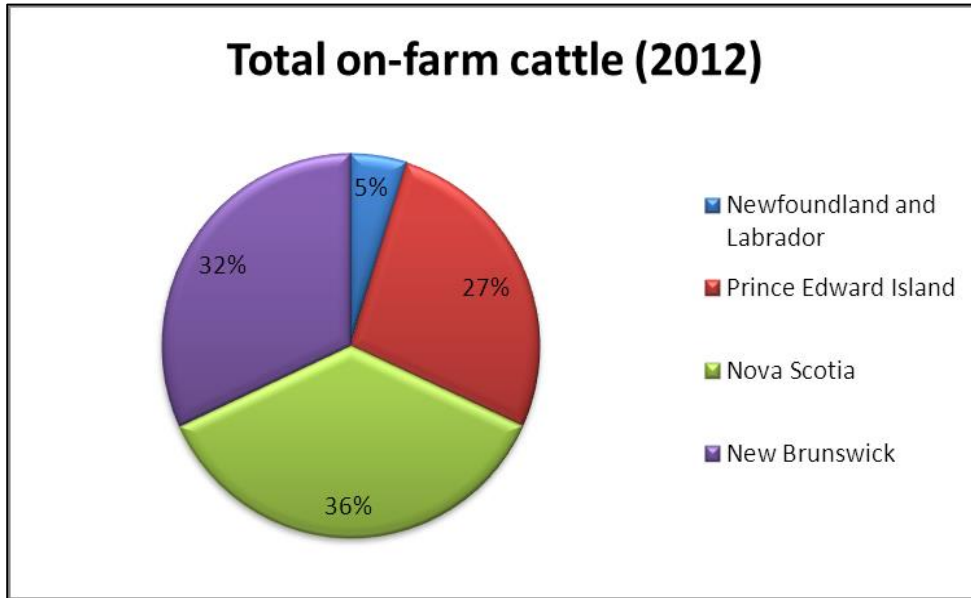
Figure 2: Provincial Breakdown of On-farm Cattle in Canada in 2012



Source: CANSIM

The figure above shows that relative to other provinces, Nova Scotia is not a major beef producer. Compared to the other Atlantic Provinces, in 2012 Nova Scotia was however the largest producer of on-farm cattle in 2012. The comparative production of the Atlantic Provinces is presented below in Figure 3.

Figure 3: On-farm Cattle 2012 - Atlantic Provinces only



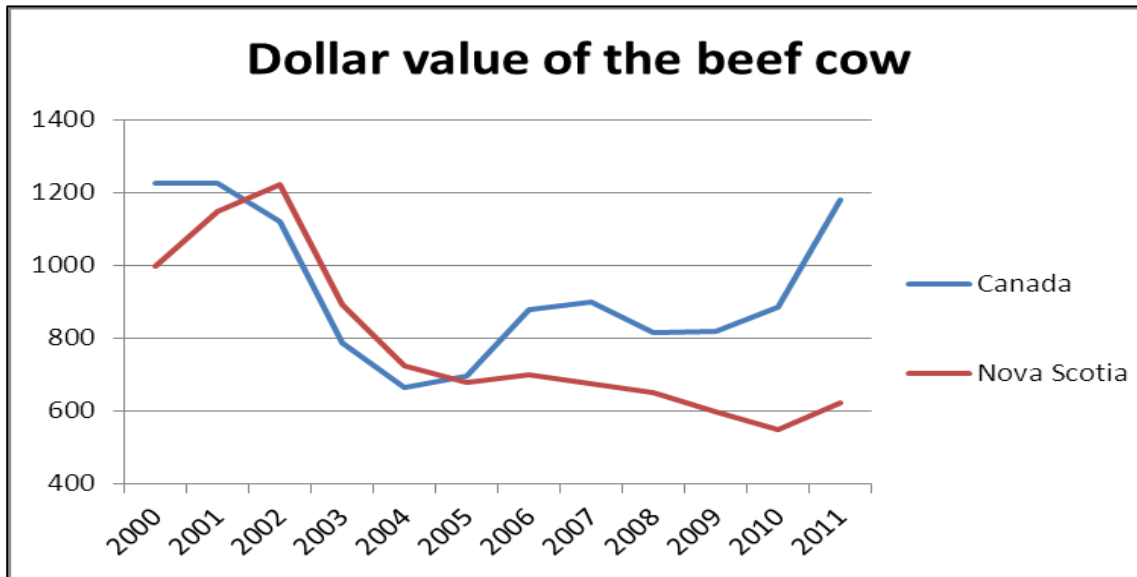
Source: CANSIM

While Nova Scotia beef may not be able to compete with Alberta or other large beef producing provinces, an opportunity exists to brand Nova Scotia as the leading beef producer in Atlantic Canada.

Dollar value

In Canada, the average price of cattle is on the rise. The same cannot be said for in Nova Scotia, where there has been a steady decline in the average price. The large increase in the average Canadian price and its relationship with the Nova Scotian beef price is shown in figure 4 below.

Figure 4: Beef Cow Price in Canada and Nova Scotia (2000-2011)



Source: CANSIM

The remainder of the report focuses on the market-driven opportunities to establish a grass fed beef initiative in Nova Scotia.

2 Overall Trends in Meat and Grass Fed Meat

A clear (albeit limited) trend is emerging in the area of differentiating beef as grass fed.

2.1 Product Launches

While grass fed meat products do not command a large presence in the food retail sector, the number of products being launched is growing (Mintel, 2012). Since 2009 there have been twelve grass fed beef products launched in the UK, US and Canada. This shows that while growth is limited, the opportunity to capture the market exists in full (Mintel, 2012). Producers wishing to beat the rush should begin to employ grass fed production techniques and be the first to have their grass fed beef enter the marketplace.

2.2 Who Buys Grass Fed Beef?

As reported by Mintel (2012) consumers with annual household incomes of 150K and above are the most likely group to purchase grass fed beef on an occasional basis. Consumers seem to view grass fed beef as a premium product, and only are willing to pay for it if they have excess disposable income. In order to capture these consumers, grass fed beef needs to be marketed as a premium high-quality product. This image would draw high-income consumers towards grass fed beef, as they would feel they are paying for the cut above.

Marketing grass fed beef as a premium product should add to the premium price asked by retailers, but this higher price does not come without sacrifice. Lower income consumers will not be willing or able to pay for grass fed beef, and the imaging of a high-end product will further deter lower income consumers. This is a necessary evil as the goal is to capture the target audience, which in this case is the high-income consumer (Mintel, 2012).

Food safety

Post events such as BSE, consumers have become increasingly concerned with the safety of the food they are eating. Food safety ranges from the growing process of the animals to the handling procedures upon slaughter. There is a risk of compromising food safety associated with each step the animal takes through the supply chain. Research shows that approximately 60% of the population surveyed, regardless of age, feel strongly about proper food safety (Mintel, 2012).

Producers could position grass fed meats (beef) as a product that has gone through many steps to ensure proper food safety. When there is an incoming load of grass fed beef, a processing facility must undergo a full sterilization to ensure no cross-contamination with commodity beef, one extra preventative measure taken in the production process of grass fed meats (Radford, 2013).

A gourmet hamburger

Mintel (2012) purports that in the US, grass fed beef is commonly found in ground-beef products such as hamburgers and cheeseburgers. They also report that there appears to be considerable room for

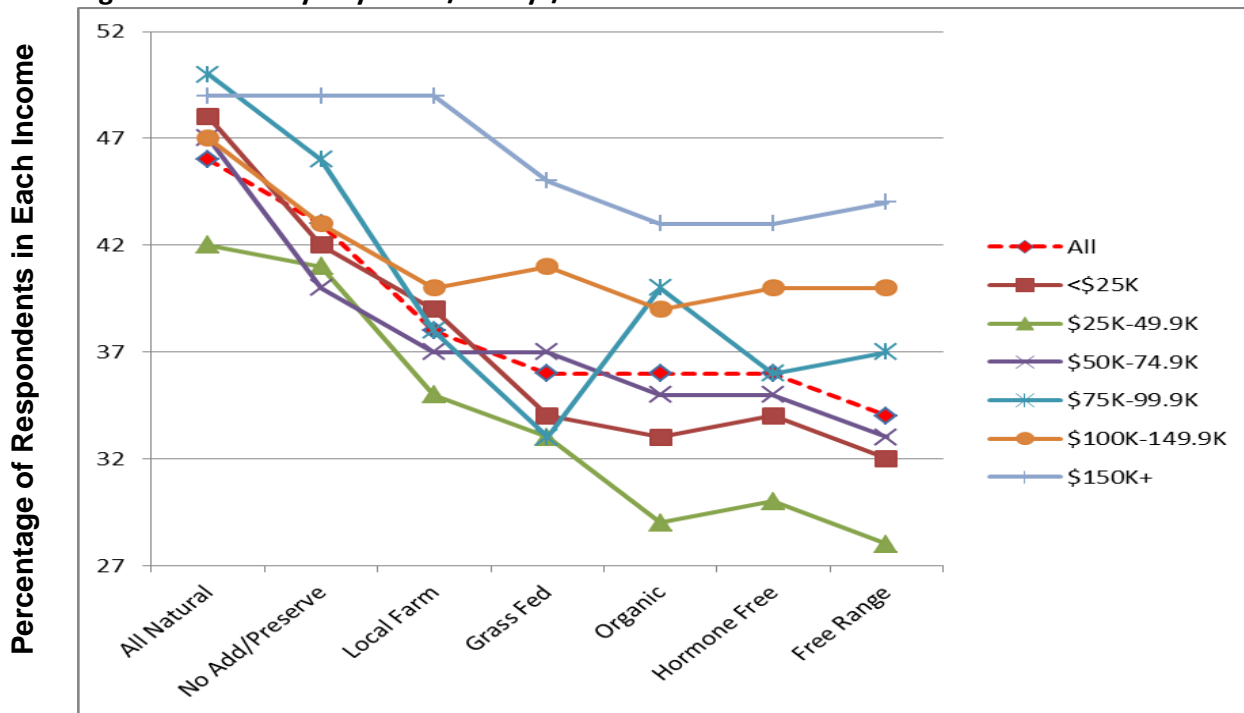
growth in the gourmet burger market, due consumers looking for differentiated products outside the regular hamburger and cheeseburger (QSR).

3 Consumer Purchasing Behaviour, and Drivers

3.1 Influence of Income on Likelihood to Purchase

Research conducted by Mintel (2012) perhaps not surprisingly suggests high-income consumers are the most likely to purchase beef differentiated by production method, including grass fed. As shown below in Figure 5, fewer consumers across all income demographics stated that they currently purchase grass fed beef versus beef marketed as local or natural (Mintel, 2012).

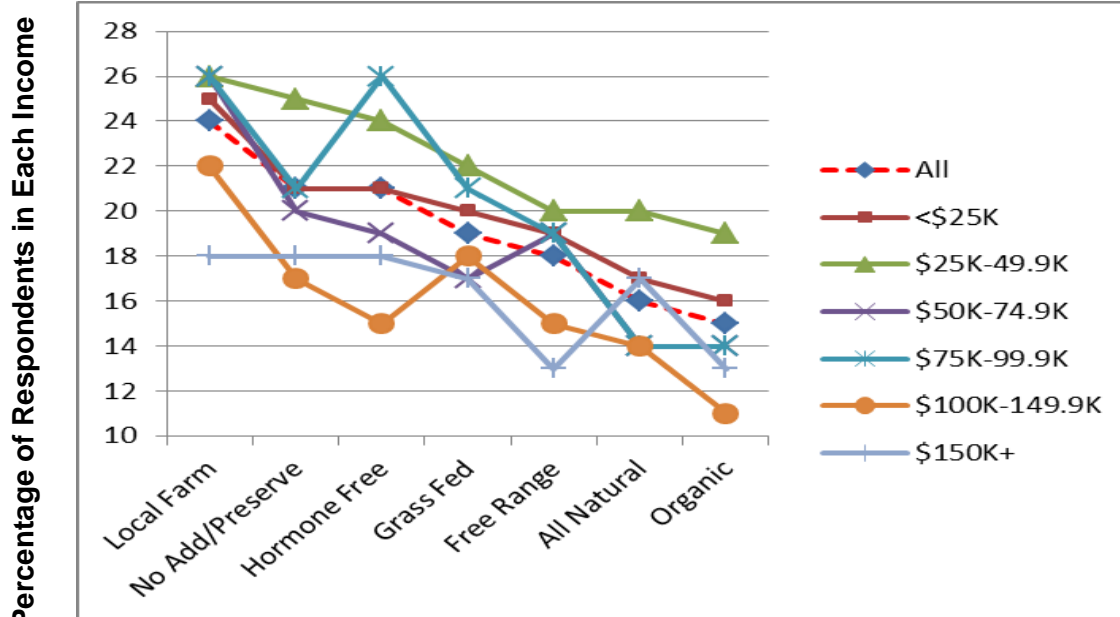
Figure 5: Currently Buy Often/Always/Sometimes



Source: Mintel 2012

The Mintel study also showed asked respondents their likelihood to purchase more differentiated beef products, if the number of available products increased. As shown below in Figure 6, consumers residing in the highest income bracket researched are amongst those who are least likely to buy more differentiated beef products if their availability increased.

Figure 6: Likelihood to Increase Purchase Behaviour If More Products Became Available



Source: Mintel 2012

While the research was primarily conducted in the United States, the findings suggest that grass fed beef does not currently attract the same interest among consumers as local. It also suggests that unmet opportunities are higher in local than grass fed. The research also suggested that elasticity of demand, the correlation between price and likelihood to buy, is less for local than grass fed beef; particularly among mid to higher income earners. This suggests that price is more important factor for motivating consumers to purchase grass fed than local. It should be noted however that the study did not compare actual price points, specific products or places of purchase. It is therefore only directional and not quantitative.

3.2 Product Attributes Driving Interest in Grass Fed Beef

A number of attributes associated with grass fed beef are driving consumer interest. These are attributes that GFB producers (in conjunction with other members of the value chain) should consider when seeking to establish an economically viable production system.

Suppliers need to understand the key motivation for consumers to purchase Nova Scotia beef. Does NS beef represent a sustainable and ethical animal food? If this is the key message then gaining customer loyalty and repeat purchases will be dependent on the value proposition. In beef, value is driven by eating experience and price. A consumer willing to seek sustainable and ethical foods probably has a broader range of concerns around human health and other social issues. For example, a consumer that buys into the sustainability piece could also be concerned about the high saturated fats in beef.

Experience in the UK on similar products such as organic and high welfare (free-range) indicates that while the product story (otherwise known as credence factors) is the main purchase driver, value remains a key consideration (Evans, 2013).

3.2.1 Ethical and sustainable animal foods

A number of factors need to be considered when targeting consumers whose primary drivers of purchase behaviour include the ethical treatment of animals and sustainable farming practices. Understanding the core ethical and sustainable messages is important as the challenge will be to deliver this message while having a product that possess consistent detectable quality and is affordable.

- Ethical treatment of animals is often associated with high welfare extensive production (low to medium density grazing, versus feedlot production). Consumers' ethical concerns often extend to the use of antibiotics and chemicals in general and effect of residues entering the human food chain.
- Sustainability, in the consumers view, is more about the environment and feeding the world into the future. While this is a very broad subject, beef production will enter the debate in a few areas.

Ruminants are seen as adding to the problem of greenhouse gas (GHG) emissions. So the carbon footprint will need to be considered. Extensive production, particularly on marginal land, can be argued to add to the environment while making use of land resources for food and helping bio-diversity. This can then lead to the subject of use of non-edible human foods to produce human edible foods. The debate here is that important crops for human food such as wheat, corn and protein crops are used in animal production. As a result there is lost efficiency or waste in the process. For example, pigs will consume around 2.5 kg for 1 kg of live weight. Ruminants, on the other hand, can convert human non-edible foods (grass) into human foods. This potentially is a positive message for grass fed beef in the world of responsible global food production.

A system that strictly adheres to grass feeding and/or not using antibiotics may not add extra value to the product from a consumer perspective, though may add considerable production costs; particularly if producers do not optimize the effectiveness of their production system.

The initiative also need to determine whether target consumers are seeking high quality (perhaps in terms of marbling) beef for special occasions or looking for a healthier alternative? Highly marbled beef is more expensive to produce, particularly in a grass fed system, and requires a considerable premium.

3.2.2 Eating quality

Eating quality in beef will tend to fall under two key headings, tenderness and flavour. Tenderness is related to genetics, animal growth, age, and post farm gate treatment. This attribute can be optimised in any system, so should be a key attribute to produce and market. Meat Standards Australia (MSA) is an example of the extent to which tenderness can be improved overall and from a consistency perspective through implementing verifiable processes along the entire value chain.

Flavour is generally, but not always, related to the intra-muscular fat within the product. Flavour profile can be affected by production system due to the different fatty acid profiles. Grass fed has a different profile to grain fed beef, as a result it will therefore taste differently. The incidence of intra-muscular fat is one factor why differences between the taste of grass fed (versus grain fed) beef is affected by age.

There is also an economic consideration, in that fat deposition in cattle is very inefficient in comparison to protein. Hence fat is more expensive to produce than lean.

3.2.3 Appearance

Appearance is one of the more important consumer attributes with the type of attributes differing between different societies. In North America, cheery red meat colour and white fat would be expected to be preferable. Consistency of cut size is another important consideration and also the size of the retail cut. The reason appearance is high on consumer preferences is probably related to the fact that appearance is the only visual indicator of quality.

While white fat colour is desirable and yellow colour less so, the target for grass fed would be white to creamy colour which can be achieved in younger well grown animals. Probably the most important consideration here is consistency which is about ensuring that the customer gets what they expect to get every time.

3.2.4 Human health

Certain attributes associated beef can have a negative impact on health. It is high in total and saturated fats and linked to bowel cancer. This can be an issue with high quality grain fed beef, however it may not be the case with grass fed product.

It is possible to produce beef that has low overall total fat, and has a higher unsaturated fat component. While lower total fat in beef will alter the flavour profile, consumer taste panels suggests that the change will not necessarily have a negative effect on consumer acceptance.

Grass fed beef can also have higher levels of 'healthy fats' such as omega 3 fats, CLA's plus other nutrients such as vitamin E that can promote better health in humans. While this is generally the case, making a claim can be problematic. For example, omega 3 levels in grass fed beef can be such higher than grain fed product, however the relative levels are still very small compared to fish and other products (Hadley, 2013). In addition, these components are difficult to measure. Nevertheless these attributes can certainly add to the grass fed 'story'.

The above points are summarized below in Table 1:

Table 1: Summary of Market Related Factors to Consider When Establishing a GFB Initiative

Attributes	Production considerations
<i>Eating quality</i>	
Tenderness	Tenderness is not usually affected by production system. In grass fed product tenderness will be more affected by genetics and animal age. Younger carcasses will typically be more tender than older cattle.
Flavour	Grass fed beef will have a different flavour profile. The older the animal the more fat deposition and hence more potential to change flavour profile.
<i>Appearance</i>	
Meat colour	Meat colour can be affected by age with beef from younger cattle being more cherry red
Fat colour	Fat deposits from grass diets will tend to be more pigmented (yellow) than on grain diets. Pigmentation increases with age and type of pasture.

Consistency	Product consistency is influenced more by cattle/e specifications.
<i>Human health</i>	
Fats	Younger cattle will tend to have lower total fat and a higher proportion of unsaturated fats.
Functional foods	Diet can influence the types of fats laid down and hence can target particular fat classes.
<i>Sustainability</i>	
Greenhouse gas (GHG) emissions	The amount of GHG emissions is related mostly to the feed consumed and productivity. Generally, the younger the animal at processing the better the carbon footprint based on a CO2 eg per kg of product.
Non-edible feeds	If the target is to reduce reliance on human edible feeds in the diet than this will effect the production protocols
<i>Other attributes</i>	
Hormone free	Hormonal growth promotants are designed to replace the growth promotant effect of natural hormones that are lost after castration. Male calves can to be left entire if adequately managed.
Ionophores (antibiotics)	In feed antibiotics such as ionophores are uncommon in grass fed programmes. Well managed extensive beef operations usually have low bacterial disease incidences which lead to a reduced overall antibiotic use.

4 Production Economics

The final product attributes that the scheme will seek to produce will ultimately be determined by the premiums that can be achieved in the market, and the ability produce the desired attributes profitability. This would normally be a compromise between desired product needs and the feasibility given the production chain's capabilities.

4.1 Cattle Production

If we consider the economics of cattle production in terms of profit per acre then the key drivers will be pounds of carcass produced, product value, and the production costs per pound of beef. Most grass based cattle enterprises can optimise profitability more effectively through cattle breeding rather than cattle finishing. In simple terms, the more offspring that are retained on the farm for finishing, the less grass is available to the breeding herd. The enterprise needs to weigh up the contribution to profit from breeding and the contribution from finishing offspring. Hence, establishing a centralized finishing unit can offer efficiencies that could not otherwise be achieved. On a limited basis, this is already occurring in Nova Scotia.

Optimising the productivity of the breeding herd is determined by the following factors:

- Optimum utilisation of forage to maximise breeding herd numbers
- Reproductive performance
- Age at first calf

- High calf pre-weaning growth rates*
- High post-weaning growth rates*
- Herd health

** Directly influenced by to feed conversion*

The extent to which producers can profit from finishing offspring to the target carcass specification will be determined by growth rates and target end live weights. Typically, the higher the target finished weight the lower the overall daily weigh gains and higher feed amounts and feed cost per lb. of beef produced.

4.2 Breeds and Genetics

Cattle breeds and the determinants of the most suitable genetic programme will be driven by the desired product specification and production system. A production system that needs to optimise cattle breeding productivity will target maternal traits and cow running costs. For example, highly fertile cows with good milking ability will optimise herd output. A medium mature weight cow needs less feed to maintain high productivity leaving room to increase herd size.

Hybrid vigour can also be an important tool in maximising genetic potential within a herd. Cross breeding provides a natural improvement in productivity and also allows a much wider selection of genetics to optimise herd performance. Examples of success identified by the Value Chain Management Centre during a 2012 analysis of innovative beef systems include the Beef Improvement Company having utilized the Stabilizer genetics to establish a forage-based system supplying the retailer Wm. Morrisons (Fuller, 2012); and Blade Farming who utilized Sterling Sire genetics to establish a forage-based system supplying McDonald's (Phelps, 2012).

4.3 Cattle Sex

If the product is to be hormone free, then young bulls could be an option as leaving bull calves entire is one way of delivering a more competitive system. The impact that castration has upon growth rates leads to growth promoting implants providing significant advantages in growth rates and feed conversion. In comparison, a hormone free production system will be at a commercial disadvantage in the market.

The advantages of bull calves are improved growth rates and feed conversion, however there a number of disadvantages. This include eating quality can be compromised after 14-15 months of age and management can be difficult

4.4 Carcass Specifications

Carcass specification is a very important factor impacting production economics. It is important that the target carcass specifications are achievable and financially viable from a production perspective and that the specifications meet target customer/consumer needs.

- A lighter carcass, in general, can be produced at a lower cost per kg and can be produced at a tighter range of weights. Lighter carcasses however may have a higher production cost at processing. If higher carcass fat content is needed than heavier carcasses will be required. If this

is the case, than cattle breeds that have lower mature end weights can be finished at a higher carcass fat content earlier than late maturing breeds.

- Carcass fat content and marbling. Marbling is difficult to consistently achieve on a grass fed programme. Marbling is related to higher carcass fat content and higher carcass fat is achieved by higher growth rates and animal age. In a grass fed programme the cost to achieve a high level of marbling may not be cost competitive and would need to attract a considerable premium.
- Fat and meat colour can be managed, however fat colour will have more yellow pigment in grass fed cattle.

4.5 Carcass Utilization

Another key determinant of supply chain profitability is carcass utilization. High quality beef programmes have the challenge of achieving sufficient premiums on the more popular cuts (~10% carcass), which enables the cover the increased costs of production across the whole carcass. A beef product that can add value to a higher proportion of the carcass, particularly around mince and diced beef, has more scope for development. Hence the appropriate marketing strategy is critical to any initiative's long term success.

5 Comparative Analysis of Successful Grass Fed Meat Initiatives

The focus now shifts to describing initiatives that seem to derive greater market return through the use of effective value chain management, and its five keys. The ensuing section will described the initiatives. Each initiative was chosen because of its ability to operate capture premiums for producers from the market. Later sections focus on the critical components that make each successful.

5.1 Blade Farming

Blade Farming is a highly integrated beef value chain located in the UK. It supplies the UK market with a high-quality, consistent beef product. It maximizes the use of the carcass by supplying the hindquarters to retail outlets such as Tesco's, the forequarters to McDonalds, and the fillets to restaurants. Established in 2000, Blade Farming handles over 30,000 head per year – making it the UK's largest beef operation. Blade farming requires demands a formal commitment that is completed in writing prior to them participating in the initiative.

All of the participants have been chosen for their attention to detail, possessing attitudes that support the idea of forming close strategic partnerships to enable them to continually innovate in relation to consumers' perceptions of value, and for their willingness to abide by pre-determined standard operating procedures. It is the producer's attitude towards managing risk that primarily determines their suitability for being involved in the Blade Farming system (Hadley, 2011).

5.2 Livestock Marketing

Livestock Marketing began in 1993, when Philip Morgan aimed to create an efficient lamb production and marketing system, one that would trump the system currently in use. Morgan believed that

producers need to cooperate and share information, rather than continue to work independently of each other (Gooch, 2009). Producers are only allowed to join the Livestock Marketing system if they are recommended by a current participant. They are then interviewed to ensure that they possess the necessary attitudes and determination. There are no formal contracts, with members only being asked to provide a forward estimate of the number of lambs they intend to sell through the cooperative. Failure to consistently provide the expected number or quality of lambs is investigated, possibly leading to the producer being expelled.

Livestock Marketing believes in the use of a short value chain to decrease middlemen and increase efficiency. The Livestock Marketing chain consists of the producers, a primary and secondary processor, and a retailer. The result is an increased aptitude to communicate and share information with others, as well as great ease in enforcing accountability. The chain currently consists of approximately 450 producers that supply Waitrose, a major British retailer, with Welsh, British and Organic Lamb. The primary and secondary processors are Randall Parker Foods and Dalehead Foods respectively; the former is a contracted abattoir, while the latter carries out the butchering and packaging processes, preparing the meat for Waitrose (Gooch, 2009).

Livestock Marketing has no entry requirements to join their cooperative but only asks that members provide a forward estimate of the number of lambs they intend to sell through the cooperative. Blade farming requires a more formal commitment, usually completed in writing, prior to the commencement of any working relationship.

5.3 Manitoba Grass Fed Beef Association (MGFBA)

This producer led-organization was born in 2007 out of a small number of Manitoba beef producers looking to garner more information about how to produce grass fed beef. Membership hovers around fifteen or so producers depending on the time of observation.

Through the Manitoba Forage Council, producers gained insights into what type of forage to use, and what type offered the highest quality. A trip to Argentina, a country that produces grass fed beef almost exclusively, offered these Manitoba producers an opportunity to see the production processes of grass fed beef relative to the grain-fed commodity beef they had been producing beforehand (Radford, 2013). The Association began experimenting in grass fed beef value added products, including beef sausages. Now the producers are focused on steak cuts and ground beef products.

The products are only sold within the province of Manitoba as there is no federally-inspected meat processing plant currently in place. There is promise that once a federally-inspected plant is ready to operate, products could be marketed outside of Manitoba, and potentially across the border to the United States. Currently many MGFBA sales are through farmers markets and on-farm stores, but a federally-inspected plant could change the scope of its retail possibilities.

In this producer-only initiative, membership costs \$100 per year, and allows members to use the MGFBA logo, contingent on them following the approved production process. Another requirement is the entry of third party verification to determine if each producer is abiding to the regimented production process.

5.4 TK Ranch

The TK Ranch is a direct marketing multiple commodity operation located in Alberta. In terms of beef production, they produce only natural grass fed beef with no additives or growth hormones. The ranch has been in operation since 1956 and gone through three generations of family ownership and operation (TK Ranch, 2013).

One of the key features of the TK ranch is that they direct market their products. There are three options when purchasing TK Ranch products:

1. Visit the ranch and purchase on site
2. Place an order, and collect at one of two locales: Edmonton or Calgary
3. Visit a range of independent retailers in Alberta

The ranch offers all cuts of beef, and the beef is frozen and vacuum sealed before delivery. The ranch also offers large bulk orders consisting of multiple beef products. These packages are marketed as 1/8's, 1/4's or 1/2's of the cow (TK Ranch, 2013). The packages range from \$50 to \$1640, depending on which option is chosen. Consumers may also select individual products if they do not wish to purchase an entire selection of beef.

While the prospects for a family-run farm are somewhat limited, the TK Ranch has been able to survive as the brand is recognizable throughout the Alberta beef marketplace.

6 Relationship to the Five Keys of Value Chain Management

Effective value chain management relies on ensuring initiatives reflect five key principles. The combined effects of these principles enable managers to acquire a sustainable competitive advantage. The described initiatives reflect all five key principles in their everyday operations:

1. Focus on customers and consumers
2. Have an information and communication strategy
3. Get the product right every time
4. Ensure effective and efficient logistics and distribution
5. Form, manage and sustain relationships

In the following subsections the investigated initiatives will be examined according to how they practice each of the five keys of value chain management.

6.1 Focus on Customers and Consumers

Blade Farming preaches a high-quality, consistent product every time. This mandate isn't for the benefit of Blade Farming; it is for the satisfaction of their retail and foodservice customers, and the final consumer.

Livestock Marketing works closely with Waitrose to better determine what the customer wants. It relies on Waitrose to conduct accurate consumer research to determine what the customer likes or dislikes about the lamb. Producers are regularly provided with carcass information that is

benchmarked against the overall group, which enables them to adjust their production processes and better tailor the final product to customer needs (Gooch, 2009). With their main product (lamb) being a seasonal item, Livestock Marketing work closely with the New Zealand producers and processor who supply Waitrose for the six months of the year when large volumes of prime lamb are not produced in the UK.

The Manitoba Grass fed Beef Association understands that consumers are searching for a differentiated beef product, bearing that in mind, MGFBA is solely focused on giving consumer the differentiated product of grass fed beef. Via taste tests in health food stores the MGFBA found that consumers who aren't as partial to beef enjoyed the taste of grass fed beef, and would consider eating it on a more regular basis (Radford, 2013).

The TK Ranch gives consumers many options when purchasing their beef. Products can be delivered to multiple locations in Calgary or Edmonton, picked at the ranch or even purchased through a variety of smaller independent retailers (TK Ranch, 2013). Product choice ranges in the dozens, as the ranch is solely focused on allowing consumers to pick and choose the products they wish in the quantity they desire.

6.2 Have an Effective Information and Communication Strategy

Blade Farming must rely on a highly-integrated information and communication strategy that keeps all members informed of any new information needed to better satisfy the customer. Communicating vital animal health and other relevant production information ensures that Blade Farming is achieving the highest-quality product possible every time.

The amount of communication back and forth between members parallels some of the larger initiatives in this study. There is weekly communication between the retailer Waitrose, the primary and secondary processors and Livestock Marketing through a variety of mediums (Gooch, 2009). This includes a weekly conference call during the season. Key members from along the value chain, including producers, also visit their peers in New Zealand to share lessons learned and identify ways to innovate as a homogenous group.

Producers in the MGFBA communicate regularly with other through various means, both electronic and on paper. Members communicate often enough with each that they are able to purchase cattle from each other to meet necessary production requirements (Radford, 2013). The ability to move cattle between different producers is only possible if each producer remains in constant communication, and knowledge of each herd is common between all producers.

The TK Ranch is a small operation, but communication with the customers is vital to their success. Customers place orders through an online form, and may even call in to change or slightly modify their order (TK Ranch, 2013). Effective communication is the only safeguard against mistakes being made in the ordering process. The worst case scenario would be for the truck to show up to a delivery location without the right products on-board.

6.3 Get the Product Right Every Time

Blade produces a highly consistent carcass through having adopted systems and techniques first developed in the car industry (Gooch, 2011). This includes clearly identified roles and accountability based on measurable performance. Key members from along the value chain (inc. feed manufacturers, veterinary service, genetic suppliers, dedicated coordinators, and the processor) meet every quarter to evaluate performance and identify opportunities to improve.

One of the main aspirations behind Livestock Marketing is the drive to consistently produce lambs that are up to par with retail specifications, ensuring that a producer's lambs will be purchased by Waitrose. The percentage of lambs that met retailer specifications hovers at around 56% for the industry, while producers in the Livestock Marketing cooperative have enjoyed up to 85% of lambs meeting the Waitrose specifications (Gooch, 2009). Waitrose is willing to remunerate producers with a premium for each lamb that meets or exceeds their specifications. This shows a financial commitment by Waitrose to the Livestock Marketing system, validating it further.

The initial members of the MGFBA went on a fact-finding mission to Argentina, a country which almost exclusively produces grass fed beef in order to view the production processes employed. The purpose of the mission was to find out which production techniques offered the best chances of producing the best quality product for consumers every time, and then to employ these techniques back in Manitoba.

The TK Ranch has been in operation for over 50 years, and still manages to produce a consistent high-quality grass fed beef product. This is only through a regimented production process that ensures the beef is produced according to grass fed standards. This is the only way that the beef will come out consistent in quality each and every time.

6.4 Ensure Effective and Efficient Logistics and Distribution

Blade Farming coordinates operations along the entire value chain, enabling the participants to maximize the opportunities to profit by reducing costs and increasing revenues. For example, animals are grouped into batches of same sex and similar age; feed suppliers are able to better utilize their manufacturing and transportation infrastructure that receiving advance notice about where and when they need to deliver.

Livestock Marketing coordinates operations on a seasonal, monthly and weekly rolling basis with the processors and Waitrose. This enables costs to be reduced through coordinating transportation of lambs for slaughter, and minimizing the need to discount products if volumes rise beyond expected levels or having to secure replacements from elsewhere if volumes fall below expectations. Ensuring carcass consistency and that carcasses match customer requirements minimizes distribution costs further.

MGFBA minimizes costs through coordinating the sale and processing of animals, ensuring that animals are produced according to established protocols, and coordinating the way that beef is distributed to customers.

The TK Ranch delivers its beef to two major cities in Alberta, Calgary and Edmonton. In order to minimize delivery costs it only delivers once a month to each location. This minimization ensures that delivery costs remains low, and as much product is sent in the truck on the day of delivery.

6.5 Form, Manage and Sustain Relationships

One of the most important aspects of the Blade Farming group is their commitment to producers, in both financial and risk management aspects. They enable producers to succeed by providing forward price contracts, which places money in the hands of the producers now as opposed to later. Blade farming also employs a risk-sharing program that pays out if the animal meets certain performance criteria, and helps to offset costs if the animal dies unexpectedly. All these aspects relate back to Blade's original mandate of producing high-quality consistent beef, ultimately satisfying the demands of the final consumer.

Livestock Marketing focuses on fostering relationships with all members of the value chain. It works very closely with Waitrose to obtain accurate specifications for producers to meet. This information is passed on regularly to producers by Livestock Marketing officials, allowing them to tweak their production processes to increase the percentage of lambs that meet these retail specifications. Livestock Marketing regularly interacts with its processors to obtain kill sheet information after each batch of lambs is sent through to the abattoir. The primary processor periodically provides analysis of liver samples that can be used to improve overall animal health. In summary, Livestock Marketing interacts with each member of the value chain with the goals of sustaining productive working relationships that are built to last.

Members of the Manitoba Grass Fed Beef Association rely heavily on their relationship with other members in the association. Members educate each other on what type of forage is best for what season. Members can also discuss various production techniques, and cattle can be purchased by members when their own stock is lower than ideal operating capacity.

The main stakeholder relationship the TK Ranch is involved with is the relationship with its end consumers. It must strive to ensure that these consumers are satisfied fully. This is achieved only through excellent customer service, flexibility to change orders (up to a certain date) and ensuring that the order is accurate upon delivery.

6.6 Information and Communication Is the Key

Of the several common themes found to exist among the investigated initiatives, the most important is communication. All of the initiatives benefit from sharing timely and accurate information amongst all value chain participants in ways that enable the participants to successfully create and capture value as a unified group. This comes from how it enables members to make better informed business decisions, resulting in increased financial performance along the entire chain and maintaining everyone's commitment to work together as a cohesive group.

Blade farming shares information in ways that allow members to make better informed business decisions. Blade is heavily involved in information sharing, so much so, that they have determined methods to increase daily live weight gain enough each day to speed up the production process,

which is regularly shared with producers through group meetings and regularly visiting each farm. This process allows for a greater number of cattle to put through the Blade Farming system each year.

Producers in the Livestock Marketing cooperative receive regular reports on the quality of lambs produced. They are also provided with an end of year financial report that benchmarks them against the overall group and best performers. Through feedback from Waitrose, producers are able to select the right lambs to send to slaughter at the right times, along with proprietary information that could only be obtained through belonging to the Livestock Marketing system.

Members can also adjust their feed and grazing routines, based on information received from the processors and retailer. Some producers have even switched breeds all together in order to meet specifications laid out by retailers (Gooch, 2009). Animal health is the last but possibly most important benefit of being part of the Livestock Marketing system is improving animal health. Improving animal health is done by analysis of liver samples that producers obtain from the kill house. Other information that leads them to adjusting their production practices in order to increase the percentage of lambs that meet Waitrose's specifications includes notices on incidences of liver damage that could be treated through managing grazing practices versus the use of medication (Gooch, 2009).

Both the MGFBA and the TK Ranch conduct similar information sharing practices, although these are done on a much smaller scale as the operations are involved in direct-marketing, and number of key stakeholders are minimized in this setup.

7 Benefits of Grass Fed Beef Production

There are three major potential benefits of grass fed beef production, as identified by McCluskey et al (2005):

1. Health and nutritional benefits
2. Animal welfare benefits
3. Sustainable farming practices

Each benefit will be described below, with an emphasis on how it relates only to grass fed beef production, as opposed to grain-fed production:

7.1 Health and Nutritional Benefits

Today's consumer is in search of a healthy alternative to the traditional red meat products of the past. A consumer is now looking for a product that does not compromise on taste, but offers increased health and nutritional benefits. Literature supports that if consumers are aware of these health benefits they will increase their willingness to pay for the product (Xue, 2010). If producers can associate grass fed beef with numerous health and nutritional benefits there will be an influx of consumers flocking towards this beef product.

Grass fed beef, when compared to grain-fed beef, contains lower amounts of saturated fats coupled with greater amounts of omega-3 fatty acids (Abidoye, 2011). When comparing fat content, grass fed

beef is synonymous to a piece of skinless chicken (McCluskey et al., 2005). It has two to six times the amounts of omega-3 fatty acids as a piece similar in size of grain-fed beef (Duckett et al., 1993). Perhaps the greatest health benefit of grass fed beef is the inclusion of conjugated linoleic acid (CLA). Grass fed beef contains three to five times the amount of CLA's when compared to grain-fed beef (Merocla). Conjugated linoleic acids are known for the following potential health benefits (Mercola):

- Fighting cancers
- Fat loss
- Immune system enhancements
- Maintaining normal cholesterol levels
- Increasing metabolic rate
- Promoting normal thyroid function
- Delaying onset of diabetes
- Maintaining healthy triglyceride levels

All these health benefits make grass fed beef the healthy alternative to grain-fed beef, producers willing to embrace the production techniques of grass fed beef will be able to appeal to the consumers that are looking for a healthier beef product. The number of consumers looking for healthier food products is growing exponentially; grass fed beef has a great opportunity to become a staple in the health-conscious consumers' diet (AAFC, 2011).

7.2 Animal Welfare Benefits

Animal welfare is a growing concern among the global population. Consumers demand to know the handling practices of animals, and want assurance that animals are being treated in the most humane way possible. There is much debate as to which type of beef production method is best for animal welfare, what can be stated is that grass fed animals are allowed to graze openly in pastures, whereas, grain-fed animals are usually slotted into feeding pens (Radford, 2013).

The practice of allowing animals to graze openly, and gain weight in a non-regulated fashion is associated with a healthier animal with a reduced stress level (Radford, 2013). Additionally, the onslaught of grain fattening has shown to be detrimental to the animals' organs, potentially leading to lesions on various organs (Radford, 2013).

The clear choice is grass fed production, when the objective is human treatment of the animal. Animals are allowed to graze freely, and are not subject feeding pens. Producers embracing grass fed beef production methods can ultimately benefit from the positive animal welfare benefits associated with this production method, and the potential for it to be translated into increased financial return.

7.3 Sustainable Farming Practices

Grain-fed cattle lose a lot of energy when converting the grain into beef at a ratio of 7:1; this is nearly double that of pork, and four times the ratio for chicken (Horrigan et al., 2002). This makes consumption of grain-fed beef an unsustainable agricultural practice, but nonetheless continues to be the preferred production technique for beef.

Grass fed beef avoids this high ratio of grain, allowing the consumer to eat the grain itself, as opposed to eating beef that is grain-fed (Horrigan et al., 2002). Allowing animals to graze on forage naturally

is a preventative step in reducing the impact that beef production and grain-feeding currently has on the world's ecosystem (Horrigan et al., 2002).

7.4 Willingness to Pay

The term "willingness to pay" can be defined as the maximum amount of dollars a consumer is willing to forfeit in return for some good or service. In the context of grass fed beef, it can be seen as the maximum price a consumer would pay for a cut of grass fed beef, and also the maximum premium the consumer would be willing to pay for grass fed beef as opposed to a similar piece of grain-fed beef.

Grass fed beef offers producers an interesting opportunity to promote their product, as research suggests that consumers are willing to pay high premiums for grass fed beef. One study finds that consumers are willing to pay up to a \$5.65 premium for grass fed beef as opposed to a similar cut of grain-fed beef (Xue et al., 2010). Another study suggests that the premium for grass fed beef can be up to 34% higher than the grain-fed beef price (Abidoye et al., 2011). Given these highly attractive premiums, producers should consider the financial incentives from undertaking grass fed beef production.

Producers can also take advantage of marketing grass fed beef for its increased health benefits. The specific health benefits attributed to grass fed beef, as stated earlier, translate into an effective marketing tool when asking consumers to pay a premium for the product. Additionally it has been stated that if consumers are aware of increased health benefits, they would be willing to pay a greater amount for grass fed beef (Xue et al., 2010).

7.5 Cost of Production

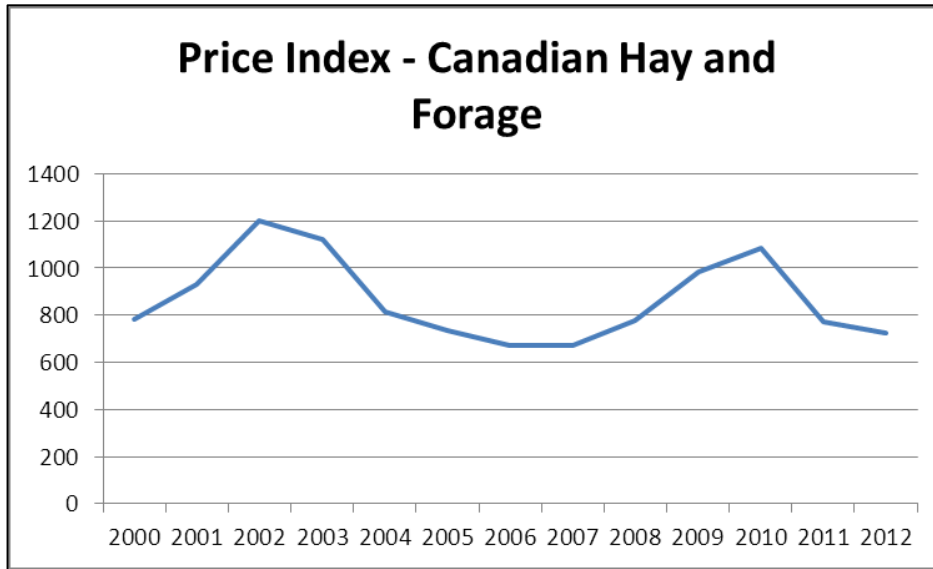
Producers will likely be more willing to switch from grain-fed production to grass fed production if the price of the most important raw material in grass fed beef production is declining in price, while simultaneously being able to secure revenues that exceed their entire production costs.

A report by Iowa State University finds that while selling prices for grass fed beef can be much higher than that of conventional beef, there are implicit costs found with grass fed beef that do not exist with grain-fed beef (Schwab et al., 2012). Bearing this in mind; it would only be prudent for producers or producer groups, to fully weigh the associated benefits of grass fed beef production against the costs.

In order to recoup the costs of producing grass fed beef, producers would require a minimum of a 10% selling premium (Umberger et al., 2009). Other literature finds that consumers would be willing to pay in excess of 10% percent more for a cut of grass fed beef, so the 10% in additional production costs are not as much of a factor.

A point of interest is the decline of Canadian hay and forage prices in the last few years. Obtaining high-quality forage can be quite cumbersome, but if the average price of Canadian hay and forage is falling, there is a greater incentive to purchase higher-quality forage at a lower price than normal.

Figure 7: Canadian Hay and Forage Index



Source: CANSIM, (2002=100)

8 Opportunities for Nova Scotia

Due to its many health benefits, grass fed beef can be positioned as the healthy alternative to grain-fed beef. This is not to say that Nova Scotia should completely abandon grain-fed beef. Subject to producers adopting the correct management systems, the production of grass fed beef appears a viable option for Nova Scotia. Market options extend beyond cuts, the greatest likely being gourmet beef burgers.

The initiatives described in the previous sections highlighted the critical role that the proactive sharing of appropriate, timely and actionable information will play in determining the viability of any system. As will involving only the correct participants, having effective leader(s), and establishing an effective and enforced governance model.

Presented below are two options that the industry could follow to capture the long term opportunities that appear to exist.

8.1 Option 1

8.1.1 Product attributes

The primary product attributes are more about ethical and responsible food production, versus grass fed *per se*:

- Natural –grass fed, no growth promotants, reduced medication or chemical usage
- Healthy – lower fat, better fats
- Environmentally friendly – produced from grass in an environmentally friendly way

To gain consumer uptake, ensuring value for money and eating quality will be critical. Consumer buying patterns become more unpredictable as the value/quality proposition deteriorates.

For the target customer the secondary attributes would include:

- Value – affordable price point
- Tenderness – consistently tender
- Appearance – consistency in cut size, meat colour, meat texture and fat colour.
- Flavour – consistent eating experience

The target customer would most likely prefer a smaller meat portion as this fits the responsible, healthy eating agenda.

8.1.2 Carcass specification

The ideal carcass specification will be lighter rather than heavier.

Product attribute	Considerations	Protocol
Natural	Grass fed, no hormonal growth promotants, no in feed ionophores (antibiotics), restricted use of chemicals	Consider lower carcass weights as higher weights will be more expensive to produce. Consider bulls to get the advantage of the natural hormones.
Healthy	Reduce total fats, increase the proportion of unsaturated fats, increase the level of 'good' fats	The younger the animal the lower the total fat and the higher the proportion of unsaturated fats.
Environmentally friendly	Ruminants are able to convert grass into human food. The GHG emissions from cattle is lower if production is high and cattle end weight lower.	The younger the animal the less grass required per kg gained and lower the carbon footprint.
Tenderness	Tenderness can be highly variable and generically linked.	A younger animal will deliver a more consistent tenderness profile.
Appearance	Appearance to a consumer is about consistency and visual attributes	Carcass weights and age need a tight specification to ensure consistency
Flavour	Flavour is mostly related a carcass fat levels.	The higher the carcass fat the better the flavour profile

8.1.3 Specification options:

Carcass weights	220 to 260 kg	220 to 260 kg
Age	12 to 16 months	10 to 13 months
Sex	Steer/heifer	Bull
Meat colour	TBD	TBD
Fat colour	TBD	TBD
Fat depth	TBD	TBD
Marbling	Slight	Slight

8.1.4 Production protocols

- Grass fed diet: pasture, grass silage or forage crops (maize)
- Mineral and vitamin supplements to meet animal needs
- Additional purchased feed stuffs not to exceed a lifetime FCR of 0.5:1
- No growth promotants or ionophores (antibiotics) permitted

8.2 Nova Scotia Beef 2

8.2.1 Product attributes

The primary product attributes are about high quality grass fed beef, produced ethically:

- High quality grass fed beef
- Natural – produced from grass, no growth promotants, reduced medications
- Environmentally friendly – produced from grass in an environmentally friendly way

The premium message is the key differentiator with the production system and geography adding to the exclusivity of the product.

For the target customer the primary attributes would include:

- Flavour – consistent eating experience
- Tenderness – consistently tender
- Appearance – consistency in cut size, meat colour, meat texture and fat colour

The target customer would most likely prefer, and pay a premium for, the high value cuts which are usually around 10-15% of the carcass. The challenge is balancing the carcass on both sales and value.

8.2.2 Carcass specification

The target carcass specifications would need to optimise the desired eating quality

Product attribute	Considerations	Protocol
Tenderness	Tenderness can be highly variable and is generically linked.	A production map on tenderness would reduce variability.
Flavour	Flavour would be related to carcass fat levels.	Target a higher marble score.
Appearance	Appearance to a consumer is about consistency and visual attributes	Carcass weights and age need a tight specification to ensure consistency.
Natural	Grassfed, no hormonal growth promotants, no in feed ionophores (antibiotics), restricted use of chemicals. Conversion of grass to a premium food.	These requirements will put the product at a commercial disadvantage to standard grain fed beef.
Welfare friendly	Grass fed extensive production.	The key message is extensive as opposed to feedlot

8.2.3 Specification options:

Carcass weights	280 to 320 kg
Age	Max 24 months
Sex	Steer/heifer
Meat colour	TBC
Fat colour	TBC
Fat depth	TBC
Marbling	Slight to moderate

8.2.4 Production protocols

- Grass based diets: Pasture, grass silage or forage crops (maize)
- Mineral and vitamin supplements to meet animal needs
- Additional purchased feed stuffs can be used but restricted
- No growth promotants or ionophores permitted

9 Genetic Programme

The correct genetics are critical piece of establishing a sustainable GFB initiative. Genetic technologies have expanded rapidly in the past few years, providing opportunities to greatly enhance performance in very affordable ways. While the overall uptake of these techniques and technologies will be slow in many beef operations, traditional and modern breeding programmes can operate together within the one system. The only requirement is that the final product specifications are adhered to.

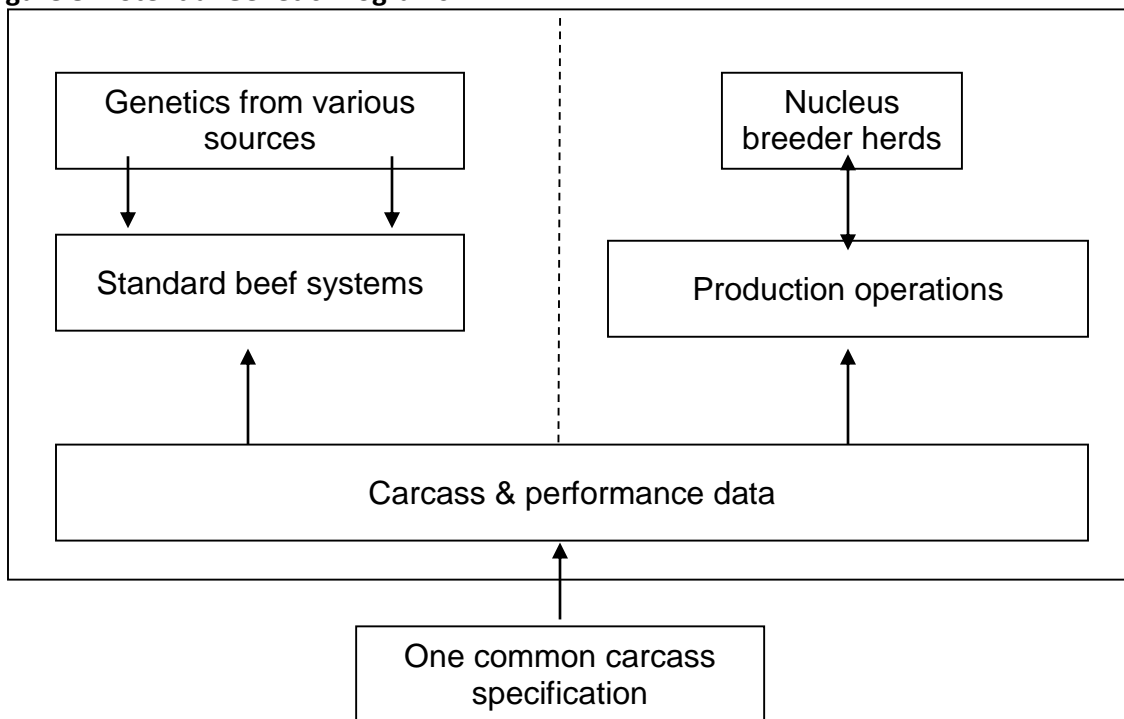
It can be expected that producers who participate in a more modern genetic programme than exist across the wider industry will see the most improvements in financial performance. The schematic

presented below in Figure 8 presents two options for enhancing genetics and the overall performance of any initiative beyond what could otherwise be achieved.

The left hand arrangement will use genetics provided by live bulls or AI. AI has become considerably more effective and affordable in recent years, with the full AI program amounting to approximately \$42 per animal. (\$20 synchro program of CIDR and Estrimate; \$12 for semen; \$10 Insem fee). This is considerably less than the cost incurred of purchasing, feeding and maintaining a bull; particularly in relation to small to medium sized operations' overall operating costs.

The right hand arrangement illustrates an initiative that has established a rapid breeding program through having formed a nucleus herd. The nucleus herd focuses on producing top quality hybrid breeding stock for the wider group. The only beef that it will produce are male calves that are not raised for breeding and cows that have exceeded their reproductive period.

Figure 8: Potential Genetic Programs



The value that either of these options bring to Nova Scotia is that a grass fed beef programme that is forage based and does not use technologies such as hormonal growth promotants or ionophores (antibiotics) needs to optimise the use of other acceptable techniques. These techniques could include heterosis (cross breeding), high performance genetics and natural hormones (bulls).

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Appendix B: SWOT of Nova Scotia's GFB Sector

Presented below is a SWOT developed from the value chain analysis of Nova Scotia's GFB sector.

<p>Strengths</p> <ul style="list-style-type: none"> • Limited demand exists for GFB • A limited number of producers are raising, marketing and selling GFB • Some restaurants have GFB as an occasional menu item • Retailers have test marketed GFB, with differing levels of success 	<p>Weaknesses</p> <ul style="list-style-type: none"> • The financial viability of many GFB producers is questionable due to ineffective management • Cost of production (COP) is neither known nor managed effectively • Current COP does not take into account cost of borrowing, buildings, land, equipment, opportunity costs, and value of labour • Economy of scale has yet to be achieved or analyzed • Estimated annual availability of verifiable GFB only 800 to 1200 head • Dressed carcass size varies from 400lb to 750lb • Annual farm output ranges from 2 to 80 head • Most producers are direct selling and enjoying revenues equal to retail price • Carcass grading is informal and infrequent • Limited ability to establish year round supply • Limited processing capacity • Inconsistency in processing and aging protocols • Consumer appetite for GFB largely unknown • There is no established GFB brand in NS • Retailers are not yet engaged in selling GFB
<p>Opportunities</p> <ul style="list-style-type: none"> • Determine best mechanism for delivering on consumer needs: GFB, free range beef, or other • Producers collaborate to establish best production practices and cost models based on pre-determined protocols • Creation of a premium GFB brand • Share information on pasture and forage management, cost of production • Ensure a verifiable standard of supply and quality • Grow the yet to established brand • Increase production, market, and economies of scale 	<p>Threats</p> <ul style="list-style-type: none"> • Lack economies of scale and dependability of supply enjoyed by commodity players • Potential of poor summer leading to pasture and forage issues with limit on alternative feed increases production related risks • Producers non-compliance with GFB protocols though selling beef as grass fed (freeloading) • Consumer may not be willing to pay a premium for GFB • Cost of production may be close to or exceed producer sell price • Lack of a Federally inspected meat plant for wider retail or foodservice distribution • Securing shelf space in face of competition from conventional beef and brands (e.g.. freezer-sort initiatives such as "Sterling Silver") • Need to invest in infrastructure required to increase production

Appendix C: Checklist for Establishing a Grass Fed Beef Initiative

Presented below is a checklist designed to guide individuals through the process of establishing a closely aligned Nova Scotia's Grass Fed Beef Initiative (NSGFBI).

Step	Activity
1	Define vision.
2	Define relative importance of product and service attributes that are critical to satisfying target customers/consumers?
3	Define what current suppliers are not providing in terms of products and performance. <i>Or if improving current chain, gaps in present vs. desired performance.</i>
4	Define true causes of present problems/challenges.
5	Determine structure of chain required to enable participants to manage financial risk by minimizing exposure to liabilities and fluctuations in the commodity market. <i>Including: number of participants, nature of each operation, ownership arrangements, contractual arrangements.</i>
6	Identify champions who will oversee operations at each link of the chain, and coordinate operations through closely communicating with other links and their own stakeholders.
7	Define expertise required to address challenges. <i>E.g. meat scientists, animal nutritionists, process improvement specialists, financial specialists, accountants.</i>
8	Develop processes required to address current issues/challenges/opportunities.
9	Define KPIs and systems required to monitor performance, and regularity of reporting.
10	Develop system for gathering and analysing information.
11	Determine inputs (i.e., genetics, feed, infrastructure) required to achieve desired outputs.
12	Develop governance system required to manage system, including roles and responsibilities.
13	Determine who will be accountable for the performance of each link in the chain.
14	Set performance targets for each primary participant, and the chain overall.
15	Develop incentive systems that reward/penalize each participant according to individual performance.
16	Determine point at which to involve each participant.
17	Establish communication arrangements.
18	Implement reporting arrangements.
19	Monitor performance according to benchmarks and targets.
20	Identify opportunities to improve through analyzing gaps in producers' performance and developing appropriate solutions.
21	Regularly communicate performance to each individual, relative to overall chain and other individuals operating at each link in the chain.
22	Establish and communicate a pricing model and grid that rewards / penalizes individuals according to their performance in relation to product attributes desired by the target market(s).
23	Enable the chain to continue adapt through making appropriate changes to processes and governance arrangements, based on insights gained through objectively monitoring performance.

Appendix D: Suggested Reporting Template

Presented below is a template that would enable customers (retailers or foodservice), processors and producers to effectively share information.

The proposed format will enable them to continually improve financial performance and reduce exposure to risk, by statistically tracking and comparing performance at multiple points along the chain. Sharing this type of information is a proven way of enabling participants from along the value chain to continually improve performance, leading to increased margins and profitability.

Customer Report to Processor	
Attribute	Measure
Past Performance	
Total volume	Kg trend
Shrinkage	Kg trend
Sales	\$ trend
Placement in category	rank or %
On time deliveries	%
Consumer complaints	#
Store complaints	#
DC complaints	#
Objective 1	KPI and trend
Objective 2	KPI and trend
Objective 3	KPI and trend
Future performance	
Forecast for next 3 months	Kg
Quality requirements for next 12 months	Specify
Innovation needs for next 12 months	Specify
Recommendations	Specify

Processor Report to Producer	
Attribute	Measure
Past Performance	
Volume	Kg trend
Variation	St dev of Kg
Value	\$ trend
Yield	% and trend
Premium product	% and trend
Downgraded product	% and trend
Position as a supplier	rank
On time deliveries	%
Objective 1	KPI and trend
Objective 2	KPI and trend
Objective 3	KPI and trend
Future performance	
Forecast for next 3 months	Animals
Quality requirements for next 12 months	Specify
Innovation needs for next 12 months	Specify
Recommendations	Specify

Appendix E: Proposal to Implement a Grass Fed Beef (GFB) Value Chain Initiative

The initial study found that the GFB sector is currently very fragmented and lacks capabilities and skills required to establish an innovative and sustainable GFB program. Following is a concise outline and cost estimate for enabling the implementation of a GFB initiative in Nova Scotia through mentoring support and training. By encompassing an action learning approach, by involving key participants throughout the process, the proposed actions would benefit Nova Scotia's wider beef industry, not only the GFB sector.

The proposed actions will provide the coaching and training necessary to establish a cohesive and competitive value chain over an 18 month period. The key tasks associated with this proposal are:

1. Further analysis of consumer research
2. Initial producer meeting
3. Validate a COP model(s)
4. Establish a brand
5. Establish a communication and marketing plan
6. Walk 8 to 10 farms
7. Visit 4 processors
8. Develop a draft production protocol
9. Facilitate and report on 4 x quarterly producer/processor meetings
10. Submit 18 month implementation support
11. Post implementation audit of protocols, performance and achievements

Details on each proposed step;

1. Further analyze consumer research data to verify specific market opportunities and the specific value proposition(s) that appeals to the preferred target markets.
2. Initial value chain meeting
We assume that 8 to 10 producers, 1 to 4 processors, along with 1-3 retailers and a foodservice distributor or operator, would participate in a working session to review phase 1 findings, agree on collaborating on a way forward, establish an implementation plan with timelines, agree and commit to roles, responsibilities and accountabilities.
3. Validate a COP model(s)
The session will agree on how the overall COP model will be validated and adjusted for individual needs. This activity will provide producers with a tool to monitor actual COP and benchmark against others to identify improvement opportunities that can be acted upon.
4. Establish a brand
We will work with a proven brand designer and implementer (perhaps Faye Clack Communications, who we have worked with on a number of occasions) to develop an effective branding strategy and materials.

5. Implement a communications and marketing plan
The branding company (Faye Clack Communications?) will execute a GFB brand and marketing plan targeted at markets identified through consumer research conducted in the previous project and analyzed further as part of this process.
6. Walk 8 to 10 farms
We will walk the farm of each participating producer to identify individual management opportunities and actions pertaining to breeding, weaning and handling practices, pasture and forage production and management, as well as animal healthcare and nutrition practices
7. Visit 4 processors
Here we will meet with 4 processors 'local' to selected producers to establish their ability to support both the brand and consumer demand, establish a grading system
8. Develop a draft production protocol
Based on outcome from the previous steps, within four months of the project commencing we will have developed a draft production protocol for review and then discussion and agreement at the first quarterly value chain meeting. The protocol will include proposals for carcass grading and reporting.
9. Host Quarterly producer/processor meetings (at the 8, 12, and 16 month milestones)
We will hold a series of subsequent quarterly producer/processor meetings to review progress and discuss and resolve issues pertaining to the project, and mentor those implementing the program.
10. Implementation support over the project's lifetime
We will allow time at the rate of one hour per month per producers for providing 'long distance' support and communications,
11. Progress reports
We will provide a bi-monthly report of progress against the project plan and specific actions
12. Post implementation audit
We will conduct a post implementation audit and report of the producer and processor adherence to the overall plan and production protocols, along with debrief to the producer/processors and other interested parties.

To ensure that the project benefit Nova Scotia's wider beef industry (not only the GFB sector) the post implementation report will also identify achievements to date, lessons learned, and the action learning activities that enabled the initiative to acquire the capabilities required to become self-sustaining.